Sexual behaviour of men who have sex with men and transgenders in Southern India



Anna Phillips

Imperial College London
Department of Infectious Disease Epidemiology

Supervisors: Dr Marie-Claude Boily
Professor Geoff Garnett
Dr Catherine Lowndes

Thesis submitted for the degree of Doctor of Philosophy

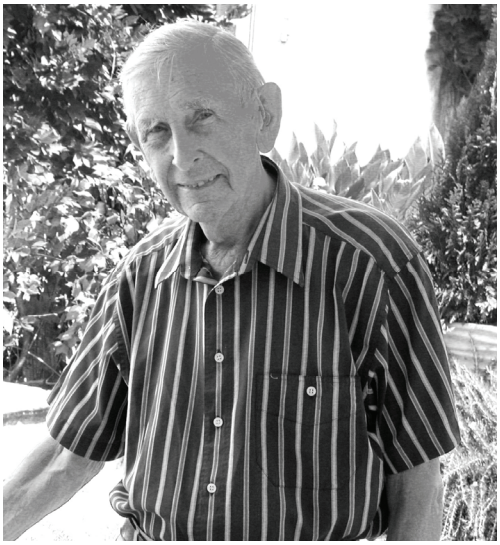
February 2009

Dedicated to:

My husband Dominic Jones, and my parents, Alan and Alison Phillips



In loving memory of my very special and sorely missed grandfather, Norman Reeves



ACKNOWLEGMENTS

Firstly I would like to thank my supervisor, Dr Marie-Claude Boily, for all her help in the preparation of this thesis, both in facilitating the opportunity to carry out my fieldwork and for carefully reviewing and correcting various drafts. I am also grateful for the guidance and support of my supervisor, Professor Geoff Garnett, for countless helpful discussions on all aspects of this thesis, his swift comments, and his calming influence over the last few months. I thank Dr. Catherine Lowndes for her supervision, and in particular for coordinating my role in managing the collection of my own data in India. I am very grateful to Dr Michel Alary, the principal investigator of the Special Behavioural Survey (SBS) for allowing me to take part in the survey and to use the data for my thesis. I also want to thank my examiners Dr Nick Grassly and Professor Jonathan Elford for their helpful comments in 'fine-tuning' this thesis.

The SBS was also a collaborative effort with the Karnataka Health Promotion Trust (KHPT). All the staff at KHPT deserve credit for their support throughout the survey. I extend my appreciation to all those who have contributed towards the success of this work including Drs. Ramesh, Stephen Moses, Jamie Blanchard, Jayachandran, and Shajy Isaac. I thank John Anthony for facilitating the contact with Sangama. I am grateful to Sudipta, Sudheer and Bheemasan for their help with managing the Access files. In particular, I thank Dr Kaveri Gurav for her inspiration and encouragement in the field and Nagaraj for the long hours dedicated to data entry.

Many thanks to all the Sangama staff, in particular the director Rex Watts, who not only mobilised the MSM community and helped recruit respondents but also provided a safe and private environment for the interviews to take place. I would like to express my special gratitude to the interviewers who spent many unsociable hours collecting data, and above all I thank all of the participants without whom the completion of the study would not have been possible.

I am grateful to the Medical Research Council for funding my studies and trips to the field as well as the Bill & Melinda Gates Foundation who fund the Avahan Project.

Many friends and colleagues played important roles in helping me accomplish this great goal; a few deserve a special mention. Firstly DIDE, which has been a great place to study, especially Drs. Artemis, James and Deirdre, who have always been there to cheer me on and provide assistance when needed. I would like to thank Poppy, Dan, Simon and Cynthia for their amusing conversations and dragging me around Hyde Park and introducing me to squash!

I thank all my friends who have helped, and sometimes hindered my PhD! My flatmates Laura and Fraser for their support in providing a wonderful home for the Joneses as well as secret chocolate stashes, fancy dress and listening to various presentations. I thank my wonderful friends Claire and Katie for their unfailing support and enthusiasm and their amazing generosity.

I thank my sister Sarah who blessed me with a beautiful niece, Fern, who was born the day I was offered the funding for this PhD and an amazing nephew, Tarn, when the thesis was handed in – what a great omen! My sister has continually inspired me through various life decisions, in particular to pursue the experience of a PhD as I was in awe of her own explorations to the Antarctic for her doctorate. I thank my sister Justine and her boys for their love and support, and of course my grandparents. This thesis is in memory of my much loved grandfather, Norman Reeves, who unfortunately did not see the thesis handed in but continues to be a motivation with his extravagant stories, a talent which I am proud to say I think I have inherited!

Most importantly I thank my parents, Alison and Alan, who have provided me with the backbone to make this happen. I thank them for giving me everything, including the education, courage, and enthusiasm to achieve this goal. I am in awe of their unwavering support throughout my schooling and various degrees, despite the hurdles that they have had to overcome, to provide me with this opportunity.

Finally my husband, Dominic Jones, who deserves this doctoral degree at least as much as I do for all the love and patience he has given me throughout. He has read and skilfully edited the thesis, visited me in the field, and provided a fantastic support. I could not have come this far without his guidance and advice, encouragement and most of all, his enduring love.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS **i**
TABLE OF CONTENTS **iii**
LIST OF FIGURES **vi**
LIST OF TABLES **viii**
LIST OF ABBREVIATIONS **ix**
ABSTRACT **x**

Chapter 1: Introduction
1.1 Cultural Context 1
1.2 India and the national HIV epidemic 2
1.2.1 Female sex workers 5
1.2.2 Intravenous drug users 6
1.2.3 Bridge populations 6
1.2.4 Treatment 7
1.3 Men who have sex with men (MSM) in India 8
1.3.1 Indian Society 8
1.3.2 History of MSM in India 9
1.3.3 Identity and the term 'MSM' 10
1.3.4 Role of MSM in HIV epidemic 12
1.4 Men who have sex with men in India – A Literature Review 12
1.4 *1.4.1 Sampling population* 15
1.4.2 Sexual identity 18
1.4.3 Bisexual behaviour 19
1.4.4 HIV-risk behaviour 22
1.4.5 Conclusions of the review 25
1.5 Objectives of the PhD 26

Chapter 2 A systematic review and meta-analysis of quantitative interviewing tools to investigate HIV risk behaviour in low- and middle-income countries

2.1 Introduction 28
2.2 Social desirability bias 30
2.3 Data collection tools 31
2.3.1 Face-to-Face Interviews 31
2.3.2 Tape-recorded questions 32
2.3.3 Computerised interview tools 32
2.3.4 Assisted self-completed questionnaires 34
2.3.5 Informal confidential voting interviews 34
2.3.6 Polling Booth Surveys 35
2.3.7 Coital diaries 35
2.4 Search methods for the systematic review 39

	2.4.1	*Search strategies and eligibility criteria*	39
	2.4.2	*Data extraction*	41
	2.4.3	*Analysis*	42
2.5		Results	43
	2.5.1	*Primary studies*	43
	2.5.2	*Main results*	43
2.6		Discussion	61
2.7		Conclusion	63
Chapter 3:		**Methods**	
3.1		Context of the study: the Avahan Programme	64
3.2		Study population	66
	3.2.1	*Definition of MSM*	66
	3.2.2	*Study recruitment*	67
3.3		Sample Size Calculations	67
3.4		Study Design: two-stage cluster sampling	72
	3.4.1	*Stage 1: Defining the clusters*	73
	3.4.2	*Stage 2: Selecting respondents within each cluster*	74
3.5		Study procedures	76
	3.5.1	*Content of the study questionnaire*	76
	3.5.2	*Team composition and training*	80
	3.5.3	*Pilot study*	81
	3.5.4	*Community preparation and sensitisation and ethical approvals*	83
3.6		Data processing	83
	3.6.1	*Data input and cleaning*	83
	3.6.2	*Statistical analysis*	85
Chapter 4:		**Interview mode and measurement error: methodological challenges and reliability of self-reported behaviour**	
4.1		Introduction	87
4.2		Methods	88
	4.2.1	*Objective 1: Comparison of face-to-face with informal confidential voting interview*	88
	4.2.2	*Objective 2: Internal consistency of face-to-face interview responses*	89
	4.2.3	*Statistical analyses*	91
4.3		Results	92
	4.3.1	*Response rate*	92
	4.3.2	*Recruitment*	92
	4.3.3	*Sociodemographic characteristics*	93
	4.3.4	*Comparison of sexual risk behaviour reported in the FTFI and ICVI*	95
	4.3.5	*Internal consistency of face-to-face interview responses*	97
4.4		Discussion	101

Chapter 5: Sexual identity and its contribution to MSM risk behaviour in Bangalore, India: the results of a two-stage cluster sampling survey

5.1 Introduction 104
5.2 Methods 106
5.3 Results 108
5.3.1 Comparison of sociodemographic characteristics and sexual experience by identity 108
5.3.2 Comparison of commercial sexual behaviour of MSM with different sexual identities 111
5.3.3 Comparison of non-commercial sexual behaviour of MSM with different sexual identities 114
5.4 Discussion 117

Chapter 6: Men who have sex with men and women in Bangalore, India and the impact on the HIV/AIDS epidemic

6.1 Introduction 121
6.2 Methods 122
6.3 Results 123
6.3.1 Sociodemographics 124
6.3.2 Sexual risk behaviour of MSMW and MSMO 128
6.3.3 Consistent condom use and mean number of monthly sex acts by different types of partner 130
6.3.4 Sexual behaviour patterns of MSMW with female partners 132
6.4 Discussion 133

Chapter 7: Conclusions and future work

7.1 Summary of research findings 135
7.2 Limitations of the work 140
7.3 Future work and policy implications 141

References 145

Appendix

A1 Face-to-face interview questionnaire 154
A2 Informal confidential voting interview questions 193
B Ethnographic Mapping Data 200
C Guide to interview methods 204
D Consent forms 205
E List of consistency checks performed on FTFI data 207

LIST OF FIGURES

Fig 1.1 HIV Prevalence among persons 15 to 49 years old in India in 2005 and 2006

Fig 1.2 Process of selection of the journal articles included in the literature review

Fig 2.1 Clipboard with enclosed PDA

Fig 2.2 ICVI voting box

Fig 2.3 PBS polling box

Fig 2.4 Self-administered, self-reporting coital diary with tick boxes

Fig 2.5 Evolution of quantitative survey techniques

Fig 2.6 Systematic review search results of computerised methods to date

Fig 2.7 Odds Ratio for 'Ever had sex' and 'Non-condom use' variables

Fig 2.8 Odds Ratio for 'Forced sex' and 'Number of partners' variables

Fig 2.9 Funnel plot for investigating bias in meta-analysis for 'Ever ever had sex'

Fig 2.10 Funnel plot for investigating publication bias in meta-analysis for 'Non-condom use'

Fig 2.11 Funnel plot for investigating bias in meta-analysis for 'Ever forced to have sex'

Fig 2.12 Funnel plot for investigating bias in meta-analysis for 'Number of partners'

Fig 2.13 Pooled estimates for subgroup analysis for 'Ever had sex'

Fig 2.14 Heterogeneity for 'ever had sex' by region

Fig 2.15 Heterogeneity & Homogeneity for 'ever had sex' by education

Fig 2.16 Heterogeneity for 'ever had sex' by locale

Fig 2.17 Funnel plot investigating publication bias in meta-analysis for 'Ever had sex'

Fig 2.18 Pooled estimates for subgroup analysis for 'Non-condom use'

Fig 2.19 Pooled estimates for subgroup analysis for 'Forced Sex'

Fig 2.20 Pooled estimates for subgroup analysis for 'Number of partners'

Fig 2.21 Heterogeneity for 'Number of partners' by region

Fig 2.22 Heterogeneity for 'Number of partners' by time frame

Fig 3.1 Organisational chart to show monitoring and evaluation procedure of Avahan
Fig 3.2 Graphical representation of sample size
Fig 3.3 MSM cruising spots identified in pre-survey mapping, Bangalore city
Fig 3.4 Flowchart of sampling procedures

Fig 4.1 Design of the ICVI card for both dichotomous and numerical questions
Fig 4.2 Settings where MSM were recruited and successfully interviewed

Fig 5.1 Proportion of sexual identities in the total sample
Fig 5.2 Proportion of MSM identities reporting ever A) selling sex to other men B) buying sex from a male sex worker (MSW) C) having non-commercial sex with another male D) having sex with a woman E) buying sex from a female sex worker (FSW) F) HIV prevalence (no data for 'No Identity')

Fig 6.1 Lifetime and current (in the past year) bridging behaviour
Fig 6.2 Association of behavioural bisexuality or marital status with age
Fig 6.3 Distribution of MSMW and MSMO reporting non-commercial and commercial sex with male partners only
Fig 6.4 Consistent condom use and mean number of monthly sex acts by different types of partner: MSMW and MSMO

LIST OF TABLES

Table 1.1	Summary of papers, the population sampled and method used
Table 1.2	Proportion of the sample married to women and reported bisexual behaviour
Table 1.3	Reported risk behaviour
Table 2.1	Acronyms and descriptions of computerised interviewing techniques
Table 2.2	Summary of advantages and disadvantages of quantitative interview tools
Table 2.3	Literature search strategy for identification of studies included
Table 2.4	Summary of selected studies comparing alternative quantitative interview tools with FTFI in low-middle income
Table 2.5	Summary OR by outcome for meta-analysis of SAQ vs. alternative interview tool
Table 3.1	Standard Values of Z1-α and Z1-β
Table 3.2	Comparison of ICVI with IBBA FTFI and SBS FTFI
Table 4.1	Response rates for FTFI and ICVI surveys
Table 4.2	Sociodemographic characteristics of respondents in the FTFI and ICVI
Table 4.3	Sexual experience and risk behaviour reported in the FTFI and ICVI
Table 4.4	Multivariate analysis of the association between sexual behaviour and interview mode after controlling for sociodemographic characteristics
Table 4.5	Example 1 Concordance of reported condom use by partner type
Table 4.6	Example 2 Concordance of reported condom use by clients only
Table 5.1	Sociodemographic characteristics and sexual experience among have sex with men (MSM) by sexual identity
Table 5.2	Commercial sexual behaviour among MSM by sexual identity
Table 5.3	Non-commercial sexual behaviour among MS) by sexual identity
Table 5.4	Multivariate analysis of the association between selected commercial and non-commercial sexual behaviour of MSM and sexual identity after controlling for sociodemographic characteristics
Table 6.1	Sociodemographic characteristics and behaviours of MSMW and MSMO
Table 6.2	Sexual risk behaviour of bisexual (MSMW) versus homosexual (MSMO) men
Table 6.3	Bisexual behaviour of men who had sex with men and women in the past year

LIST OF ABBREVIATIONS

ACASI	Audio-computer assisted self-interview
ANC	Antenatal clinic
ARV	Anti-retroviral drugs
ASCQ	Assisted self-completed questionnaire
BMGF	Bill & Melinda Gates Foundation
CAPI	Computer assisted personal interview
CASI	Computer assisted self-interview
CCS	Conventional cluster sampling
CHARME	*Centre hospitalier affilié universitaire de Québec*
DD	Double Decker
FSW	Female sex worker
FTFI	Face-to-face interview
GDP	Gross domestic product
GPS	General population survey
HIV/AIDS	Human immunodeficiency virus/Acquired immunodeficiency syndrome
HSV-2	Human syphilis virus
HSW	*Hijra* sex worker
IBBA	Integrated biological and behavioural assessment (Avahan project)
ICVI	Informal confidential voting interview
IDU	Injecting drug use
KHPT	Karnataka health promotion trust
M&E	Monitoring and evaluation
MSM	Men who have sex with men
MSMH	Men who have sex with men and *Hijra*
MSMO	Men who have sex with men only
MSMW	Men who have sex with men and women
MSW	Male sex worker
NACO	National AIDS control organisation (India)
NC	Non-commercial
NFHS-3	3rd National family health survey
NGO	Non-governmental organisation
PASI	Palmtop assisted self-interview
PBS	Polling booth survey
PDA	Personal digital assistant
SAQ	Self administered questionnaire
SBS	Special behavioural survey (Avahan project)
STI	Sexually transmitted infections
SVY	Survey method in STATA
TG	Transgender
TLS	Time location cluster sampling
UNAIDS	United Nations AIDS program
WHO	World health organisation

ABSTRACT

Background

The HIV epidemic in India remains predominantly concentrated in groups where individuals display high risk behaviours, including men who have sex with men (MSM). Widespread behavioural changes are crucial to the control of HIV, but need to be informed by an understanding of the risk factors for infection. However, reliability and validity of self-reported behaviour are difficult to determine. This thesis aims to contribute to the literature comparing innovative data collection modes for self-reported HIV risk behaviour in developing countries.

Methods

The Avahan programme is a large-scale HIV-prevention project that focuses on the six states in India with the highest HIV prevalence. The programme focuses on core and bridging groups, including MSM. This thesis presents the findings of one aspect of the monitoring and evaluation: behavioural data collected using face-to-face interviews (FTFI) and informal confidential voting interviews (ICVI) among MSM sampled in public place and Hammam cruising sites in Bangalore.

Results

A review of empirical data collected in developing countries comparing FTFI with new interviewing tools, found private data collection methods to have mixed success in reducing underreporting of risky behaviour. A comparison of ICVI and FTFI in India found that ICVI significantly increased reporting of stigmatised behaviours, but results did not adhere consistently to expectation. A number of self-identified categories of MSM are commonly applied in the intervention context in India, each of which was generally associated with different HIV-risk behaviours. Although there was evidence of role segregation and identity-specific behaviour, the categories were found to be more fluid than has previously been documented. Bisexual behaviour was common, and condom use with female partners was low, which suggests a potential bridge of HIV transmission into the general population.

Conclusions

The dataset provided a solid description of HIV risk behaviours among MSM cruising in public places in Bangalore, which has immediate implications for designing appropriate targeted HIV prevention programmes that address fluidity in risk behaviour between MSM identities and reach out to behaviourally bisexual men, rather than treating MSM as a homogenous group. Both the systematic review and the comparison of ICVI and FTFI highlighted difficulties in gathering 'truthful' self-reported behaviour, as determining the precise reasoning where individual responses departed from the presumed norm was impossible. Qualitative research might contribute to a better understanding of the motivations behind reporting biases amongst MSM.

Chapter 1: Introduction

Increasingly, studies from lower and middle-income countries have found a high burden of HIV among men who have sex with men (MSM), which can be attributed to many factors that place MSM at an elevated risk of acquiring HIV [1].

Biological factors include the fact that unprotected receptive anal sex is nearly 10 times more likely to result in acquiring HIV than unprotected receptive vaginal sex [2]. Several behavioural factors can also increase vulnerability of MSM to HIV including multiple sex partners, inconsistent condom use and lack of knowledge about HIV risk. The use of alcohol and drugs has been linked to higher rates of unprotected sex amongst MSM. Some studies have also found that MSM with a history of childhood sexual abuse are more likely to engage in high risk behaviour. Socio-cultural factors such as stigma and discrimination may inhibit many MSM from identifying as such, potentially resulting in denial of their own risk and thus alienating themselves from prevention programs that target gay/bisexual populations. For this reason, this study explores the nature of same sex interactions between men and transgenders in India and their potential exposure to HIV risk focusing on a quantitative behaviour survey in Bangalore.

1.1 Cultural Context

India is a nation of contrasts. Whilst the economy is modernising, the society is largely traditional. Although India has become a global leader in fields such as information technology, outsourcing of business, and pharmaceuticals, adult literacy rates remain low: 48% among women and 73% among men [3]. India's gross domestic product (GDP) grew by 8.5% in 2004 – one of the world's fastest growth rates – yet a third of its population was living on $1 a day or less [4]. While the private health care industry is booming, with many technologically advanced hospitals opening, public expenditure on health remains low. In 2003, India's total expenditure on health was 4.8% of GDP, as compared with 8% in the U.K [4].

India is also culturally and ethnically heterogeneous. Within its population of approximately 1.15 billion, representing nearly one-sixth of the world's population, there are six major religions, 17 major languages as well as 844 dialects, which results in a variety of behavioural patterns and attitudes towards sexual relations [5].

1.2 India and the National HIV Epidemic

The first HIV positive person in India was identified in 1986, and there has since been a rapid spread of the epidemic in some parts of the country [6]. Accurately estimating the number of HIV positive individuals is difficult, in part because of a wide national variance in factors which put people at risk of infection. HIV infection levels in Asia are low compared to Africa [7]. However the statistics can be misleading as populations of many Asian nations are so large that even a low national prevalence still means that large numbers are living with HIV. Within the burgeoning Asian epidemics, India has the largest burden of disease [7]. In 2006, the joint United Nations Program on HIV/AIDS (UNAIDS) and the World Health Organisation (WHO) estimated that 5.7 million people in India were infected with HIV, ranking above even South Africa (5.5 million) in terms of the absolute number of infected individuals [8]. As a result there was increased interest among the scientific community in the factors that enable the transmission of HIV in India, in the hope that greater understanding would aid the development of effective interventions and curtail the future spread of the virus.

In 2007, however, the estimated level of infection was revised by India's National AIDS Control Organisation (NACO) downward to 2.5 million (range 2.0-3.1 million), a revision so large that it reduced by nearly 10% the estimated number of people living with HIV globally and reinforced ongoing concerns about the validity of the methods used in producing such epidemiologic estimates [9]. Previously HIV prevalence estimates for India were based on anonymous HIV testing in antenatal (ANC) and sexually transmitted infection (STI) clinics [10]. This approach was used to identify high-prevalence areas (a rate of HIV positivity exceeding 5% among STI clinic attendees and 1% among pregnant women) and monitor trends of infection rates over time. The revised 2007 estimate is based on population-based household data on HIV prevalence from the third National Family Health Survey (NFHS-3). This method corroborates the findings of

Dandona *et al* [11] who argued that high HIV rates among STI clinic attendees and the preferential use of public hospitals by people in the lower socioeconomic strata had lead to a gross overestimation of HIV prevalence. On the other hand Kang *et al* [12] and Thomas *et al* [13] had previously argued a lower prevalence among antenatal clinic attendees underestimated HIV in the general population but this assumption proved incorrect. The 'general population survey' may fail to consider some risk groups[*] and hinder an understanding of what drives a nascent epidemic, but this method achieves a more representative estimation of national prevalence [14, 15]. It is suggested that surveillance through antenatal clinics can be a useful measure of prevalence once HIV has entered the general population [16].

The geographical distribution of surveillance sites is another potential cause of distortion of data. Although the number of surveillance sites has been expanding – from 180 in 1998 to 1122 in 2005 [17] – they remain largely concentrated in urban areas. This may lead to an urban bias that fails to take into account the rural population that comprises 72% of the total population [18]. Furthermore, antenatal coverage between states varies from as low as 34% in the North to 90% in some Southern states, meaning that an inconsistent level of information available is unavoidable [19]. The use of antenatal clinics as a source of HIV prevalence data may be complicated further by the low mean age for voluntary sterilisation (26 years) and the high proportion of women choosing this means of family planning (around 50% in Southern states) [19, 20].

The reduced estimate is obviously good news, but the HIV epidemic in India still accounts for about a quarter of the estimated 10.7 million people outside of sub-Saharan Africa who are infected with HIV [9]. The results from NFHS-3 indicated that 0.36% of adults were infected with HIV, which translates into 1.7 million HIV positive persons [17]. Prevalence is higher in urban areas than in rural areas and higher among male than female Indians in all age groups except those aged 15-19 years, in which rates were very low. In both women and men, HIV

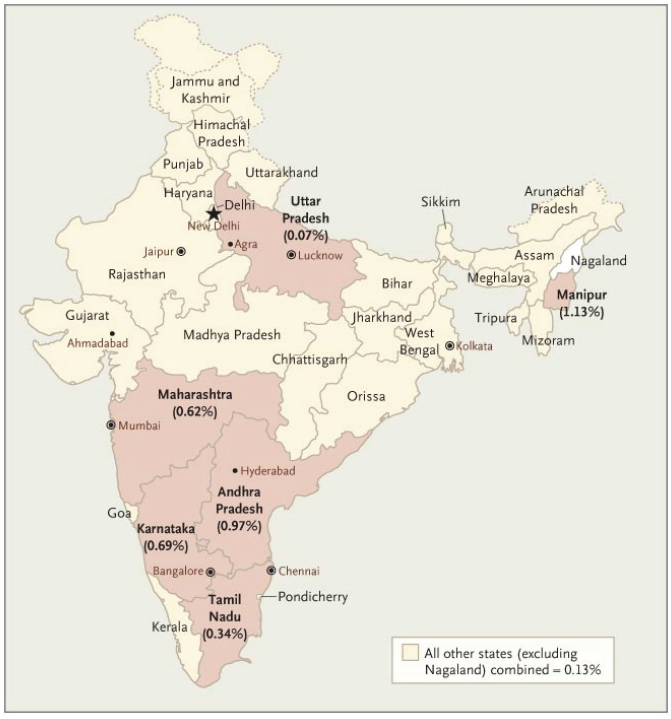
[*] Although 'risk group' is an umbrella term which fails to take account of differences in risk behaviour between individuals, it is used throughout this thesis to denote groups in which HIV prevalence tends to be higher than in the general population as a result of behaviours which certain members of that population are more likely to engage in than members of the general population. It does not follow, however, that all individuals classified in a high risk group necessarily engage in high risk behaviour.

prevalence initially increases with age, peaks among people aged 30-34 years old, and generally decreases thereafter [9].

Despite the noted methodological concerns, an analysis of existing data on HIV prevalence in India allows interesting patterns to be discerned. Within India's 35 states and territories there is distinct regional and sub-regional variation in levels of HIV infection. Prevalence in the adult population ranges from less than 0.1% in some states to 1.67% in the state of Manipur [17]. Six states have been categorised as high prevalence (see Figure 1.1).

Transmission routes within these six states also happen to vary markedly. In the four Southern states, Karnataka, Tamil Nadu, Maharashtra and Andhra Pradesh, the role of sex work is pronounced, with HIV prevalence exceeding 5% among female sex workers (FSW), and therefore thought to be a key transmission route [10]. In the Northern states of Nagaland and Manipur, located within the heroin 'golden triangle', injecting drug use is believed to be a dominant transmission route [10].

Figure 1.1: HIV Prevalence among persons 15 to 49 years old in India in 2005 and 2006 [9]



Data is taken from NFHS-3; a household survey that provided the prevalence rates for six states (five high-prevalence and one low-prevalence state) and an overall prevalence figure for the rest of India.

High HIV prevalence states are: Andhra Pradesh, Karnataka, Maharashtra, Tamil Nadu, and Manipur. Nagaland, which is considered a high-prevalence state, was excluded because of local opposition to HIV testing. National prevalence in this age group is 0.28% overall, 0.22% among women, and 0.36% among men.

An overview of the issues relating to FSW, injecting drug users (IDU), bridging populations and treatment is offered below before a more thorough consideration of research on MSM.

1.2.1 Female Sex Workers

The first reported case of AIDS in India was of a FSW in Chennai and prevalence rates among FSW have risen steeply since then [6]. In Mumbai the rate of HIV infection among FSW rose from 1% to 71% between 1986 and 1997 [21]. It has therefore been suggested that prevention interventions directed at FSW alone could curtail the HIV epidemic [22]. The Sonagachi programme, which targeted FSW in Kolkata in the early 1990s achieved some success in applying this rationale. Between 1992 and 1999 reported condom use in Kolkata increased from 3% to 90%, potentially contributing to the maintenance of a relatively low HIV prevalence compared to other Indian cities [23]. Recent models assessing the impact of intervention on prevention of HIV transmission in India suggest that FSW interventions promoting safe condom use may be most effective as part of more holistic initiatives which encourage safe sex practices in general [24].

Most sex work has a strong economic basis, primarily as a source of income, not only for sex workers themselves, but also for dependent kin and associates, including 'pimps' and managers [25]. Economic and power differentials between men and women in India are believed to facilitate the transmission of HIV/AIDS; women's lack of power and bargainable assets relative to men often makes it difficult for them to negotiate condom use with their partners or even to refuse sex [26]. However, some progress is being made in the battle for female equality in India. Whilst economic parity with men remains a long way off the ritual significance of traditional caste-based prostitution, for example among the *Devadasi* in Karnataka in which young women are 'married' to a temple or deity and provide sexual services to priests and patrons, has greatly diminished over time [27].

1.2.2 Intravenous Drug Users

Injecting drug use is a major driver of the epidemic in the Northeast states where heroin is widely available. Recent data shows that IDU could constitute 1.9-2.7% of the adult population in Manipur and Nagaland [28]. In a sample of IDU (N=191) in the Northeast, 75% were HIV positive, most of who were under the age of 19, two-thirds were sexually active and only 3% reported using condoms [29]. Monitoring the sexual behaviour of IDU is therefore important for programming responses and tracking the spread of HIV to the general population.

1.2.3 Bridge populations

'Bridge populations' comprise people, who, through close proximity to risk groups such as clients of male and female sex workers are important vectors of HIV transmitting it to the general population [30, 31]. A large-scale study among male clients of FSW in three states in Southern India have shown nearly a half of all clients were labourers (49%); others were transport workers (12%) and business men (11%) [32]. Multivariate logistic regression indicated that buying sex from FSW during travel was significantly associated with the volume of sex acts [32].

Mobile groups are vulnerable to HIV in different respects, often related to a particular stage of the mobility process. Some are most vulnerable at their destination, for example migrant labourers or military personnel. For others, the greatest risk occurs in transit such as long-distance truck drivers, in order to complete their journeys [32]. India has a large trucking population estimated at 5-6 million truckers and helpers, and approximately 3.5 million are classified as long-distant truckers, staying away from home for a month or more [33]. HIV prevention interventions have often focused on truckers because of their risk behaviour, mobility, and ability to spread infections to new geographical areas. Surveys of truckers in India indicate that they are highly likely to be clients of FSW, with 31% reporting having had commercial sex in the last year, highest in the south-east route (44%) and lowest on the NE route (25%) [34]. A small percentage of truckers (2%) reported either male or *Hijra* sexual partners in the past 12 months [34]. Even though the percentage of truckers reporting sex with men is quite low,

elevated HIV prevalence among them has been found (4.6%), over 12 times higher than that reported in the general male Indian population (0.36%) [34]. While there are attempts to educate the trucker population about HIV, their mobility and the variety of languages spoken makes interventions very difficult.

1.2.4 Treatment

Highly active antiretroviral therapy, which uses antiretroviral drugs (ARVs) to significantly delay the progression from HIV to AIDS, has been available in richer countries since 1996. India has provided leadership in producing and exporting low-cost antiretroviral drugs to developing countries. Generic competition fuelled by Indian production has been largely responsible for reducing the prices of ARV's from $10,000 in 2000 to $140 per year per person for a first-line drug today[†] [35]. Despite this access to this treatment is severely limited in India, only about 64-92,000 pregnant women (less than 10-24% of those in need) were receiving ARVs by the end of 2008 [36]. To date, the largest numbers of patients who have been treated with ARV drugs in India have been seen in private clinical settings [37]. The vast majority of people remain unable to afford private treatment. While the scope of treatment coverage remains low, improvements are being made. NACO has supported a limited number of testing centres since 1997 and has scaled this support up substantially since 2002. By the end of 2005, there were 52 NACO supported ARV centres providing care to 24,301 AIDS patients. An additional 10,333 patients received care through centres supported by the Global Fund to Fight AIDS, Tuberculosis and Malaria located at government hospitals, non-governmental organisations (NGOs), and private hospitals [38]. India's emergence as one of the leading manufacturers of cost-effective generic antiretroviral drugs is likely to bolster governmental and non-governmental efforts to scale up the use of ARV in the public sector [37].

Program effectiveness may be increased by prioritising interventions and by focusing implementation on a core set of the most cost-effective interventions. The new HIV estimates

[†] Not everyone responds well to first-line regimens. Others may eventually be affected by drug resistance and will require second or third line drug combinations. However, these are usually newer drugs subject to stronger patent protection, which means they are much more expensive than first-line regimens. In Manipur, north-east India, many people living with HIV/AIDS have begun to pay for their own drugs after developing drug resistance to first-line combinations offered for free. Some NGOs obtain second line drugs at whole-sale prices to reduce the costs [32].

support the notion that HIV prevention efforts in India should concentrate on risk groups such as FSW and their clients; MSM; IDU; and the immediate long-term sex partners of such individuals [16].

1.3 Men who have Sex with Men (MSM) in India

1.3.1 Indian Society

In Indian society generally, and particularly in rural areas, there is little acknowledgement of men whose primary sexual orientation is towards other men [39]. As a result, the impact of homosexual sex on the Indian HIV epidemic is still relatively unclear. In the last decade there has been increased recognition of the impact male-with-male sex has on the epidemic and researchers are increasingly documenting the sexual behaviour of this group. This chapter examines the social background of MSM in India and documents the cultural context that shapes both their gender identity and sexual orientation.

In India, family remains a crucial institution where masculinity is asserted through marriage and more importantly, through biological reproduction. In this highly patriarchal society, providing they do not adopt an alternative gender, men may engage in male-with-male sexual activity without compromising their masculinity. On the other hand women are conditioned to suppress their sexuality because social (and sexual) interactions with men have more far reaching consequences (children), therefore the taboo on pre-marital sex for women is more strictly enforced [40].

As a result of this environment MSM are a diverse group of people, some of whom do not have purely homosexual proclivities. Some, for example, turn to men to engage in extra-marital sex due to limited opportunities to mix socially with women and because sex outside marriage is discouraged [41]. In this scenario sexual behaviour is linked to opportunity rather than to identity. Such situational homosexuality can be seen in both rural and urban areas, and among all sectors of Indian society [42, 43]. Homosexual encounters often occur with relatives such as uncles, nephews, cousins and in-laws, or in public places where men can go to find other men for

sex. These encounters may just be adolescent explorations for some, but for others homosexual activity may continue into adult life and to varying degrees can be a lifelong preference. Seabrook and Khan explain that as this behaviour is unseen by society at large and not spoken of, it remains effectively invisible [42, 43]. In a traditionally patriarchal society where considerable emphasis is placed on biological reproduction, continuity of lineage and social identity, it is not socially acceptable for men to be openly homosexual. Some homosexual men marry in response to this strong social pressure. Once a man becomes a husband and father, his masculinity is not compromised if he engages in homosexual activity [41].

Dichotomising men into strictly 'homosexual' and 'heterosexual' categories may therefore be misleading and underestimate the number of MSM in India [44]. What is more, given an Indian tradition which centres on marriage and procreation, and the Indian penal code – a remnant of British colonial law, which until July 2009 cited sodomy as an offence (http://in.reuters.com/article/topNews/idINIndia-40752720090702) – the pressure to deny MSM activity is particularly pronounced. Misreporting biases make accurate estimates of the proportion of men practicing sex with other men difficult [41].

1.3.2 History of MSM

The stigmatisation of homosexual behaviour may not always have been the norm in India. In ancient India, the Kama Sutra recognised sex acts between men and men and women and women [40]. Lesbian and homosexual male acts are depicted in erotic sculptures of ancient Hindu temples, and during the Mughal period (early 16th to mid-19th centuries) some rulers maintained harems of young boys [45]. This seemingly tolerant view of homosexual behaviour was replaced when British imperial rule introduced Section 377 of the Indian Penal code to criminalise homosexuality, and missionary activity during the colonial period further ingrained sexual inhibition. Since independence, sexual intolerance has been justified in terms of tradition, although economic growth and consequent shifts in social attitudes have enabled the emergence of increasingly visible homosexual communities and rights groups, particularly in large cities. Despite this progress, the social and cultural pressures against same-sex relations, and the norm

of heterosexual marriage, remain particularly strong in India. As a result the vast majority of Indian MSM do not identify as homosexual [41, 46].

1.3.3 Identity and the concept of 'MSM'

In the early 1980s many of the first HIV/AIDS cases were diagnosed amongst gay men in industrialised countries [47]. Much of the subsequent research into the disease has been divided by the concept of a heterosexual/homosexual dichotomy. However, homosexuality and heterosexuality are terms that do not translate very well in India and in many other circumstances and locations. As a result the term 'men who have sex with men' is used in HIV/AIDS discourse, which describes a behavioural phenomenon that encompasses all men and transgender individuals who have sex with men. This generic classification however ignores divergent male-with-male sexual behaviours, expressed in a variety of identities, behaviours, networks and genders, which defy such a simple categorisation. Much recent research on same sex behaviour in India has been in collaboration with community-centred HIV prevention interventions, run by and for MSM, that classify MSM into 'indigenous', non-gay sexual identities such as *Hijras*; *Kothi*; *Panthi*, and *Double-Decker*[‡].

- *Hijras*: *Hijras* are born biologically male but dress and behave socially as females. *Hijras* are considered a separate 'third gender' or a male-to-female transgender. Men who want to join the *Hijras* community must go through a rite of passage in which castration may occur. *Hijras* can be classified as *nirvaan* (ritually castrated) or *akwa* (not yet castrated). By choosing this way of life, *Hijras* surrender ties of caste and family and instead live in small communities. Groups of around ten are led by a *guru*, or spiritual leader, for sexual or other advice. Earnings of the Hammam are pooled and distributed from the head *guru* down to the *chelas* (daughters).

Traditionally regarded as bestowers of blessings and curses, *Hijras* held a special status in society by performing at births, festivals and celebrations (*badai*). Their religious role is being eroded however, now only a minority retain their ritual status and increasingly *Hijras* survive by begging (*masti*) or selling sex to men (*pun*) [48]. To our knowledge only one study has been

[‡] There may be geographical variation in these identity terms within India [41. Asthana, S. and R. Oostvogels, *The social construction of male 'homosexuality' in India: implications for HIV transmission and prevention.* Soc Sci Med, 2001. **52**(5): p. 707-21.]

published in the peer-reviewed international literature exclusively on the sexual behaviour of a small sample of *Hijras*; this reports that *Hijras* tend to be the receptive partner in anal and oral sex, which is consistent with their feminine identity [49].

- *Kothi*: *Kothi* is a term used to describe effeminate men who remain biologically male. As with the other groups, there is a spectrum of men within this group [50]. Some wear women's clothes and have feminine mannerisms sometimes referring to themselves or other *Kothi* with feminine pronouns, others wear male clothing and may express this femininity only when cruising for sex with other men. *Kothi* predominantly engage in receptive anal and oral sex [50-52]. Although *Kothis*, like *Hijras*, are effeminate men, they do not live in the kind of closed communities that *Hijras* usually live in.

- *Double-Decker: Double-Deckers* are primarily sexually orientated toward men, but their gender identity is more masculine or neutral than *Kothi.* They can take both the active or passive role during anal sex, and depending on their gender identity, can have relations with all four groups of MSM [41].

- *Panthi:* This term describes men with a masculine identity. It is generally only used by *Kothi* or *Hijra.* Transient and irregular visitors of cruising areas, *Panthi* commonly take the insertive role when they engage in anal and oral sex with other men. *Panthi* do not necessarily identify themselves as homosexual. They are typically married to a woman or are expected to get married. Their reasons for seeking other men in order to have sex include taboos against pre-marital sex, the high cost of FSW, or the desire for sexual activities not offered by their wives or FSWs [41]. Asthana and Oostovogels (2001) state that there is even a tacit acceptance that men in this category often assume 'a very macho identity and see themselves as having unbridled sexual needs' [41].

- Bisexual: Although western paradigms do not always align neatly with the terms outlined above, one 'non-indigenous' identity stipulated by the local NGO at the outset of the study was bisexual. Similar to *Double Deckers*, bisexuals gender identity is more masculine than *Kothi*.

Due to the complexity and overlap of these identities and gender roles, the term MSM is used throughout this thesis as a general term that encompasses a wide range of sexual orientations, including *Hijras*. MSM is intended to be a strictly behavioural term and does not suggest any specific sexual gender or identity, which is explored in detail in Chapter 5.

1.3.4 Role of MSM in the HIV epidemic

Although MSM represent a risk group for STIs and HIV in other developing countries in Asia and Latin America [53-55], there has been limited research into the role of sex between men on the HIV epidemic in India. Recent data from small samples of MSM suggests a high prevalence of HIV in these groups, for example a survey of MSM outreach workers in Chennai found that 24% of MSM (and 50% of *Hijras*) were HIV positive [52]. Sexual behaviour research is hindered by the complexity and sensitive nature of MSM sexual identity in India and much more remains to be understood regarding MSM typologies, sexual networks and risk behaviour to determine their role in the epidemic and to develop effective prevention responses. The potential importance of male-with-male relationships in the overall transmission of STIs and HIV has recently been acknowledged by NACO, which has initiated HIV behavioural surveillance amongst MSM [17].

1.4 Men who have sex with Men in India – A Literature Review

This literature review brings together quantitative and qualitative data on male-with-male sex (including male-to-female transgenders) in India. Its aims are two-fold:

- firstly, to examine and compare the methods used by previous studies of MSM in India, in order to determine an appropriate framework for future research into MSM sexual behaviour; and
- secondly, to collate information on MSM across India, including socio-demographics, bisexual behaviour, sexual identity, unprotected sex, rate of sexual partner change, commercial sex, drug use and HIV-testing; all of which may be associated with risk for HIV transmission.

Resources included online databases (PubMed, Web of Science, BIDS Ingenta) identifying all articles published by the academic press on MSM in India available up to February 2009. Keywords for electronic searches included:

- Men who have sex with men (MSM) + India
- Homosexuality + India
- Gay men + India
- Same-sex behaviour + India
- Male-with-male sex + India

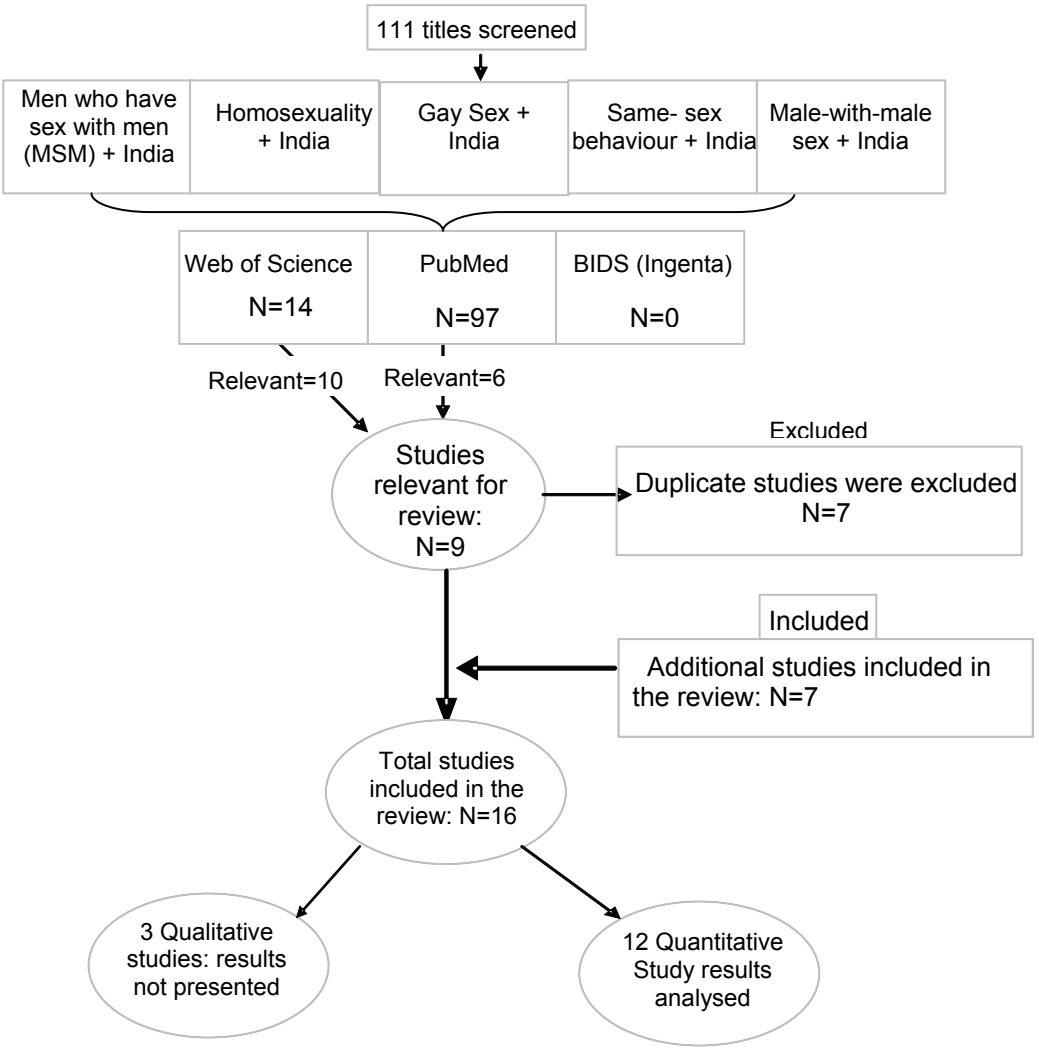
Searches of recent key HIV/AIDS conferences were also made to locate additional studies and identify work in progress by researching online databases for additional work by those authors already identified. These were complemented with searches in general engines (for example, Google) for key words. Finally the references of each paper or report were searched for additional relevant research.

For inclusion in the review, all studies had to be published in peer-reviewed, English language journals examining male-with-male (including *Hijra*) sexual behaviour in India using quantitative or qualitative interviews. In total 111 studies were found, many of these were excluded as they did not report male-with-male sex. Many studies discussed sociological aspects, such as legal rights of gay men and government policy, or the general trend of the HIV epidemic in India. Others discussed MSM within the Indian sub-continent (Bangladesh and Pakistan). Of the 19 relevant studies resulting from the online database search, seven were duplicates. The bibliographies of these 12 selected papers were searched and three additional studies were found from their references. In total, 15 quantitative/qualitative studies on male same sex behaviour in India met the inclusion criteria. Two additional studies were subsequently published at the beginning of 2009.

Of these, 13 studies were quantitative, most of which were carried out among urban populations, with only two reporting MSM behaviour among rural districts [39, 56]. Five studies sampled MSM respondents only [39, 52, 57-59] and six recruited from risk populations such as STI clinic attendees [48, 49, 60, 61]; a district jail [62]; and long-distance truck drivers [63]. Three recruited from the general population [57, 64, 65].

Four studies were qualitative [39, 41, 51, 52], three of which have not been included in the review analysis summarised in Table 1.1, 1.2 and 1.3 as they are based on ethnographic research without empirical findings. All three studies have explored the context of different MSM sexual identities and have highlighted the importance that HIV prevention in India does not focus on pre-determined and fixed categories of sexuality.

Figure 1.2: Selection of the journal articles included in the literature review



1.4.1 Sampling population

Most estimates of HIV prevalence among MSM derive from convenience samples of MSM, recruited on the streets or at STI clinics. These samples commonly include a higher proportion of sex workers and *Hijra*, which are more likely to be affected by HIV than the general MSM population [49]. There are three types of samples summarised in the review: those recruiting specifically from the MSM only sites; those sampling among risk populations; and low-risk/general population.

Recruiting specifically from MSM only sites: Five studies in this review recruited a completely MSM sample. Two studies [52, 58] interviewed respondents through NGOs targeting MSM which, like sampling in STI clinics, may be less reliable due to increased exposure to education about condom use, therefore a greater pressure to deny risky behaviour. Three studies recruited MSM in urban and rural cruising sites, where average HIV prevalence ranged from 8% in Tamil Nadu [39] to 21% in Andhra Pradesh [58].

Recruiting among 'risk' populations: The rates of male-with-male sexual behaviour of men from 'risk' populations varied from 5% among truck drivers [63] to 100% in STI clinic attendees [60]. Four studies collected data in a clinical setting, which may be biased to those with higher risks. Indeed these studies suggest a high overall HIV prevalence among MSM at STI clinics in Pune (19%) and Mumbai (29%) among whom a significant association between HIV and a history of genital ulcer disease was reported [50, 60]. Gupta *et al* [61] collected surveillance data among urban public STI clinic attendees from 1993 to 2003. Of the 708 respondents (7%) who reported ever having male-with-male sex, 19% were HIV positive. Hernandez *et al* [49] also interviewed STI clinic attendees, the majority of whom were long-term migrant workers living in Mumbai. In total 34% reported sex with other MSM. One of the explanations for having sex with men was because 70% of the respondents were from out of state and, if married, lived apart from their wives. It was reported having sex with other men is often cheaper than paying to visit an FSW.

Nearly one third (29%) of inmates from a district jail reported anal sex with another male, where only three out of 240 respondents (1%) were found to be HIV positive [62]. This study was carried out in 1999 and the HIV prevalence rates may not be representative of the current statistics. Singh and Malaviya [63] interviewed 200 truck drivers in 1990 and a further 100 in 1991-1992. Of those interviewed only 5% of the truck drivers admitted homosexual encounters and 3 of the 302 drivers tested were found to be infected with HIV.

Recruiting among general/low risk populations: The degree of homosexual behaviour varies widely from 1% [64] to 10% [57] amongst the male general population. Verma and Collumbien [57] revealed that out of a cross-sectional survey of 2910 rural men from five different states, nearly 10% of single and 3% of married men reported unprotected anal sex with a man in the past year. Furthermore there were marked differences by state. In Orissa for example, 17% of single men and 9% of married men reported male-with-male sex in the past year, compared with 6% and 2% respectively, in the other states combined. Men with male partners also have more female partners. One reason for this discrepancy across states may be attributable to the fact that according to Collumbien *et al*, men in Orissa start sex (with women) very late and they have few pre-marital and extra-marital partners. It is possible therefore men may experiment with other men prior to marriage.

Potdar and Koenig [64] sampled young men from a slum and compared them with literate college students, in order to investigate whether ACASI improved the reporting of risk behaviour in comparison to FTFI and SAQ. For college students the reported prevalence of stigmatised behaviour was generally higher through ACASI, but the results were more mixed for slum youth. Overall across all modes, male-with-male sex was reported to be lower among college youth (1%) than slum dwelling boys (6%). Go *et al* [65] also interviewed male residents of a Chennai slum, where 6% reported ever having sex with another man. It is possible that boys from the slum, who are poor and less educated than college students, sell sex to men as a means of generating an income.

Table 1.1: Summary of papers, the population sampled and method used

Study (year)	Location	Interview tool	Definition of 'MSM'	Sample size (% MSM)	% HIV positive
Recruiting specifically from MSM only site:					
Shinde *et al* (2009) [58]	STI clinic at NGO: Mumbai	Quantitative: FTFI	Men/TG 18+ who engaged in sexual activities in return for cash	75 (100%)	33% (TG: 41%) (MSM: 17%)
Safren *et al* (2006) [52]	3 NGOs targeting MSM: Chennai	Quantitative: SAQ	Outreach workers who 'reported they had sex with men' **§ Þ**	62 (93%)	7%
Dandona *et al* (2005) [39]	Cruising sites: rural Andhra Pradesh	Qualitative: FGD & In-depth Interviews	Men older than 15 years who had had 'sex' with a man in last 12 months **Þ**	6661 (100%)	16% *
Brahmam *et al* (2008) [57]	Cruising sites: Andhra Pradesh Tamil Nadu Maharashtra Karnataka	Quantitative: FTFI	Men or *Hijra* 18+ who had any sex (oral, anal or masturbation), paid or unpaid, with a man at least once in the last month	4597 (100%)	AP: 21% TN: 8% MH: 11% KTK: 17%
Newman *et al* (2009) [59]	Cruising sites: Chennai	Quantitative: FTFI	Paid sex assessed by: (1) receiving money for sex from a man in the past 3 months or (2) self-identification as a sex worker as a primary occupation	200 (60% sold sex)	
Recruiting among 'risk' populations:					
Setia SM *et al* (2006) [49]	2 STI clinics (hospital and MSM NGO): Mumbai	Quantitative: FTFI	MSM and transgender older than 18 years reporting a history of 'same sex behaviour'**§ Þ**	178 (100%)	MSM: 24% TG: 50% Overall: 29%
Kumar & Ross (1991) [60]	Four STI Clinics: Northwest India	Quantitative: FTFI	'Homosexually active men' attending STI clinics in India **§ Þ**	49 (100%)	19%
Gupta *et al* (2006) [61]	STI clinic: Pune	Quantitative: FTFI	Men older than 18 reporting any sexual contact (oral or anal) ever with another man (and on a regular basis). *Hijra* were excluded from the analysis.	10,785 (7%)	19% among MSM
Hernandez *et al* (2006) [48]	STI clinics: Mumbai	Quantitative: FTFI	Men older than 16 years reporting anal sex with men/*Hijra* in their lifetime	2381 (25%)	4% among MSM
Singh S *et al* (1999) [62]	District jail: Ghazibad (Delhi)	Quantitative: FTFI	Inmates aged 15-50 years who reported a history of 'sex with men' **§ Þ**	240 (29%)	1% in total
Singh Y & Malaviya A (1994) [63]	Delhi	Quantitative: FTFI	Truck drivers reporting an oral or anal sexual encounter ever with another man	300 (5%)	1% in total
Recruiting among general/low risk populations:					
Potdar & Koenig (2005) [64]	4 colleges and 2 slums: Pune	Quantitative: ACASI, SAQ & FTFI	Unmarried men aged 18-22 years reporting ever had anal and oral sex with another man	1500 (9% College 15% Slum)	
Go *et al* (2004) [65]	Slum Dwellers: Chennai	Quantitative: FTFI	Men aged 18-40 years who ever reported sex with men	774 (6%)	7% (n=3/46)
Verma *et al* (2004) [56]	Rural men: Haryana, Rajasthan, U.P, Orissa and Karnataka	Quantitative: FTFI	Men aged 18-40 years reporting anal sex in the last year	2910 (10% Single 3% Married)	

***** HIV prevalence referenced in this study referred to the national sentinel surveillance carried out independently to Dandonda's study by the Andhra Pradesh State AIDS Control Society [61]

§ A time frame was not stated in any of these definitions – whether the respondent had sex with men in their lifetime, week or month.

Þ The type of sex is not defined

1.4.2 Sexual identity

Although several unpublished reviews have examined the cultural context of MSM and their identities in India, very few have been published in peer-reviewed journals [42, 43]. It is noted that commonly used terms in the West such as heterosexual, homosexual and bisexual cannot adequately describe the diverse forms of identity in India, although acknowledgement of these terms are becoming increasingly common in many urban, middle class populations.

Three ethnographic reviews have discussed the social aspects of sexual identities of MSM using qualitative interview tools [41, 50, 51]. Asthana and Oostvogels interviewed several hundred men (number not specified), to provide information about their daily sexual behaviour. It is argued that traditional definitions of identity such as *Kothi*, *Panthi* and *Double Deckers* often are predictive of role behaviour, penetrating or being penetrated [41]. However, studies in Chennai [50] and Calcutta [51] reveal fluidity in behaviour. Although *Kothis* in Chennai largely engage in receptive anal sex, they also may engage in insertive sex.

Two studies broke MSM down by identity [52, 57], the latter was the first journal article to be published quantifying the sociodemographic and sexual risk behaviours of different MSM self-identities sampled across four states in Southern India. Among the identities surveyed, 37% were *Kothi*, 22% *Double-deckers*, 20% bisexuals, 13% *Hijra* and 9% *Panthis*. Almost all identities reported having multiple partners. A significantly higher proportion of *Kothis* (49%) and *Hijras* (61%) first had sex before 15 years of age, compared with other categories (25-34%). A significantly higher proportion of *Hijra* (87%) and *Kothi* (74%) reportedly ever sold sex to men compared with the other categories of MSM (20-43%); a high percentage of these paying sex partners being strangers and with low levels of overall consistent condom use. This is reflected in high prevalence levels of HIV among *Hijra* (18%), bisexuals (16%), *Kothis* (14%), *Panthis* (8%) and *Double-Deckers* (11%). The prevalence of syphilis ranged from 5% in *Panthis* to 16% in *Kothis* and 14% in *Hijra*s. The prevalence of any STI (Neisseria gonorrhoea, Chlamydia trachomatis or syphilis serology) ranged from 9% to 16% across categories.

Three studies have examined the difference in behaviour between MSM and *Hijras* [53, 58, 59], where in all papers the majority of the *Hijra* were found to have engaged in sex work, reported low rates of condom use and as a result presented significantly higher rates of HIV infection.

1.4.3 Bisexual behaviour

Ten papers reported a high proportion of bisexual behaviour. All indicated that a significant proportion of MSM in India are married and engage in sex with both men and women. Levels of marriage range from 15% to 55% amongst MSM and the prevalence of condom use for sex with both male and female partners is often very low. Thus, MSM may be at high risk for HIV infection and may pose risks to both their male and female partners. Verma and Collumbian [56] supported the idea that homosexually active men in rural India link high-risk sexual networks with the general population. Behaviourally homosexual men also practised more anal sex with their wife (11%) than other men (3%), which adds to the vulnerability of female partners.

Kumar and Ross [60] found major differences between Australia and India on frequency of marriage (significantly higher in India) and condom use for both anal and oral sex (significantly higher in the Australian sample). There was also a substantial level of heterosexual anal intercourse reported in the Indian sample. This is explained by the strong emphasis on marriage in India and the relative unacceptability of a homosexual subculture.

Gupta *et al* identified two subsets of MSM: those that reported multiple partner types, including women (83%), and those reporting regular or exclusively male partners (18%) [61], whereas Hernandez *et al* found very few (1%) who had sex exclusively with men [49]. Singh *et al*'s [62] study of jail inmates revealed that out of 115 married inmates, 25% had ever had male-with-male sex. Since the respondents are confined to jail and segregated from the opposite sex, it was expected that some would engage in homosexual sex. A review of the literature examining the process of institutional recruitment for homosexual roles ("Becoming Homosexual in Prison: a socialization Process" by Van Wormer *Criminal Justice Review.*1984; 9: 22-27) challenges dichotomising prison homosexuality into 'true' and situational categories, a division that dominates the prison literature.

Brahmam *et al* [57] found a significant number of MSM had sexual contacts with paid/regular female partners, and used condoms inconsistently; making them an important bridge group to the general population at large for acquiring/transmitting HIV. Broken down by identity, a significantly higher proportion of bisexuals (61%) were ever married, compared with other categories (11-25%). Similarly, a significantly higher proportion of ever married bisexuals were living with their spouses (86%) compared with other categories (56-58%).

Ethnographic research has also shown that men who identify as *Kothi* also report sex with women as well as lack information on how to negotiate condom use with their wives [50]. While engaging in sex with men is a source of stigma and shame among wives and family, being married is also a source of stigma within the *Kothi* community [51]. Issues around sex with female spouses are overlooked by many HIV-prevention programmes and are an important topic to be addressed.

Table 1.2: Proportion of the sample married to women and reported bisexual behaviour

Study	Proportion of MSM currently married to women (unless stated otherwise)	Bisexual behaviour §
Recruiting specifically from MSM only site:**		
Shinde *et al* (2009) [58]	15% married	4% had vaginal sex in the past 6 months
Safren *et al* (2006) [52]	27% married	- 25% have children
Dandona *et a*l (2005) [39]	42% married 5% separated/divorced 1% widowed	68% had ever had sex with a woman 51% had sex with a woman in the last 3 months Of those married, 76% reported sex with their wife - 42% had children
Brahmam *et a*l (2008) [57]	Ever married AP: 37% MH: 18% TN: 23% KTK: 21%	Ever paid to have sex with a woman AP: 43% MH: 33% TN: 15% KTK: 4%
Recruiting among 'risk' populations:		
Setia SM *et al* (2006) [49]	23% married (30% HIV +ve)	49% MSM first sexual partner a female 44% MSM reported having visited a FSW in their lifetime
Kumar & Ross (1991) [60]	55% married	65% Had sex with women and men 2 months prior to the survey
Gupta *et al* (2006) [61]	36% married	MSM only: 73% reported sex with a FSW 57% reported sex with a non-FSW 23% reported sex with a *Hijra*
Hernandez *et al* (2006) [48]	30% married *	13% had sex with men and women, 13% men had sex with *Hijra* and women; 11% men who have sex with men, women & *Hijra*
Singh S *et al* (1999) [62]	48% married *	Out of 115 married men, 25% had ever had male-with-male sex
Recruiting among general/low risk populations:		
Go *et al* (2004) [65]	57% married	
Verma *et al* (2004) [56]	3% married	53% homosexually active married men and 12% homosexually active single men reported extramarital sex with women in past year 42% single men with male partners reported female partners.

* Not all of the sample were MSM

** Newman et al did not report on marital status or sex with women

§ The type of bisexual behaviour reported varied from study to study. Some reported commercial sex with FSW, children, or the genders of different partners.

1.4.4 HIV-risk Behaviour

The most commonly reported HIV-related behaviours in all studies was unprotected sex, insertive and receptive anal sex, number of sexual partners, exchanging money for sex, and intravenous drug use. Despite high rates of infection, many MSM appeared to have a low risk perception and knowledge of HIV transmission, as shown by high rates of non-condom use reported across all studies ranging from 32% never used a condom [39] to 100% unprotected sex in last anal intercourse [56].

Among the studies recruiting specifically from the MSM only site, receptive anal sex is common. The most frequently reported behaviour among MSM not recruited in MSM only sites, was insertive anal sex [48, 56, 60]. Hernandez *et al* [48] also reported that MSM having sex with *all* gender types were more likely to have insertive anal sex (99%), compared to other groups .

It was difficult to compare the number of male partners, as this variable was reported with various outcomes such as mean lifetime, or using cut off points such as more or less than 5 or 10 partners over various time frames such as ever, in the past year or in the last week. Nevertheless men recruited in MSM only sites and those among high-risk populations appear to have a greater number of partners than those among general or low risk populations.

Male sex worker (MSW) activity is common: some sell to truck drivers [63], others perform sex work among college students and slum populations [64, 65], and others engage in commercial sex in public places [39, 57]. Whilst only 9% of MSM sampled in cruising sites reported that they were sex workers, when probed through indirect questions a much higher number (27%) admitted to having sold sex to men [39]. This suggests that some commercial sex between men may be opportunistic. Dandona *et al* [66] compared the chance of acquiring HIV among men who sell sex to men (12-18% annually) is considerably higher than that among women who sell sex (2-3%). This is largely due to the approximately ten-fold higher risk of transmission of HIV per act of unprotected receptive anal sex compared with vaginal sex [2]. As reported by Brahmam *et al* [57] the proportion of MSM selling sex to men varied according to state (40% in

Maharashtra – 68% in Karnataka) and sexual identity (reported in Section 1.4.2 where *Kothis* and *Hijras* reported more paying partners).
Shinde *et al* [58] described the behavioural patterns exclusively among MSW and reported that about 85% relied on sex work as a primary source of income. These MSW were more likely to report receptive anal sex with their clients compared to others (92% vs. 55% respectively).

Drug use was only reported in four studies. Only 3% of jail inmates reported ever having injected drugs [62]; only 2% of college students and 8% of slum youth reported using drugs (not specifically intravenous)[64]; and 19% of males in a Chennai slum reported using drugs in the last three months (again not specifically intravenous) [65].

Table 1.3: Reported risk behaviour

STUDY (YEAR)	NON-CONDOM USE (%)	INSERTIVE ANAL SEX ACTS (%)	RECEPTIVE ANAL SEX (%)	NUMBER OF MALE PARTNERS Þ	EXCHANGED MONEY FOR SEX Þ
Recruiting specifically from MSM only site:* (condom use with male partners)					
Shinde *et al* (2009) [58]	67% §	13% 38% MSM; 21% TG	87%: 63% MSM 98% TG		100%
Brahmam *et al* (2008) [57]	50-83%Men clients§ 71-86% NC men§ 71-98% NC female§ 51-77% FSW §			Mean # in the last week: 4.2 - 6.3 Male clients 2.7 – 3.4 MSW	40-68% by state 20% (*Panthi*) – 87% (*Hijra*)
Dandona *et al* (2005) [39]	32% *	43%	46% [* 10.9% Both receptive and insertive]	87% anal sex with 1+ men in last 4 weeks 63% had sex with 3+ men in last 4 weeks	9% sex workers - probing showed **27%** had sold sex
Newman et al (2008) [59]	18% <100% in last month	60% reported anal sex in the last month			60%
Recruiting among 'risk' populations:					
Setia SM *et al* (2006) [49]	*Rarely/Never*: MSM:59% [Insertive sex: 43% Receptive sex: 39%] TG: 54%	MSM: <5 = 54% >5 = 56%	MSM: <5 = 72% >5 = 28% TG: <5 = 44% >5 = 56%	MSM: <5 = 55% >5 = 45% TG: <10 = 61% >10 = 39%	TG: 96%
Kumar & Ross (1991) [60]	93% with males * 78% with females *	18%		2 average	
Gupta *et al* (2006) [61]	61% with current sexual partner *	81% [**ever*]	35% [**ever*]	2-9: 55% 10+ partners: 31.7%	13%
Hernandez *et al* (2006) [48]	95% MSMW (men and women) * 89% MSM+H * (men and *Hijra*) 85% MSMO * Total: 90% *	97% MSMW 99% MSM+H 12% MSM Total: 69.3%	11% MSMW 12% MSM+H 3% MSM	2+ partners – 34% MSMW 45% MSM+H 62% MSMO 1+ partners – 13% MSMW 5% MSM+H 25% MSMO (**last 3 months*)	21% MSMW 40% MSM+H 67% MSM
Singh Y & Malaviya A (1994) [63]	72% *irregular* condom use §				
Recruiting among general/low risk populations:					
Potdar & Koenig (2005) [64]	Of those sexually active *: 72% college boys 51% of slum youth			2+ male or female partners: 6% college 6% slum youth	
Go *et al* (2004) [65]				<4 = 5% >4 = 14%	21%
Verma *et al* (2004) [56]	100% respondents reported their last sex act with a man as unprotected	72% during last sex act	30% during last sex act	3+ sex partners in *past year* = 57% Married men = 34% single men	18% most recent sex acts involved payment

Þ Lifetime number of partners/commercial sex, unless stated otherwise
* Never used a condom
§ Inconsistent condom use (NC=non-commercial)
† Brahmam *et al* report findings across four states in Southern India, the ranges from each state are presented in the table. The mean number of partners is presented by identity (not State), the results of which are in the table.

1.4.5 Conclusions of the review

The first purpose of this review was to summarise and compare the methods used by previous studies focusing on MSM in India, in an attempt to understand how to achieve a typical sample of MSM. Several factors addressed in the review that were known to affect the representativeness of the study included:

1) **Recruiting venue**: MSM can be recruited from cruising sites, drop-in centres of community organisations or STI clinics, however, non self-identified MSM are difficult to recruit since there are no formal groups or socialising venues for these men. For this reason sampling outside the MSM only site can result in varying levels of reported male-with-male sex ranging from 5% in truck drivers to 29% in jail inmates. Sampling in public cruising sites, which serve to negotiate sexual interest with other cruisers and provide men a legitimate reason for being there, seems a logical place to locate men seeking sex *in situ*.

2) **Interview tool**: Face-to-face interviews were the most common tool used, with only one study testing the efficacy of an alternative tool, ACASI, which had mixed reports among illiterate respondents. Because all behavioural data rely on self-reporting methods, associations of risk behaviour and HIV may be underestimated or even overestimated. In order to add to the literature on alternative interview tools, we have tested the ICVI in this study.

3) **Inclusion criteria**: Of those studies that did outline a definition for 'MSM' in the study, 'ever' had sex with a man was a common classification.

The second aim of the review was to collect information on HIV-risk factors of MSM in India, those that were highlighted in the literature included:

1) **Sexual identity**: The presence of diverse identities of MSM in India poses unique challenges in conducting research. Ethnographic research has shown differences in role behaviour according to gender identity, the first peer-reviewed journal articles investigating the meaning attached to the identity labels and quantifying risk behaviour by identity was published in 2008 [58]. Further research is still needed to assess the potential risks of HIV infection between different MSM identities.

2) Bisexual behaviour: Men who are homosexually active do not seem to form a discrete sexual network. Instead they link both to circuits of risk activity (unprotected anal sex with men) to the general female population. Since many papers report high levels of marriage to women amongst MSM, one focus of this thesis will be to examine bridging behaviour in greater detail.

1.5 Objectives of the PhD and organisation of the chapters

The HIV epidemic in India remains predominantly concentrated in groups where individuals have high risk behaviours, including MSM (and transgenders). The principal aim of this thesis is a thorough statistical investigation of the risk factors for HIV infection, with an emphasis on sexual behaviour, in a survey of MSM in Bangalore as part of the Avahan Initiative.

The next chapter, Chapter 2 considers the methods that have been adopted in collecting behavioural data among risk populations in developing countries. It will discuss the lessons that have been learnt from fieldwork in order to then help examine the efficacy of interviewing tools in reducing social desirability bias.

Chapter 3 presents the methods chosen for the sampling frame as well as the pilot and description of the data collection tools. Until now the ICVI method had not been tested in the Indian context. The impact of this interviewing technique among MSM in Bangalore is compared with FTFI in an attempt to understand misreporting biases for sensitive questions among a predominantly illiterate group in Chapter 4.

In India there are a number of self-identified categories of MSM each of which are generally associated with different risk behaviours. Chapter 5 reports on differences in risk behaviours across self-defined categories of MSM and quantify to what extent they correlate with the understanding of these identities in mainstream HIV prevention discourses.

Empirical data on the extent of bisexual behaviour among MSM in India independent from that of exclusively behaviourally homosexual men is lacking. Chapter 6 aims to quantify differences in the patterns of sexual behaviour of men who have sex with men and women (MSMW) from men who have sex with men only (MSMO) to examine the extent to which bisexual behaviour may act as a bridge for introducing infection into the general population. Chapter 7 presents the conclusions of the thesis and discusses the potential for future work.

Appendices A1 and A2 contain the face-to-face and informal confidential voting interviews used in the study, respectively.

Chapter 2: A systematic review and meta-analysis of quantitative interviewing tools to investigate self-reported HIV and STI associated behaviour in low- and middle-income countries

2.1 Introduction

On a global scale, there were an estimated 33 million (30.3-36.1 million) people living with HIV in 2007 [67]. Despite this considerable global burden, methods for gathering accurate information on the transmission dynamics of the disease suffer from severe limitations. HIV intervention programmes aimed at reducing HIV and STI incidence often rely on self-reported measures of behaviours because of the difficulty in directly measuring the infrequent occurrence of infection. Such self-reports are subject to recall bias and social desirability bias [68]. Concerns over the accuracy of these measures have prompted efforts to improve data collection through the modification of interview modes [69].

Several methodological reviews of research into sexual behaviour have been published in the last decade [68-72]. Most have acknowledged that the reliability of behaviour self-reports may not be high, expressing a scepticism that the dominant mode of data collection – face-to-face interviews (FTFI) – is the most effective means of gathering high quality data and have urged the adoption of alternative methods [73]. There are a number of reasons that may lead to inconsistencies between actual and self-reported behaviour obtained in an interview such as selective participation, poor recall and the desire to conceal socially prohibited behaviour. In general, intentional misreporting of sensitive behaviours is motivated either by a desire to underreport socially proscribed behaviour or by a tendency to exaggerate sexual experience and socially desirable behaviour [68]. Examples are culturally dependent and may depend on intervention efforts, so for example, in some communities same-sex activities may be stigmatised.

Several studies suggest that improving the level of privacy and anonymity that an interview method affords a respondent can greatly increase the acknowledgement of high-risk activities, particularly those that are stigmatising or illegal [68, 71]. As a result, researchers have developed alternatives to the face-to-face interviewer-administered questionnaires in an attempt to enhance the accuracy of self-reporting, such as self-administered questionnaires (SAQ). Whilst SAQs are thought to reduce biases associated with FTFI, variable literacy levels amongst respondents and difficulties in correctly following complicated skip patterns mean that responses on SAQs are often less internally consistent [68]. About 20 years ago attempts to deal with these challenges began to employ computerisation, including computer-assisted personal interviewing (CAPI) which evolved into computer-assisted self-interviewing (CASI). Computer- based responses were then amalgamated with tape-recorded questioning to create audio-CASI (ACASI).

A growing body of research in the United States indicates that computer-based interviews can dramatically increase reports of sensitive behaviour compared with interviewer-administered surveys. Several studies have found that higher levels of reported risky behaviour, such as multiple partners or injecting drug use, were obtained through ACASI than through FTFI or SAQ methods [74-79].

These findings from developed countries cannot be directly generalised to developing countries as there can be fundamental differences between the contexts in which information is gathered. Such differences include the respondents' previous exposure to surveys, their familiarity with computer technology, and their levels of literacy. These factors are likely to result in different patterns of responses to SAQ and CASI. Indeed, relatively few studies conducted in developing countries have successfully demonstrated increased reporting of sensitive behaviours by using ACASI as opposed to FTFI [80-87] while the results of other studies have shown inconsistent responses across all behaviours [64, 88-95b]. More recently, handheld personal digital assistants (PDAs) have emerged as a new tool for collecting risk behaviour data, due to the advantages of portability and energy efficiency [96, 97]. Such computerised methods may still pose some challenges for participants with low literacy levels, less education and less experience with technology.

Non-computerised interview tools have also been developed for enhancing privacy among low literacy populations, these include tape-recorded interviews which were trialled in China [98], informal confidential voting interviews (ICVI) developed in Zimbabwe [99, 100], polling booth surveys (PBS) in India [27, 101], and assisted self-completion questionnaires in Tanzania (ASCQ) [27, 101-103]. Interviewer bias aside, even highly motivated and uninhibited respondents may have trouble being able to recollect past sexual events. In another strategy the introduction of coital diaries in several developing countries has achieved some success in minimising recall bias [104-108]. However, to simplify the comparison between methods here, recall bias will not be explored in this review.

There are a number of published papers on the use of innovative interviewing tools to collect sensitive information. Although these studies provide insight, most of the literature describes results in a qualitative way and there are few evidence based publications comparing new tools with the traditional FTFI within one population. This chapter aims to review the empirical data collected in low- and middle-income countries (since over 90% of HIV infections take place in these populations [72]) that compare traditional FTFI with innovative interview tools for reporting of HIV risk behaviour, including sexual behaviour and injecting drug use. The purpose of this review is to determine which techniques seem to minimise misreporting of sensitive information by reducing social desirability bias such as interviewer preconception or otherwise.

2.2 Social Desirability Bias

Social desirability bias is the inclination to present oneself in a manner that will be viewed favourably by others. Reliable data on sensitive issues such as risky sexual behaviour, associated with stigmatised diseases such as HIV, may be difficult to obtain due to the respondent's fear of admitting to behaviour contrary to the social norm. The magnitude and direction of these biases seem to be affected by the interviewer, fear of breach of confidentiality, the respondent's perceived value of the behaviour being measured and even the respondent's self-denial of their own risk behaviour as well as by factors such as gender, race, and age [72].

Desire to conceal socially forbidden behaviour may, through providing a false basis on which to work, have potentially far-reaching implications on public health policies and reproductive health interventions. To obtain more accurate reporting of highly sensitive behaviour, a careful selection of interviewing strategies can be employed to reduce social desirability bias [72]. Providing clear information about the purpose of the study, reducing potential embarrassment, ensuring confidentially and anonymity, matching respondents with interviewers with whom they feel most comfortable, and securing the trust of the respondent are all important strategies to consider [100]. Although it is unrealistic to expect to eliminate social desirability bias totally, an improvement in reporting would facilitate the identification of significant patterns in behaviours. In theory, more secret methods of data collection should reduce bias and provide more reliable information.

2.3 Data collection tools

2.3.1 Face-to-Face Interview

FTFI is the standard interview technique that most novel methods usually build from or compare against. FTFI are one-to-one meetings between a respondent and an interviewer, where the interviewer records the respondent's answers on a questionnaire. FTFI can lead to reporting of socially proscribed behaviours, provided time is taken to build a rapport with the respondent. However there is a possibility that the respondent's reaction to the interviewer may influence his or her responses, and a risk that the interviewer's interpretation of the respondent's answers may reduce the accuracy of the responses recorded [70].

In developed country settings, where most of the population is literate, self-administered postal, telephone, and computer-assisted surveys that provide a great deal of privacy typically yield increased reporting of highly sensitive behaviours. In contrast, in developing countries where fewer respondents are literate, data collection methods are needed that are reliable, inexpensive and do not require extensive technological expertise.

2.3.2 Tape recorded questions

Because computer-assisted approaches are not always feasible, particularly among participants with less experience with technology, where electricity is scarce or interviewer security is a concern, a non-computerised interview method for reducing social desirability effects is needed in resource poor settings.

Early precursors of ACASI involved the respondent using a personal stereo cassette player to listen to a tape on which the questions were recorded. The respondent then entered responses onto an answer sheet that did not have question wording [98, 109]. This approach has the advantage of increased privacy and reduced literacy (respondents could listen to the questions rather than read them). However, the pre-recorded nature of the tape makes it difficult to implement skips or tailor the working based on previous answers. Hence ACASI was developed.

2.3.3 Computerised interview tools

Standard approaches to data recording can be time-consuming and error-prone. Correct recording of responses depends on training interviewers to understand the flow of the questions and skip patterns; internal consistencies being checked for completeness and accuracy by a field supervisor, though the correction of responses may no longer be possible; double data entry and the resolution of discrepancies by checking with the original questionnaires; and then cleaning the data to correct omissions or further internal consistencies. Furthermore, there may be a considerable time lag between data collection and the availability of a complete data set for analysis. Computerised tools can increase the efficiency of surveys by using purpose-built data entry software at the point of collection.

In preparation for the ACASI, the interviewer explains the procedure to the respondent and remains available in case the respondent needs assistance while completing the self-administered portion. The interviewer may actually administer the questions or assist the respondent (CAPI). The interviewer thus remains an integral part of the data collection.

Table 2.1: Acronyms and descriptions of computerised interviewing techniques [68]

Acronym	Name	Description
CAPI	Computer-assisted personal interview	An interviewer reads the questions from the computer screen and records the respondent's answers directly onto the computer
CASI	Computer-assisted self-interview	The respondent reads the questions from the computer screen and records their answer using a numbered computer keyboard
PASI	Palm-top assisted self-interviewing	The respondent reads and answers the questions on a handheld minicomputer using a simplified keyboard or touch controls
ACASI	Audio computer-assisted self-interview	The respondent listens to the questions using headphones and records their answer using a numbered computer keyboard. The respondent may simultaneously read the questions on the screen.



Fig 2.1 Clipboard with enclosed PDA[§] [32]

A PDA, such as the palmpilot™, eliminates a major source of potential bias associated with the interviewer's presence. These instruments are handheld, and therefore mobile, computers that generate electronic forms of data entry by using push button technology or touch sensitive screens with a stylus pen. Despite being relatively inexpensive and enabling rapid and accurate downloading of data, few studies have evaluated the use of PDAs in developing countries [96, 97].

[§] This design was developed to avoid security risks for interviewers in having the PDA being stolen

2.3.4 Assisted self-completed questionnaires

SAQs may reduce social desirability bias by enhancing a greater sense of privacy, but can have lower response rates and more missing data than FTFI surveys. In FTFI participant misconceptions can be readily clarified, illiterate respondents can participate easily and complex skips, multiple choices and open-ended answers can be used. One method that combines the benefits of the SAQ (privacy and confidentiality) with those of FTFI (clarity and simplicity) is assisted self-completion questionnaires (ASCQ). The interviewer reads the question and answer options aloud, while the respondent completes the questionnaire independently. ASCQ can also be administered to many people simultaneously and are therefore inexpensive to use in group situations (i.e. in schools or health clinics).

2.3.5 Informal Confidential Voting Interview (ICVI)

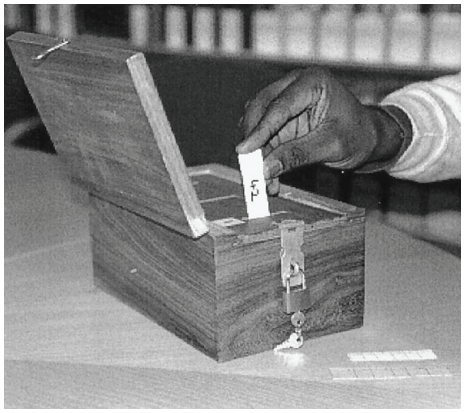


Fig 2.2 ICVI voting box [100]

ICVI are interviewer-administered questionnaires which incorporate confidential self-completion methods and have demonstrated increased reporting of risky sexual behaviour compared to the FTFI [99, 100]. The first part of the ICVI interview is typically conducted as a variant of the FTFI method and is used to collect more sensitive data and to sensitise the respondent to the non-prejudicial viewpoint of the interviewer. The second part of the interview is self-completed as the interviewer, who is screened from the respondent, reads out the questions to the respondent who writes their answer on a colour coded slip (each with the respondents number on the back) and puts it in a colour labelled slot of a locked ballot box [99, 100]. The ICVI allows for more complex questions, not limited to a yes/no response like the PBS, and can also be matched to the rest of the questionnaire at an individual using an identification number.

2.3.6 Polling Booth Surveys



Fig 2.3 PBS polling box

PBS can be seen as a more general version of the ICVI. PBS are conducted as a focus group with 8-10 individuals (divided demographically – married and unmarried, male and female etc), where each respondent is separated from another by a private booth in a large room. Every respondent has a set of numbered cards on which the answers are colour coded for 'yes' or 'no' (although numerical answers could also be used). The interviewer reads out a number of questions and the participants reply by placing the appropriate numbered and coloured card, without an identification number, into in a voting box in their private booth. All the cards in all of the voting boxes are combined and the total number of 'yes' and 'no' answer for each question are tallied. As there is no identification number, the data can only be analysed at the aggregate level [101]. In addition to methods aimed at eliciting more accurate responses to sensitive questions based on trust and confidentiality, there are also issues of detail and recall that have been addressed in other approaches such as coital diaries.

2.3.7 Coital diaries

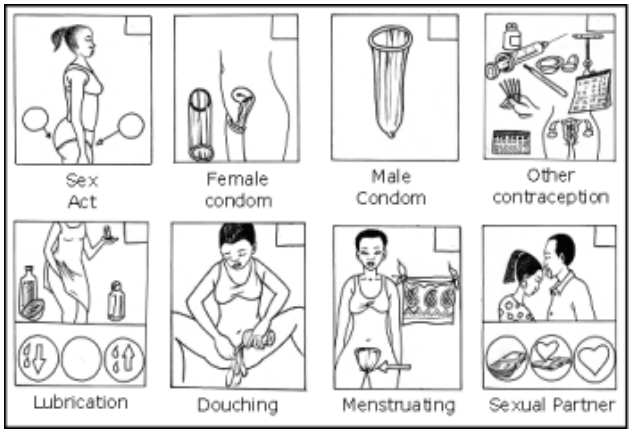


Fig 2.4 Self-administered, self-reporting coital diary with tick boxes [108]

Coital diaries may be used to gather retrospective reports of behaviour on a daily or other periodic basis or after each sex act. Coital diaries consist of a log, which can be pictorial, where respondents record information on each sex act such as the type of sex, type of partner, whether a condom was used

etc, such as the example shown in Figure 2.4 below. This picture card can be used to record up to four sex acts a day for seven days a week. Some studies suggest that the diary procedure may yield more accurate recall information about sexual behaviour than FTFI in resource poor settings with high completion rates, however, the reliability of this method remains contentious [104-108]. The diary method has its drawbacks however, such as the investment of time and complexity in coding and subsequently analysing the data; subjects tire of the procedure; and the expense required to train and monitor the respondents. Thus, this method is more suitable in detailed studies of small samples of individuals with frequent risk behaviour, who can be compensated for their efforts.

Table 2.2: Summary of advantages and disadvantages of quantitative interview tools

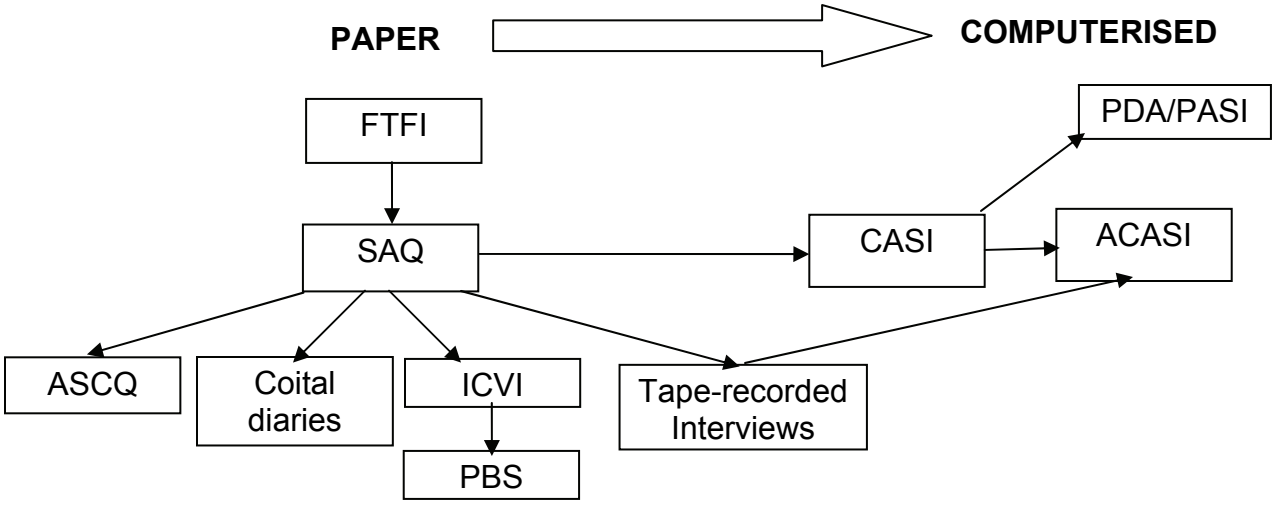
Interview tool	Advantages	Disadvantages
FTFI	• Ability to build a rapport with respondent • Ability for interviewer to probe inconsistent or non-responses • Ability for respondent to clarify terms or questions with the interviewer	Less privacy than non-interviewer administered tools ○ Possible reaction to interviewer
Computerised tools: CASI, ACASI, PASI, and PDA	• Increased privacy and feeling of anonymity than FTFI • Only the respondent hears the question • Eliminates source of potential bias associated with interviewer's presence • Can incorporate complex skip patterns, as well as consistency / range checking • Creates an automated data set allowing for immediate data analysis and reduces data entry error, thereby reducing costs and maximising reliability • Greater sense of confidentiality as no written record exists • ACASI: Removes literacy barrier to CASI as respondent can listen to the questions and have the option of turning off the screen for privacy • PDA: Portable and energy efficient, more practical than computers/laptops, requires less computer literacy (simplified keyboard) and relatively inexpensive	○ May be limited by computer illiteracy ○ Respondents fear of computers may negate privacy and confidentiality of computers [93] ○ Expensive computer infrastructure (hardware and software) and problems moving equipment around ○ Risk of data loss due to manhandling, malfunction or theft ○ Relies on reliable electricity source ○ CASI: requires respondent literacy
Tape-recorded interviews	• Increased privacy and feeling of anonymity than FTFI • Only the respondent hears the question • Removes the literacy problem as respondent listens to the questions	○ Pre-recorded nature of the tape makes complex skip patterns or open-ended questions difficult ○ Difficult to tailor wording based on answers ○ No potential to probe non-response

Table 2.2: Summary of advantages and disadvantages of quantitative interview tools continued…

Interview tool	Advantages	Disadvantages
ICVI and PBS	• Increased privacy and feeling of anonymity for respondent than FTFI • Low technology and inexpensive method for collecting data • Does not rely on reliable electricity source • Ability to build a rapport with the respondent Ability for respondent to clarify terms or questions with the interviewer	○ Maybe limited by illiteracy No potential for interviewer to probe non-response ○ Not possible to use complex skip patterns or open-ended answers ○ Representativeness of the population is difficult to achieve with the PBS, since it is often based on a non-random sample administered as a group
ASCQ	• Increased sense of privacy than FTFI, may reduce social desirability bias • Reduced chance of an interpersonal reaction to interviewer	○ Literacy dependent ○ No potential to probe non-response ○ Difficult to use complex skip patterns or open-ended answers
Coital diaries	• Diaries encourage frequent data recording, reducing recall bias • Eliminates source of potential bias associated with interviewer's presence	○ Literacy dependent ○ Time-consuming to code and analyse the data ○ Boredom as respondents tire of the procedure Expensive to train and monitor the respondents ○ Respondents could fill out the diaries before they hand them in rather than on a daily or weekly basis

As a result of the advantages and disadvantages of different interviewing techniques summarised in Table 2.2, quantitative survey techniques have evolved to address these issues (see Figure 2.5 below).

Figure 2.5 Evolution of quantitative survey techniques



2.4 Search Methods for the systematic review

2.4.1 Search strategies and eligibility criteria

A systematic review of existing literature on alternative interview tools was conducted. Electronic searches of PubMed, LILACS, Web of Knowledge, and Embase were carried out from June 2008 up to November 2008, and Pubmed search was updated in April 2009. Search terms included are outlined in Table 2.3. These searches were complemented with searches in general engines (for example, Google scholar), and reference lists of papers identified for inclusion were also searched. Six authors were contacted in a request to send additional data for the meta-analysis, which was not available from the paper alone [82, 88, 90-91, 95b, 99-100, 102-103]. All authors replied and sent data that was included in the review.

All records were initially screened by a single author (Anna Phillips) to exclude records that were irrelevant. A second author (Gabriela Gomez) performed the search again to check all relevant articles had been found. A short list was then prepared by both and checked for compatibility. If either author found an article to be relevant, a full text copy was obtained. There was no restriction on date or language. Only one paper was returned in Chinese and this was translated into English for the analysis. A short list was then prepared by both and checked for compatibility. If either author found an article to be relevant a full text copy was obtained.

Studies were selected for inclusion within the review using the following criteria:

- studies compared one or more interviewing tools with the paper-based FTFI or SAQ questionnaire;
- studies took place in low- and middle-income (according to World Bank classification) countries, in order to examine the feasibility of alternative interview methods in resource poor settings
- studies collected data on HIV risk, including sexual information or injecting drug use

Table 2.3: Literature search strategy for identification of studies included

Search terms		
1. HIV risk behaviour 2. Sexual* 3. Injecting drug use [*Truncated term]	AND	1. Self-administered questionnaire OR SAQ 2. Assisted self-administered questionnaire OR ASCQ 3. Audio computer assisted self-interview OR ACASI 4. Computer assisted personal interview OR CAPI 5. Handheld 6. Pocket PC OR Pocket-PC 7. Palm-top OR Palmtop 8. Personal digital assistant OR PDA 9. Palm assisted self-interview OR PASI 9. Informal confidential voting interview OR ICVI 10. Polling (booth OR box) survey OR PBS 11. Coital diaries

2.4.

2.4.2 Data extraction

We hypothesised that innovative methods that bypass the interviewer will be more successful than FTFI in achieving self-reports of risky behaviour as the impact of interviewer bias has been removed. For this reason a comparison will be made between alternative interviewing tools (mostly ACASI) and FTFI. Four potentially sensitive questions were included for review:

1) '**Have you ever had sex**': since many of the papers interviewed adolescents, it was assumed that social desirability bias may be particularly great among school pupils concerned about peer stigma and adult punishment for pre-marital sex. For example, in Tanzania school pupils are severely punished if they are found to have had sex [49]. Therefore, according to our hypothesis a higher proportion should report ever having sex in the alternative interview method.
2) **Non-condom use** included a range of questions such as *lifetime*, *last 6 months*, *last 2 weeks*, and *last sex act*. Although there was no uniform question asked across all papers, it was assumed that it is socially undesirable to report non-condom use regardless of time frame, therefore respondents would be more likely to admit unprotected sex if the interviewer bias had been removed. In religious communities or where condom use is associated with risky behaviour, condom promotion might be frowned upon and it would be 'desirable' to deny condom use. Such a circumstance was not addressed in any of the papers in the review so we assume condom use is socially desirable.
3) '**Ever been forced to have sex**': since this outcome was expected to have strong negative connotations, it was expected that in a more private interview setting an increased number of respondents would report forced sex in the alternative interview tool;
4) **Number of partners**: time over which partner numbers are elicited, and threshold number distinguishing few from many partners, varied across studies. Despite this variation it was assumed that it would be socially undesirable to report a higher number of partners. In order to assess variability, timeframe and partner threshold were included in the subgroup analyses.

2.4.3 Analysis

Sample size was defined as the number of people that took part in the survey because the denominator for each of the four outcomes varied within and between papers. Crude odds ratios (e.g. odds of respondents reporting the risk behaviour in ACASI/odds of respondents reporting the risk behaviour in FTFI or SAQ) and the 95% confidence intervals were calculated using the FTFI as the comparative group. For the meta-analysis, odds ratios (OR) were transformed into log(OR) and standard error of log(OR) to calculate summary estimates. Cochran's Q test and I-squared were performed to assess heterogeneity between studies [110].

Studies were grouped by study or population characteristics: gender, education, locale (urban/rural) and region (Africa/South America/Europe/Asia). Surveys that interviewed both male and female respondents were considered independent and treated as two separate studies in the meta-analysis, in order to examine the impact of gender. For instance it was anticipated that girls, for whom secrecy about sexual activity is the norm, would be particularly susceptible to report more premarital sex in a more private interview setting [95]. However, boys may exaggerate their level of sexual activity in the FTFI. Regarding education level of the participants, we created an aggregated study-level variable: over or under 60% of the sample having received secondary school education. Summary estimates in the subgroup analyses were calculated using random effects models [111]. Forest plots were used to explore graphically the heterogeneity found between the studies and between the pooled estimates by subgroups [112].

Subgroup analysis can be performed at two levels. At the individual level, categorising individuals into subgroups within a study permit the exploration of individual level influence on a particular estimate. At the study level, studies can be grouped by study or population level characteristic to observe their influence on variability across summary study estimates across levels. However, in some instances, significant residual intracategory variation may exist across studies within a given level, which may explain more of the variability across all study estimates than the factor under study (i.e. stratified for).

Due to the small number of studies, especially by subgroup, a multivariate meta-regression could not be performed.

2.5 Results

2.5.1 The primary studies

Nearly 1700 articles were identified. Of these 105 were selected to be reviewed in full. Twenty-one studies satisfied the primary selection criteria, examining interviewing techniques in resource poor settings. Eight additional papers were identified in the reference lists. Of these 29 studies, five were excluded because they did not contain quantitative results and four studies compared interviewing tools with SAQ only (the search results are summarised in Table 2.5). Of the remaining 20 studies, five were combined as they reported results from the same dataset. A final total of 15 studies were divided by gender, interview mode and district to create 26 independent datasets to be included in the meta-analysis, the characteristics of which are described in Table 2.4. The decision tree for inclusion of studies is shown in Figure 2.6.

2.5.2 Main results

Figure 2.7 and 2.8 show OR and 95% CI for reporting HIV risk behaviour by interview mode. An OR>1 meant respondents were more likely to report a risk behaviour using an alternative interview mode than by FTFI.

The funnel plots in Figures 2.9- 2.12 show the interview mode effect from individual studies (horizontal axis) against measure of study size (vertical axis). A funnel plot is a scatter plot that reflects how the estimates of the interview tool vary as sample size increases. In the absence of bias, results from small studies are expected to scatter widely at the bottom of the graph, with the spread narrowing among larger studies. Publication bias (the association of publication probability with the statistical significance of the results) and the use of the wrong measure of association may lead to asymmetrical funnel plots.

The funnel plots (Figure 2.9-2.12) are reasonably symmetrical therefore we can be reasonably confident in assuming there is no publication bias for these outcomes.

Figure 2.6: Systematic review search results of computerised methods to date

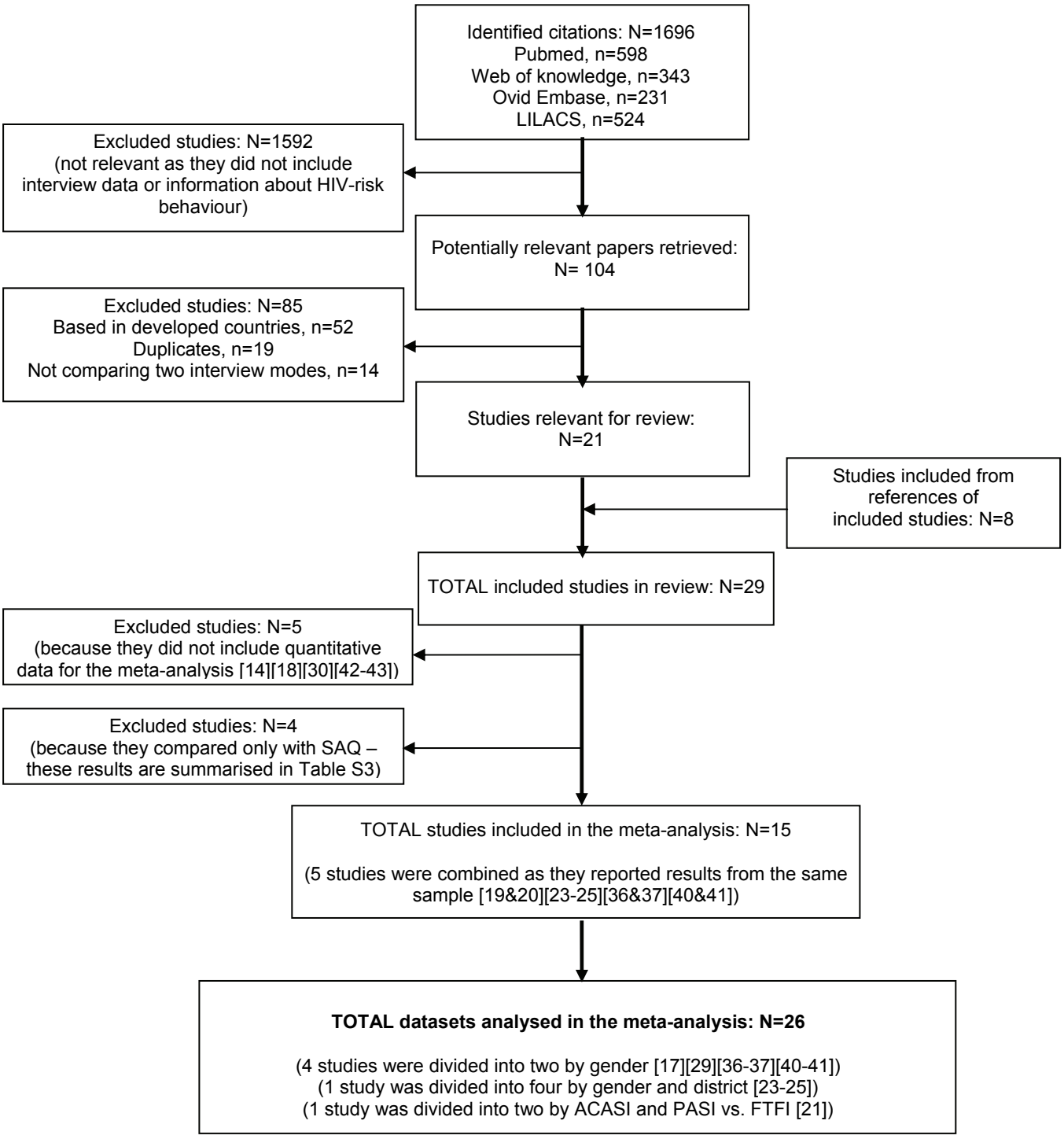


Table 2.4: Summary of selected studies comparing alternative quantitative interview tools with FTFI in low-middle income

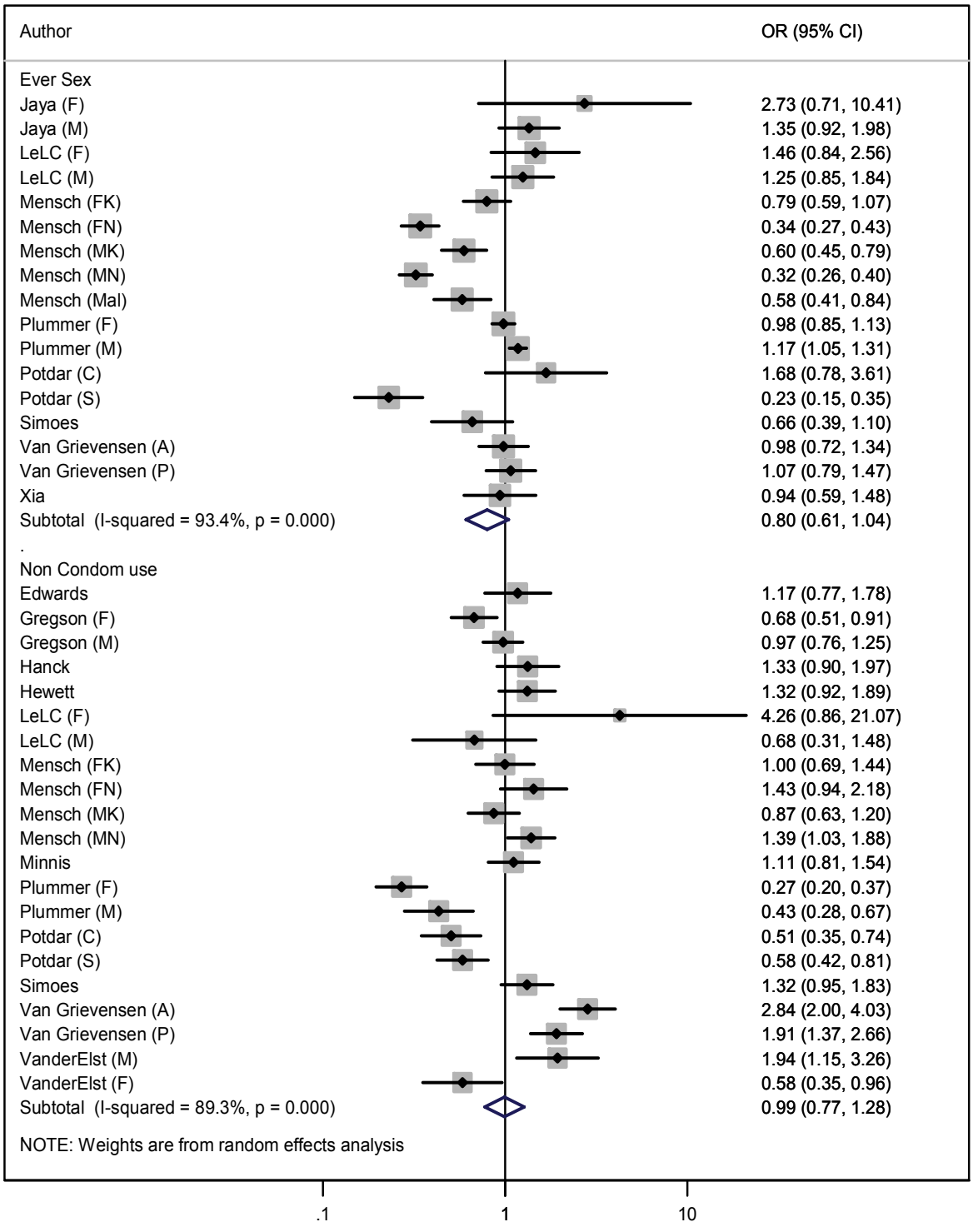
Study population (grey) and reporting estimates (white)	Design	Gender	Tool	Age	Ever had sex n (N-n)	Non Condom n (N-n)	Timeframe of Non-Condom use question	Forced Sex n (N-n)	Number of partners n (N-n)	No. of partners threshold	Timeframe number of partners	ΣN
Simoes, Brazil, Injecting Drug Users 2003												
Simoes (2005)	RCT	C	ACASI	18+	260 (35)	279 (88)	*Inconsistent*		67 (300)	2+	*6 months*	367
			FTFI		338 (30)	260 (108)			40 (328)	2+		368
LeLC[82], Vietnam, Adolescents												
LeLC (2006) [82]	RCT	M	ACASI	15-24	69 (309)	50 (22)	*Last sex act*	1 (375)	*3.46 §*	*[Mean]*	*Lifetime*	378
		M	FTFI		54 (302)	47 (14)		0 (352)	*1.46 §*			356
		F	ACASI		29 (364)	50 (22)		2 (385)	*1.92 §*			393
		F	FTFI		24 (441)	47 (14)		0 (461)	*1.06 §*			465
Hewett[81] and Mensch, Brazil, Adolescents												
Hewett[81] (2004)	RCT	F	ACASI	15-21		243 (68)	*Last sex act*		*1.6 §*	*[Mean]*	*Last 6 months*	409
			FTFI			254 (94)	*(vaginal sex)*		*1.3 §*			409
Van Griensven[87], Thailand, Adolescents												
Van Griensven (2005) [87]	RCT	C	PASI	15-21	192 (136)	238 (90)	*Last sex act*					328
			FTFI		180 (137)	184 (133)						317
			ACASI		183 (142)	259 (66)						325
			FTFI		180 (137)	184 (133)						317
Mensch [90] & Hewett [91-92], Kenya, Adolescents – data taken from												
Mensch (2003) [90] & Hewett (2004) [91-92]	RCT	M (K)	ACASI	15-21	193 (212)	250 (109)	*Lifetime*	17 (83)	45 (55) ‡	1+	*Lifetime*	764
		M (K)	FTFI		217 (142)	262 (99)		9 (91)	41 (59) ‡			
		F (K)	ACASI		146 (197)	256 (69)		31 (69)	35 (65) ‡			691
		F (K)	FTFI		168 (180)	275 (74)		13 (87)	21 (79) ‡			
		M (N)	ACASI		271 (417)	111 (160)						1509
		M (N)	FTFI		548 (273)	182 (365)						
		F (N)	ACASI		138 (465)	79 (48)						1324
		F (N)	FTFI		335 (386)	178 (155)						

Potdar[64], India, College students and Slum dwelling adolescents												
Potdar (2005)[64]	RCT	M (C)	ACASI	18-22	18 (282) ‡	205 (95) ‡	*Lifetime*	19(281)‡	25 (275) ‡	2+	*Lifetime*	300
		M (C)	FTFI		11 (289) ‡	243 (57) ‡		2 (298)‡	13 (287) ‡			300
		M (S)	ACASI		33 (267) ‡	134 (166)‡		24(276)‡	143 (157)‡			300
		M (S)	FTFI		105 (195)‡	174 (126)‡		13(287)‡	143 (157)‡			300
Edwards, Russia, Drug Addiction patients												
Edwards (2008)	XSect	C	ACASI	18+		79 (101) ‡	*Last 6 months*		47 (133) ‡	4+	*Last 6 months*	180
			FTFI			72 (108) ‡			50 (130) ‡			180
Minnis, Zimbabwe, General population												
Minnis (2007)	RCT	F	ACASI	18-35		122 (216)	*Lifetime*		76 (262)	1+	*Lifetime*	338
			FTFI			106 (209)			77 (238)			315
Jaya, India, Adolescents												
Jaya (2008)	XSect	M	ACASI	15-19	78 (212)			33 (257)				290
		M	FTFI		62 (228)			23 (267)				293
		F	ACASI		8 (225)			8 (225)				233
		F	FTFI		3 (230)			3 (230)				242
Mensch, Malawi, Adolescents												
Mensch (2008)	RCT	F	ACASI	15-21	79 (147)				27 (73) ‡	1+	*Lifetime*	226
			FTFI		132 (143)				17 (84) ‡			275
Van der Elst, Kenya, Sex workers												
Van der Elst (2009)	XSect	M	ACASI	18+		75 (36)	*Inconsistent with regular partner*	23 (236)	*2*	*[Median]*	*Last month*	259
		M	FTFI			72 (67)		10 (249)	*1*			259
		F	ACASI			213 (46)		9 (129)	*2*			139
		F	FTFI			230 (29)		3 (132)	*1*			139
Xia, China, General population												
Xia (2004)	RCT	F	Tape	18-49	41 (246)							287
			FTFI		46 (259)							305
Gregson, Zimbabwe, General population												
Gregson (2004)¤	RCT	M	ICVI	15-54		999 (353)	*Last 2 weeks*		112 (1239)	1+	*Last month*	1351
		M	FTFI			311 (107)			21 (398)			418
		F	ICVI			1304 (207)			35 (1476)			1511
		F	FTFI			624 (67)			8 (683)			691

Hanck, India, Female Sex Workers												
Hanck (2008)	XSect	F	PBS	18+		55 (164)	*Last sex act*					269
			FTFI			81 (322)						812
Plummer, Tanzania, Adolescents												
Plummer (2004)	XSect	M	ASCQ	15-21	1430 (1142)	1986 (68)	*Lifetime*	149 (2423)	240 (1055)	2+	*Last month*	1430
									53 (1242)	4+		
		M	FTFI		1327 (1245)	2024 (30)		3 (2569)	105 (1238)	2+		1343
									7 (1336)	4+		
		F	ASCQ		481 (1684)	2225 (172)		266 (1899)	48 (401)	2+		449
									4 (445)	4+		
		F	FTFI		489 (1676)	2348 (49)		4 (2161)	32 (470)	2+		502
									2 (500)	4+		

Study population: ¤ Gregson *et al* Round 1 data has been analysed only. **Design of sampling method**: RCT: randomised control trial (i.e. respondents were randomly allocated to either innovative interview tool or FTFI), XSect: Cross-sectional survey where respondents answered both interview tools; Male and female results were combined together and it was not possible to analyse separately; **Gender**: C; Combined male and female studies; M: Male data was reported and analysed independently; F: Female data was reported and analysed independently; Mensch [23] (2003) & Hewett [24-25](2004) have beed divided by gender and location of study – Kisumu and Nyeri districts (K) and (N) respectively; Potdar (2005)[26] has been divided by population type College students (C) and slum swelling adolescents (S); **Outcome**: n: the number of respondents who answered positively to the question in each interview tool and N-n: the number of respondents who answered negatively to the question in each interview tool, OR were then derived by [Odds of reporting behaviour in non-FTFI]/[Odds of reporting behaviour in FTFI]; ‡ the results in these papers were given as percentages, these were then re-calculated using the total sample size to calculate absolute numbers; § The mean number of partners were given by interview type in this study, as a result they were not included in the meta-analysis. **Number of partners**: The threshold of partner number varied across the studies, the odds ratio was calculated as above using the absolute number of respondents that had reported above the threshold in the non-FTFI method/the number of respondents that had reported over the threshold in the FTFI. * Plummer et al reported number of partners for several thresholds, those reporting over 2 and 4 partners have been included in the meta analysis for ASCQ data in 1998 only. ΣN = number of subjects that participated in the study by interview type. Please note that the number of respondents answering each question may vary for example those that had never had sex would not answer a question on non-condom use. The total number of respondents answering each question can be calculated by adding together the number answering by alternative interview type plus FTFI.

Figure 2.7**: Odds Ratio for 'Ever had sex' and 'Non-condom use'



** Four papers were divided into separate studies by gender (M)=Male and (F)=Female as the data was reported by individual sex. Potdar & Koenig analysed slum-dwelling (S) and college (C) youth individually and so have been divided into two separate studies. Van Grievensen reported individual comparisons between ACASI (A) and PASI (P) with FTFI. Mensch sampled into two regions in Kenya (Kisumu and Nyeri) where samples were further divided by gender, therefore the data has been split into four: Kisumu Female (FK) and male (MK) and Nyeri Female (FN) and male (MN).

Figure 2.8: Odds Ratio estimates for 'Forced sex' and 'Number of partners'

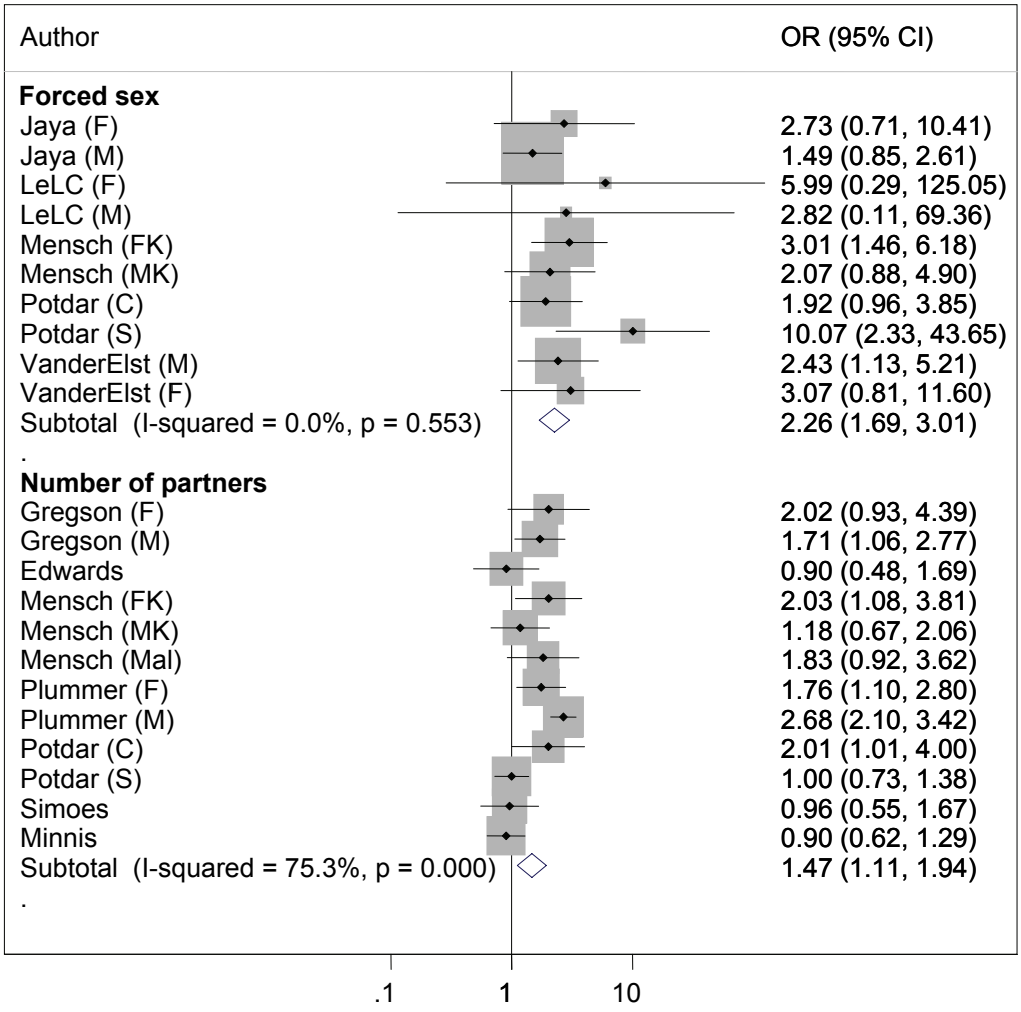


Figure 2.9: Funnel plot, with pseudo 95% confidence limits, investigating publication bias for 'Ever had sex'

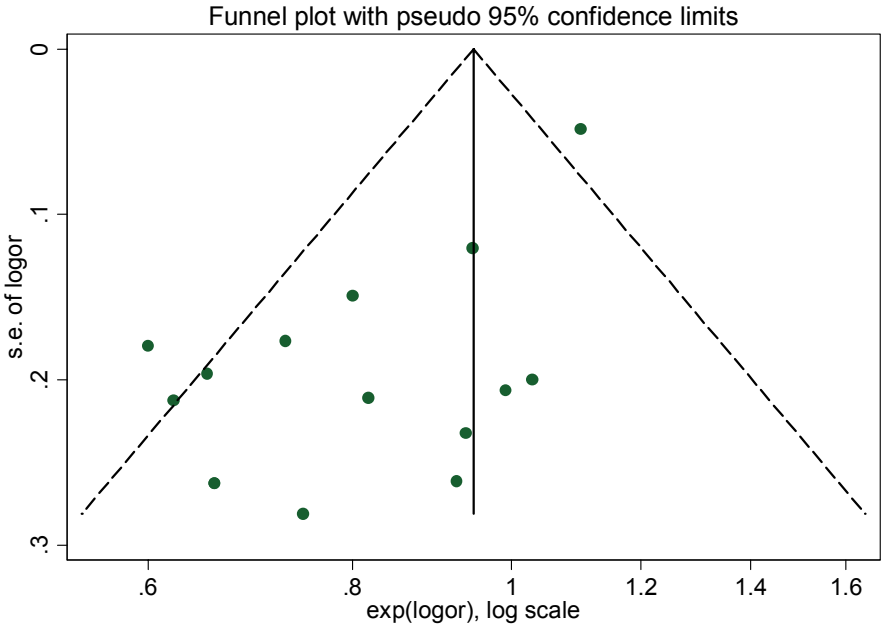


Figure 2.10: Funnel plot for investigating publication bias in meta-analysis for 'Non-condom use'

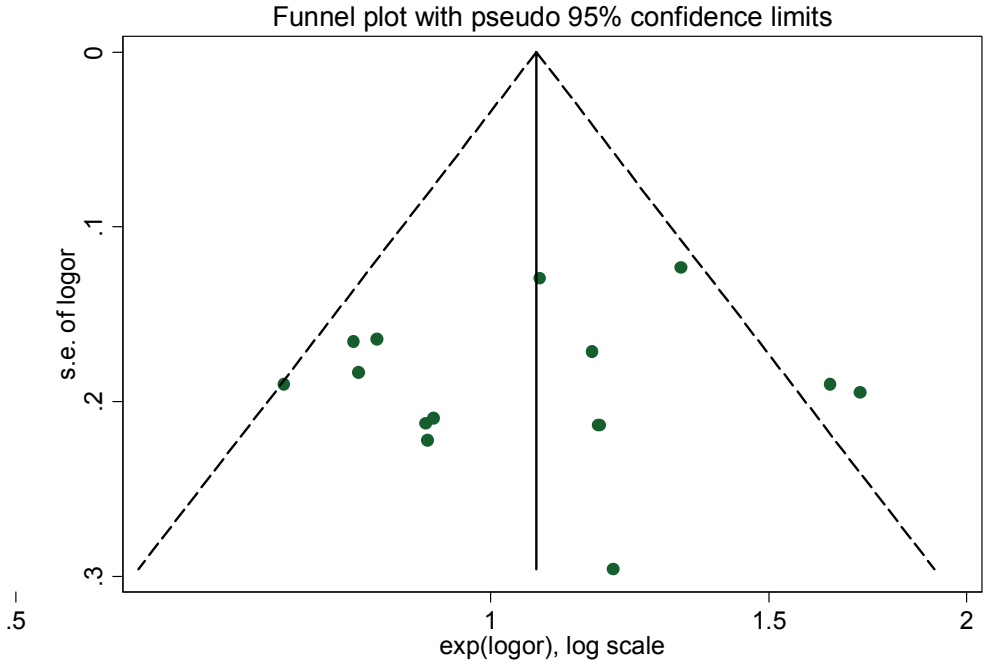


Figure 2.11: Funnel plot for investigating publication bias in meta-analysis for 'Ever forced to have sex'

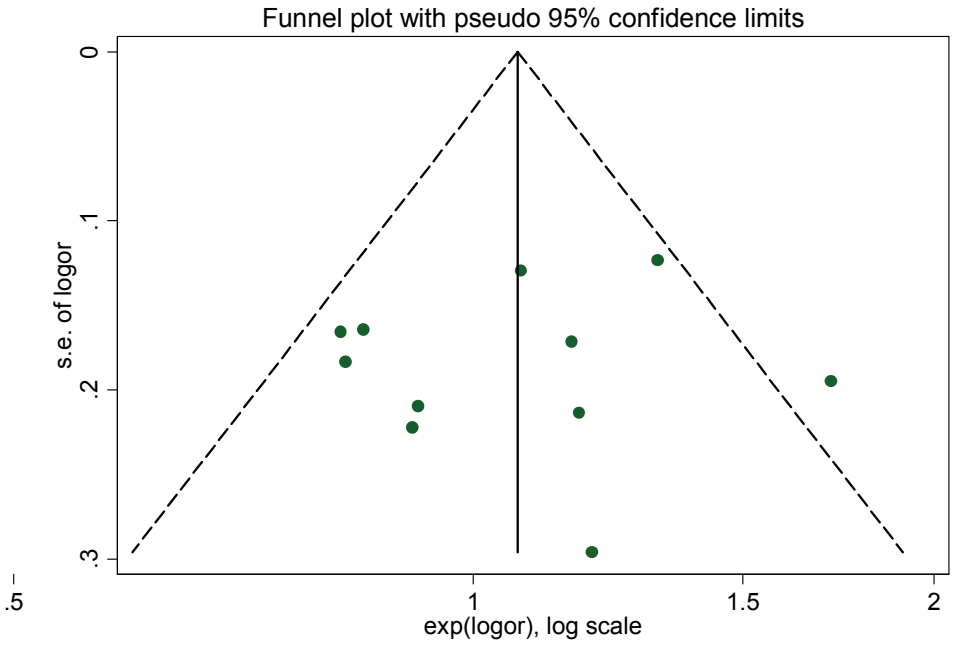
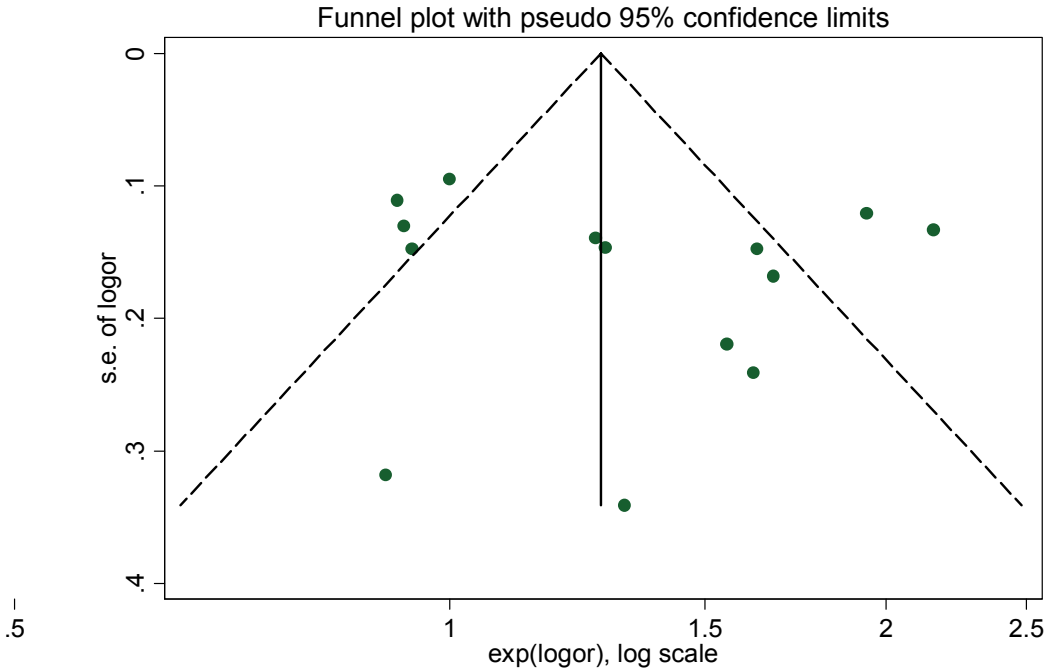
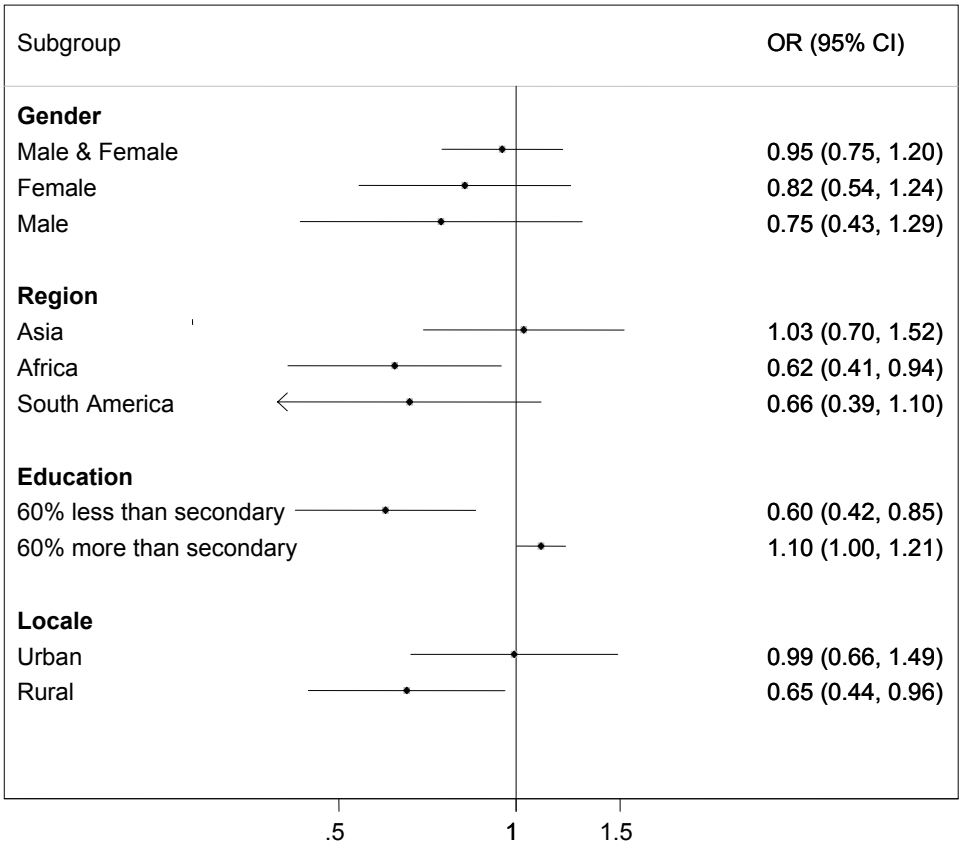


Figure 2.12: Funnel plot for investigating publication bias in meta-analysis for 'Number of partner'



'Ever had sex'[††]: There were a total of 17 studies reporting 'ever had sex'. There is significant heterogeneity between studies (I^2=93.4%, p<0.001), preventing a summary estimate to be interpreted. However, in the subgroup analysis presented in Figure 2.13, studies with a higher proportion of participants having finished secondary education had a significantly higher pooled estimate of reporting sex in non-FTFI methods. There were trends observed between region and locale, with studies from Africa and those sampled in rural areas presenting a lower pooled OR. However the CIs overlap for these subgroups.

Figure 2.13: Pooled estimates for subgroup analysis for 'Ever had sex'



[††] Since it was assumed that this question would only be susceptible to bias among adolescents, general population were excluded from this analysis, except for the study by Xia in China [34]. In this study it was asked if respondents had had sex before marriage, which was considered by the authors as predisposed to social desirability bias.

As a result of the distinctions emerging in Figure 2.13, ever had sex by region, education and locale were explored to examine heterogeneity between studies, as shown in Figure 2.14, 2.15 and 2.16 respectively.

Figure 2.14: Heterogeneity for 'ever had sex' by region

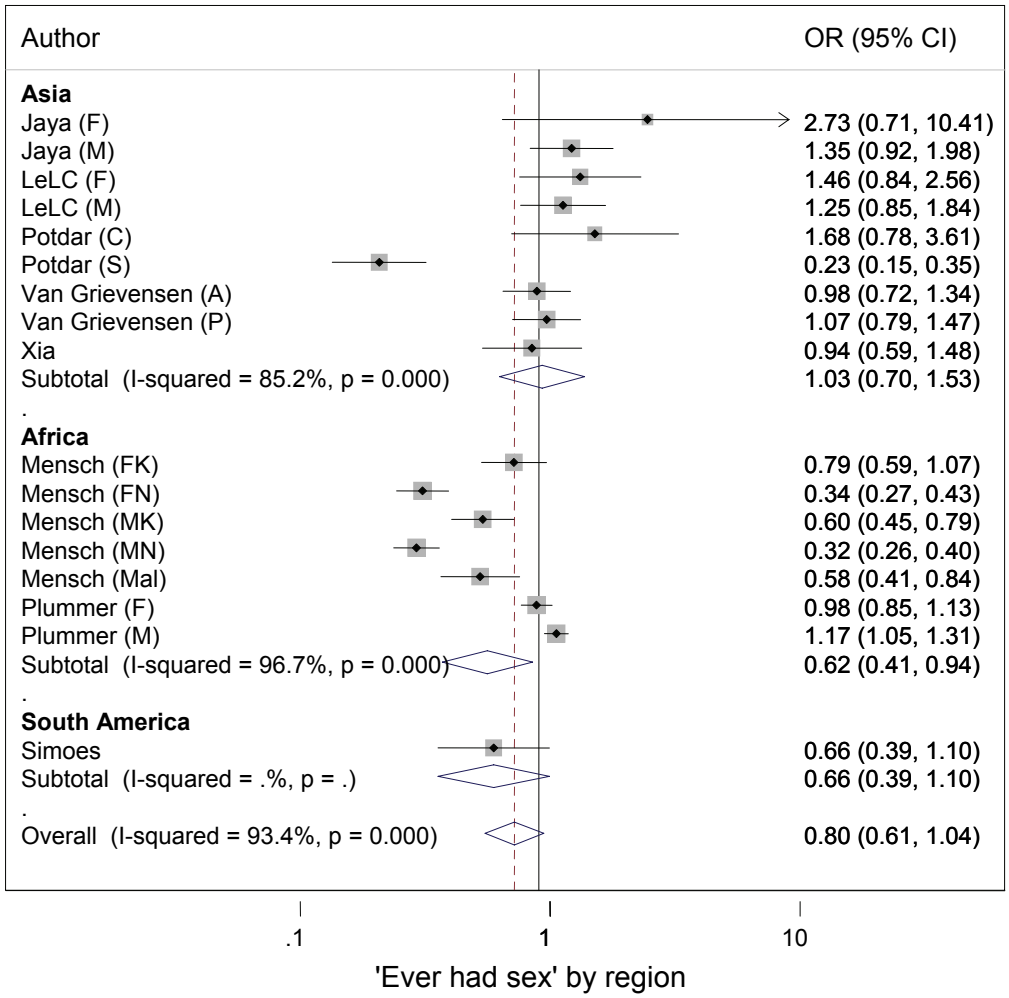


Figure 2.14 shows increased reporting of 'ever had sex' in non-interviewer administered tools for many studies conducted in Asia, compared to those in Africa and South America, although this difference is not statistically significant.

Figure 2.15: Heterogeneity & homogeneity for 'ever had sex' by education

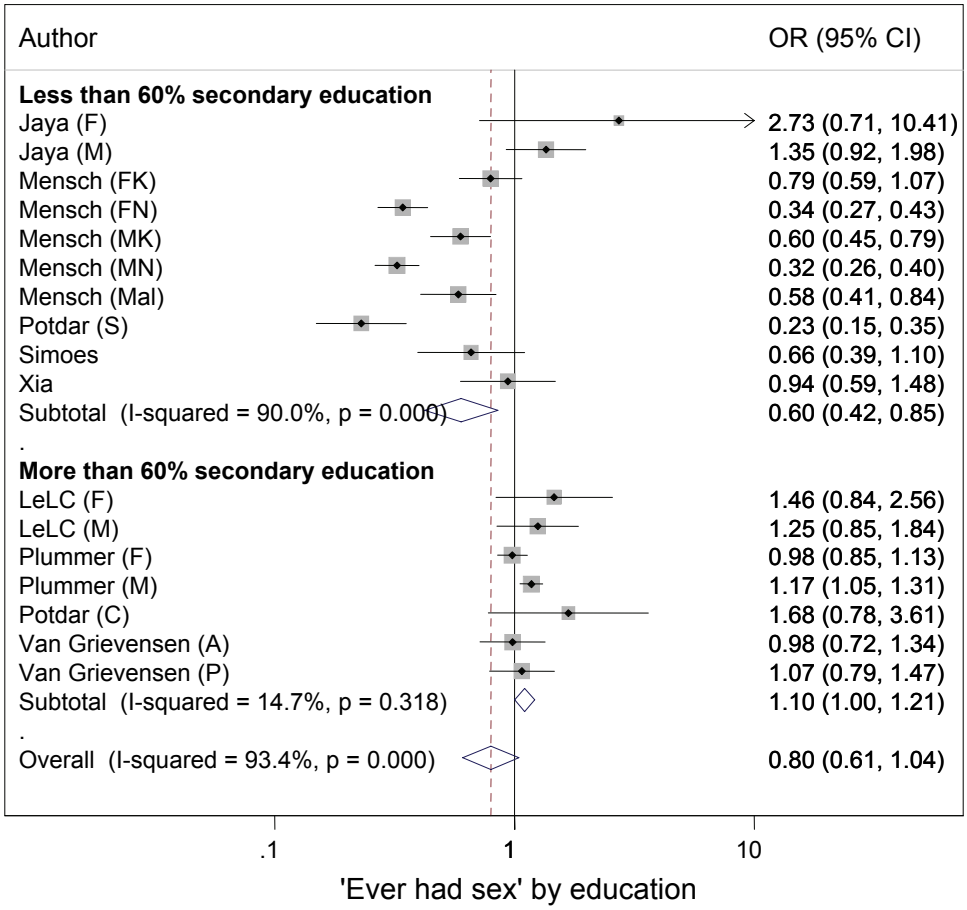


Figure 2.15 shows statistically signficant increase in reporting of ever had sex by non-FTFI methods among studies where more than 60% have secondary education, compared to studies where less than 60% had received secondary schooling.

Figure 2.16: Heterogeneity for 'ever had sex' by locale

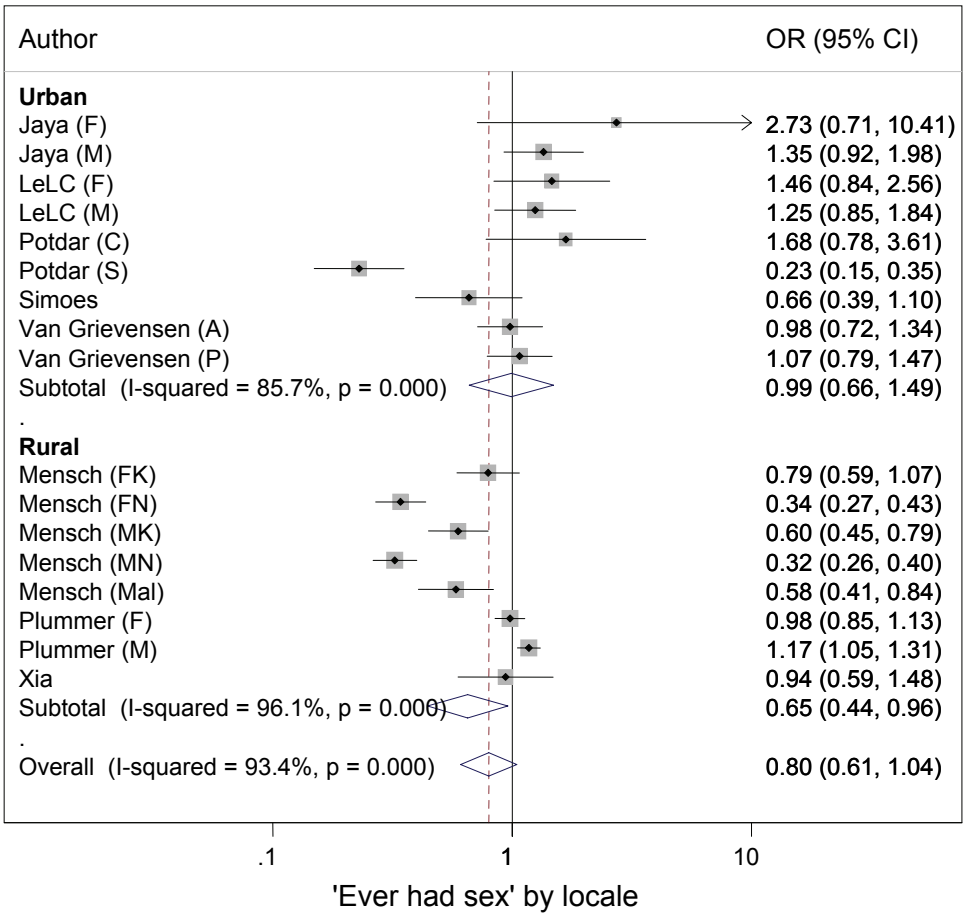
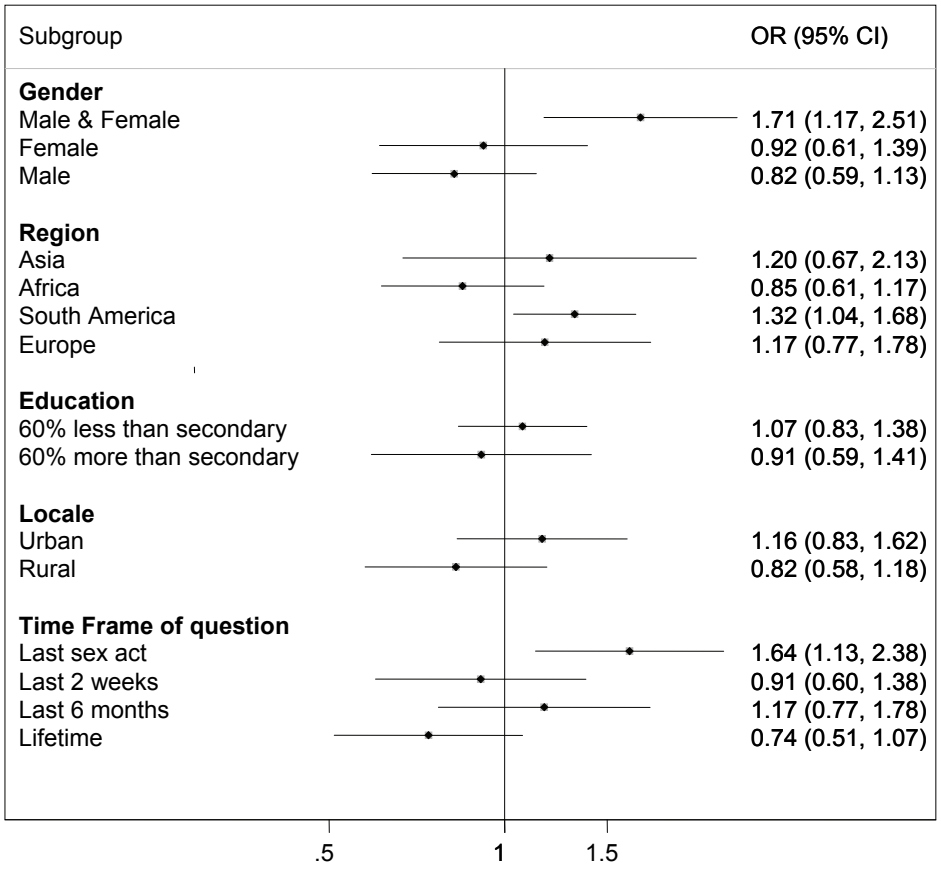


Figure 2.16 demonstrates that reporting 'ever had sex' was higher (although not significantly) across most studies in urban areas. However, the study among slum respondents by Potdar *et al* had much lower reporting in non-FTFI which is likely to be a result of confounding with lack of education and experience with technology.

Non-condom use': There were 21 studies that reported on 'non-condom use'. As shown in the bottom part of Figure 2.7, there is also significant heterogeneity present across all studies for non-condom use (I^2=89.3%, p<0.001) preventing us to quote a summary statistic. Subgroup analysis to explore the source of variation is included in Figure 2.17. In contrast to 'ever had sex', there were fewer clear distinctions emerging. There was a trend to an increased reporting of non-condom use among non-FTFI participants in all regions except Africa. This effect was particularly pronounced regarding South America. We also observed a trend in rural areas towards a lower effect estimate, which supported the findings of 'ever had sex'. However, the CIs are

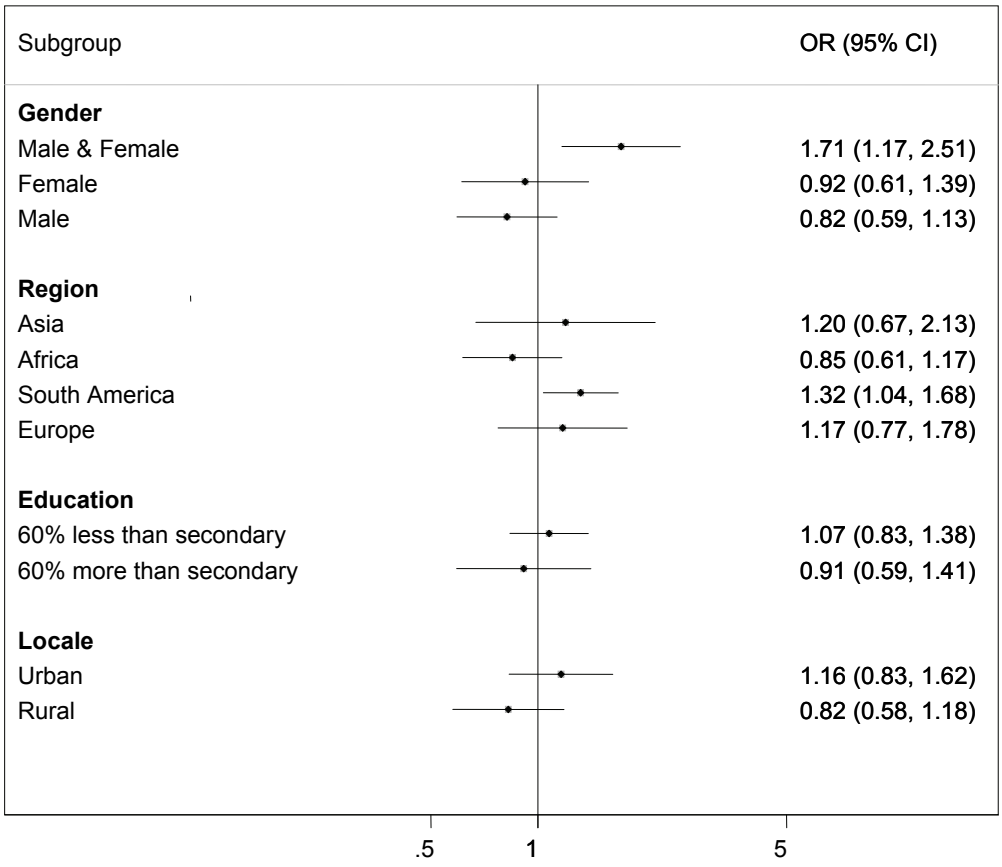
large and overlap for these subgroups. 'Last sex act' seemed to show a greater increase in reporting of non-condom use with respect to questions asked with a longer time frame.

Figure 2.17: Pooled estimates for subgroup analysis for 'Non-condom use'



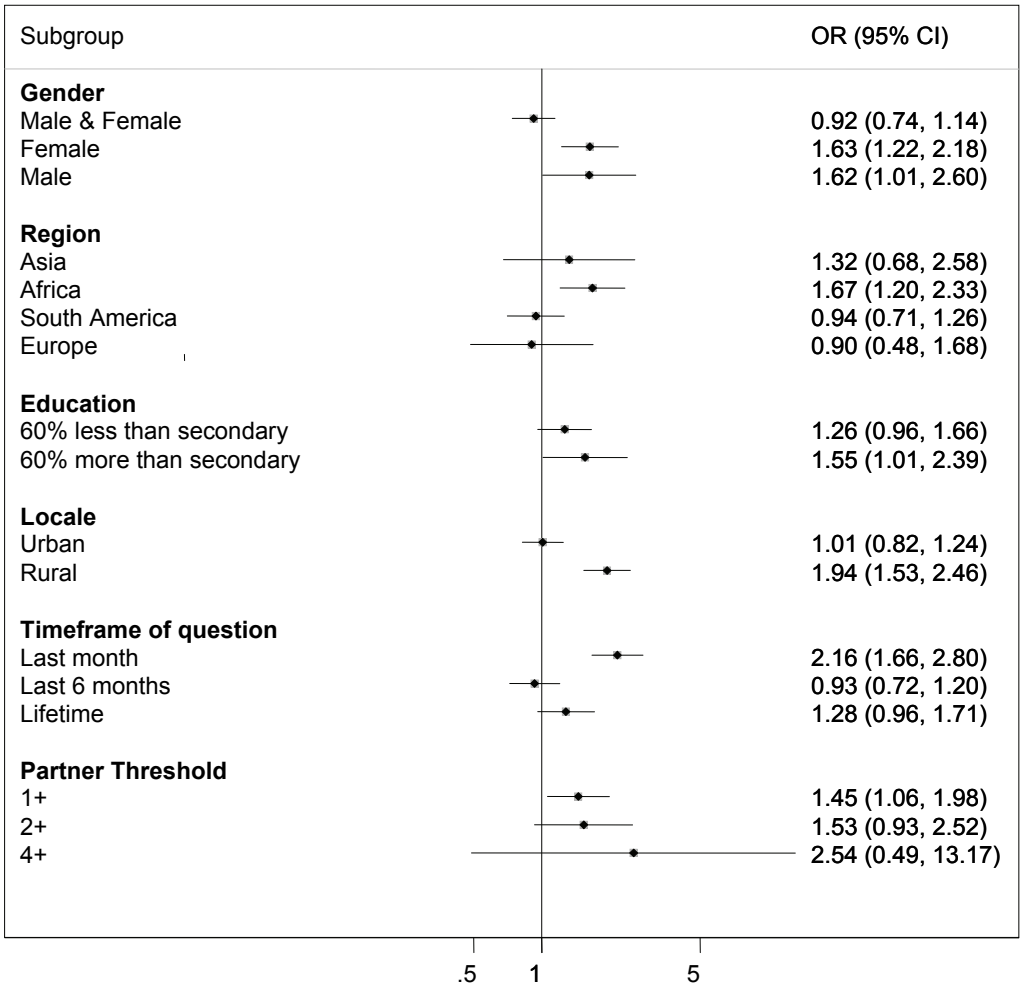
'Ever forced to have sex': There were a total of 12 studies reporting 'ever been forced to have sex'. There was consistent increased reporting of coerced sex among non-FTFI participants in all studies with no significant heterogeneity between them (Figure 2.18 OR 2.26; 95% C.I 1.69-3.01). Contrary to expectation, Figure 2.8 shows a trend towards less educated respondents as well as rural, African studies presenting a slightly higher pooled estimate of reporting forced sex in non-FTFI method, although the CIs overlap for these subgroups.

Figure 2.18: Pooled estimates for subgroup analysis for 'Forced sex'



'Number of sexual partners': There were a total of 12 studies reporting 'number of partners'. Nearly all studies demonstrated increased reporting of a higher number of sexual partners among non-FTFI participants (Figure 2.8), with significant heterogeneity observed between them ($p<0.01$). Figure 2.8 shows a higher reporting in non-FTFI among more educated respondents but contrary to the trends observed for ever had sex and non-condom use, studies from rural areas presented the highest pooled OR in non-FTFI. We also observed a similar trend regarding studies in the African region but in this subgroup analysis CIs overlap. Figure 2.8 also shows studies with a shorter reporting timeframe (last month) report higher numbers of partners in the non-FTFI. Furthermore, as the number of partner threshold increases (i.e. more stigmatised behaviour) the difference between the FTFI and alternative tool also tends to increase. As a result of the distinctions emerging in Figure 2.8, the number of partners by region and timeframe were explored to examine heterogeneity between studies, as shown in Figure 2.20 and 2.21 respectively.

Figure 2.19: Pooled estimates for subgroup analysis for 'Number of partners'[‡‡]



[‡‡] Note Plummer et al have reported number of partners over +2 and +4 threshold, therefore the OR for Plummer et al have been calculated and included in pooled estimates for both threshold question subgroups.

Figure 2.20: Heterogeneity for 'number of sexual partners' by region

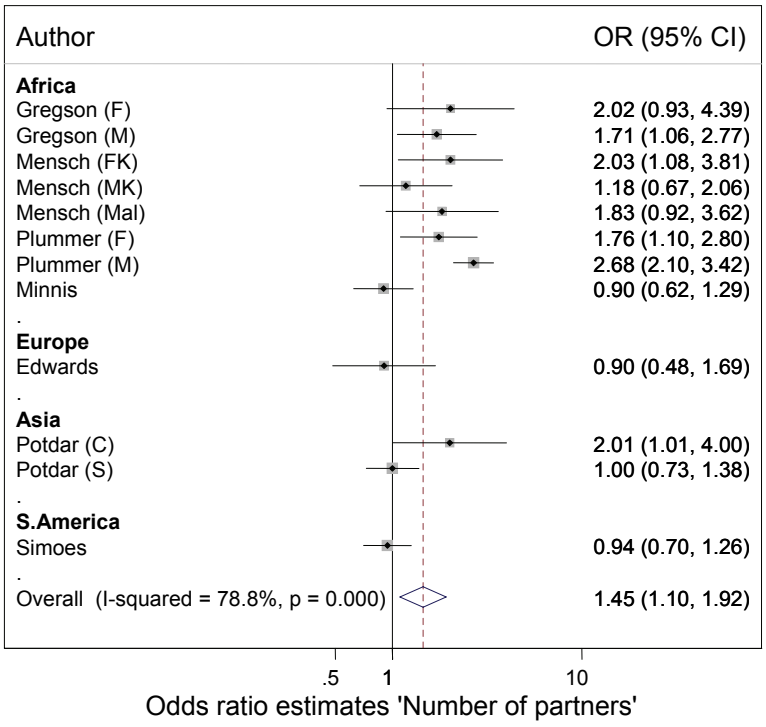
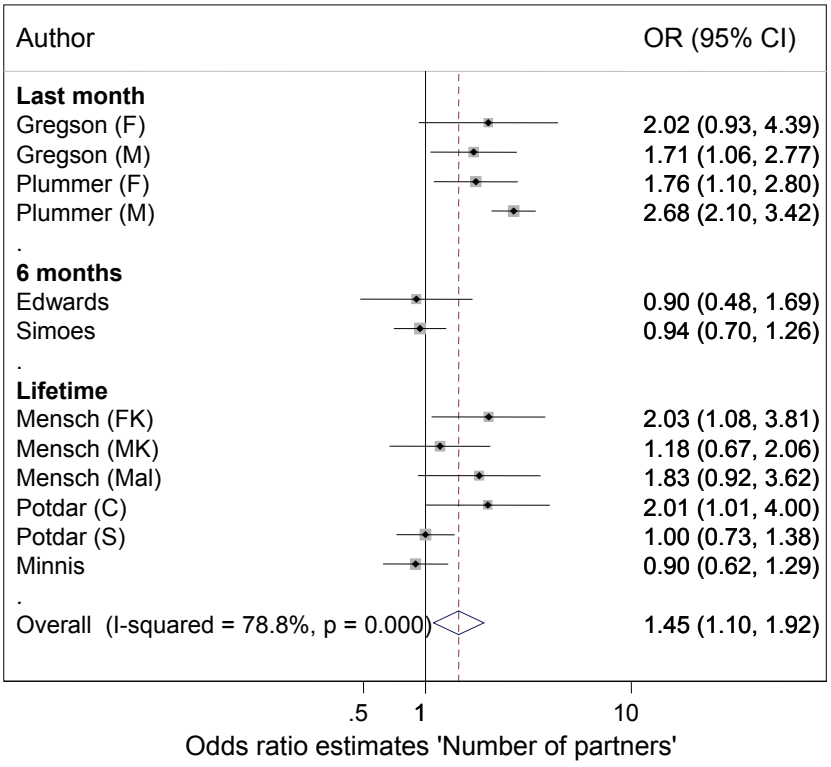


Figure 2.21: Heterogeneity for 'number of sexual partners' by timeframe



A comparison was also made between innovative interview tools and paper-based SAQ. Although the results have not been analysed in detail, the summary Table 2.5 outlines the similar estimates with the FTFI comparison, and lack of difference between SAQ and alternative interview methods for the outcome 'ever had sex' (OR: 1.07; 95% C.I 0.91, 1.25) and non-condom use (OR: 0.87; 95% C.I 0.67, 1.12). Although forced sex also demonstrated increased reporting in the non-FTFI with respect to the SAQ method, the difference was not as significant.

Table 2.5: Summary odd ratios by outcome for meta-analyses of SAQ versus alternative interview tool

Outcome	Subgroup		Random effects estimate, Odds Ratio	95% C.I	Q	P	N	References
Ever had sex	Gender	Combined	1.10	0.83, 1.46	10.7	.03	5	[87][96-97][114]
		Male	1.04	0.76, 1.42	7.94	.09	5	[64][82][90-91][95]
		Female	1.08	0.82, 1.42	17.8	<.001	5	[82][90-91][95]
	Region	Asia	1.24	1.04, 1.47	12.2	.	10	[64][82][87][114]
		Africa	0.85	0.71, 1.02	8.28	.08	5	[90-91][95][97]
		S.America	1.69	0.85, 3.34	0.00	.20	1	[96]
	Education	Less 60%	0.93	0.75, 1.15	10.0	.04	5	[90-91][95-96]
		More 60%	1.15	0.94, 1.41	20.6	.02	11	[82][87][95-96][114]
	Locale	Urban	1.23	0.96, 1.57	17.5	.02	8	[64][82][87][96][115]
		Rural	0.92	0.78, 1.08	11.0	.14	6	[90-91][95]
	Summary estimate		1.07	0.91, 1.25	39.2	<.001	16	
Non-condom use	Gender	Combined	0.93	0.69, 1.25	2.60	.27	3	[87][97]
		Male	0.77	0.54, 1.11	19.3	<.001	6	[82] [90-91]
		Female	1.41	0.51, 3.90	16.7	.01	3	[64][82][90-91][95]
	Region	Asia	0.96	0.67, 1.37	16.2	.01	7	[64] [82][87][95]
		Africa	0.79	0.52, 1.19	21.0	<.001	5	[90-91][95][97]
	Education	Less 60%	0.80	0.50, 1.27	20.9	.02	4	[90-91]
		More 60%	0.93	0.67, 1.29	16.7	<.001	8	[64][82][87][95]
	Locale	Urban	1.01	0.68, 1.49	14.9	0.01	6	[64][82][87]
		Rural	0.78	0.54, 1.12	21.5	<.001	6	[90-91][95]
	Summary estimate		0.87	0.67, 1.13	39.7	<.001	12	
Ever forced to have sex*	Gender	Combined	1.54	0.38, 6.27	0.00	.	1	[97]
		Male	1.11	0.56, 2.19	0.16	0.98	4	[64][82][95]
		Female	1.49	0.76, 2.92	1.78	0.41	3	[82][95]
	Region	Asia	1.29	0.80, 2.08	2.32	0.89	7	[64][82][95]
		Africa	1.54	0.38, 6.27	0.00	.	1	[97]
	Locale	Urban	1.22	0.51, 2.93	0.52	0.92	4	[64][82][97]
		Rural	1.35	0.80, 2.29	1.82	0.61	4	[95]
	Summary		1.31	0.84, 2.06	2.38	0.94	8	

Q –heterogeneity statistic; P – p-value; N- number of study estimates
* All respondents in studies reporting 'Ever forced to have sex' had more than 60% of the sample with secondary education

2.6 Discussion

This review evaluates the impact of innovative modes of data collection in low- and middle-income countries by collating studies that compare two or more interview tools on one population in reporting HIV-risk behaviour. The purpose of this meta-analysis was to identify patterns and sources of disagreement among the results. With no gold standard in sexual behaviour research it is difficult to determine whether modification of interview mode (e.g. self-administered vs. interviewer-administered) increase the accuracy of reporting sensitive behaviour. However, the results showed that alternatives to FTFIs do not always yield higher estimates of risky behaviour.

Our hypothesis was based upon previous research indicating that a method providing greater anonymity and privacy than conventional interviewer-administered methods were more likely to yield higher affirmative response rates to sensitive questions. Since respondent's perceptions of social norms and their own notions of acceptable behaviour influence their willingness to respond truthfully to interview questions. It was further believed that differences in reporting would be greater among females and those with higher education.

This hypothesis was not confirmed for the reporting of 'ever had sex', where there was no significant difference between FTFI and non-interviewer administered tools, and little difference between gender. However, more educated respondents did have a higher pooled estimate for reporting sex in the non-FTFI methods. Moreover a trend was observed in Asian studies and those conducted in urban areas suggesting an increase for reporting 'ever had sex' in the non-FTFI method, although the summary effect did not reach statistical significance. Overall, the results imply that FTFI may not be inferior to innovative interview tools in eliciting this behaviour. One possibility is that having started sexual intercourse was not perceived as particularly stigmatised. A second reason is that respondents had become more comfortable in the presence of an interviewer, or in the case of computerised methods inhibited by the technology.

There was no significant difference by interview tool in the reporting of non-condom use. However, higher levels of non-condom us were reported in non-FTFI studies in South America, and a similar trend was observed for studies in Asia, urban areas and,

unexpectedly, among respondents with less than 60% education. The timeframe of the question seems to have been important, with questions using a shorter recall period such as "condom use at last sex" resulting in increased reporting of non-condom use. There was a significant increase in the reporting of forced sex in the non-interviewer administered tools. Rural and African studies as well as those less educated reported more forced sex by non-FTFI, although the effect was not significant. Subgroup analysis for number of partners also showed that studies in Africa and rural areas were higher in non-FTFI. However, participants with a secondary education and asking the question within a recent timeframe showed an increase in the reporting of higher number of sexual partners in the non-interviewer administered tools.

There are limitations to the results of the meta-analysis. Firstly, not all of the studies identified asked about every behaviour, for example those sampling adult sex workers did not asked if the respondents had ever had sex. Secondly, question phrasing did vary across studies for example the time frame for non-condom use and the number of sexual partners. A third reason points to bias that could not be attenuated even with increased privacy and anonymity. For example Hewett *et al* suggested STI positive participants were more likely than STI negative participants to misreport their behaviour in the FTFI [81]. Finally the response rate was not available for all studies so it was difficult to know if it was a factor influencing the performance of the different methods [99].

In further developing methods for collecting HIV and STI risk behaviour data, multiple methods assessing self-reported behavioural risks should be complemented with the appropriate biological markers of sexual activity, as appropriate depending on the type of study. Although these tests may provide evidence of the validity of self-reported behaviours, their application is limited because the exposure period captured by a biomarker may not be the relevant exposure period for the study. Moreover, infection probabilities are moderated by other factors irrelevant to the particular risk behaviour, including prevalence in the general population, partner status, biological susceptibility of the respondents, and availability of STI testing and treatment [81]. Only a few studies have attempted to validate the reporting of behaviour with STI biological markers within an interview mode experiment in a resource-poor setting [81][90].

2.7 Conclusion

In conclusion, the findings of the review have important implications for research design and data interpretation. The results of this review show that the relationship and success of novel interviewing methods has proved complex in a low- and middle-income country context. The results suggest that strongly stigmatised behaviour such as forced sex was significantly more likely to be reported in a non-FTFI setting, whereas other outcomes such as 'ever had sex' and non-condom use did not vary by interview mode. Further research efforts to understand factors affecting the degree of measurement error obtained with different interview methods are required, as different tools may generate very different conclusions about what should constitute essential elements of HIV prevention programmes.

Chapter 3: Methods

3.1 Context of the study: The Avahan Programme

The Avahan Programme is a large 5-year HIV-prevention programme funded by the Bill & Melinda Gates Foundation (BMGF). Avahan was launched in 2004 and focuses on the six states in India with the highest HIV prevalence (Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra, Nagaland and Manipur). Its goal is to scale up high quality prevention interventions in order to reduce HIV transmission in the general population by supplementing current national prevention initiatives. The programme focuses on core and bridging groups, including FSW and MSM and their sexual partners [10, 115]. The services provided include:

- condom promotion and provision of free condoms to all key population members;
- behaviour change communication;
- sexually transmitted disease services including the supply of treatments;
- community led interventions;
- building political commitment, mobilizing societal leaders, reducing stigma, increasing HIV discourse and addressing critical policy and structural barriers (i.e. police harassment); and
- advocacy initiatives to increase attention to HIV/AIDS.

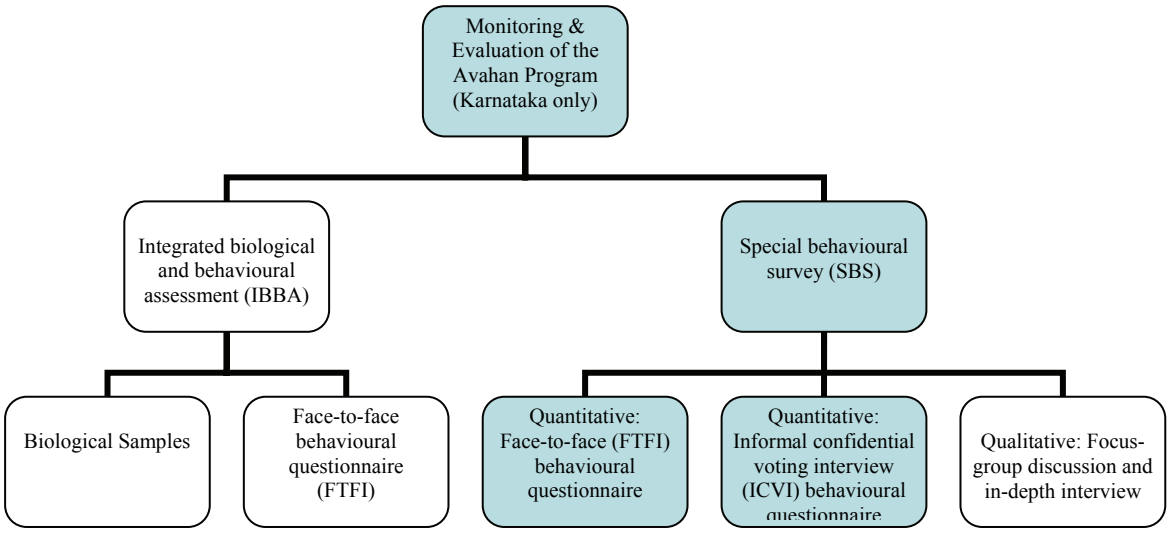
The BMGF has awarded one of its three main monitoring and evaluation (M&E) grants as part of the Avahan Programme to the *Centre hospitalier affilié universitaire de Québec* (CHARME), under whose auspices the present study was conducted. The CHARME evaluation framework uses mathematical modelling in combination with cross-sectional behavioural and STI/HIV prevalence data to investigate HIV transmission dynamics among core, bridge and general population groups [115, 116]. CHARME evaluation framework, unable to estimate the number of HIV cases averted by the intervention in absence of HIV incidence data, predict the course of the HIV epidemic in India. Modelling is based on data collected in the integrated behavioural and biological assessment (IBBA), government surveillance data, CHARME-directed general population surveys (GPS) and special behavioural studies (SBS) of at-risk populations [115, 116].

The IBBA and SBS surveys are a key part of the Avahan evaluation strategy. In the state of Karnataka they were carried out by the University of Manitoba (Winnipeg, Canada) in collaboration with the Institute of Population Health and Clinical Research, St. John's Medical College, Bangalore (India), through the Karnataka Health Promotion Trust (KHPT).

Firstly the IBBA was carried out in five districts of Karnataka, collecting both behavioural and biological (urine and blood) data, amongst pregnant women, FSW, clients of FSW, and MSM. Following this, the quantitative component of the SBS was carried out to firstly validate key sexual behaviour data items collected through the IBBA (through the ICVI), and secondly to collect additional data on sexual networks and concurrency not collected through the IBBA (through the FTFI). The qualitative aspect of the SBS, carried out after the quantitative SBS, primarily aims to gather information about perceptions of the HIV prevention programmes being implemented and aims to capture any changes in attitude of the target groups over time, which will enable assessment of the impact of the ongoing HIV prevention programme.

This thesis presents findings of one aspect of the CHARME portfolio, namely the quantitative SBS survey among MSM in Bangalore, as highlighted in blue in Figure 3.1. Many behavioural variables could be explored in the analysis but this thesis concentrates on whether sensitive variables are similar across the ICVI and FTFI, how different behaviours vary according to sexual identity and to what extent bisexual behaviour occurs and might be a risk of HIV.

Figure 3.1: Organisational chart to show the data collection taking place as part of the monitoring and evaluation procedure of Avahan



The team at KHPT involved with the data collection consisted of: Dr BM Ramesh, director of the M&E IBBA and SBS survey; Dr Kaveri Gurav, manager of the SBS survey; and myself, data collection manager for the SBS survey among MSM in Bangalore. My role was to write the questionnaires, the survey protocol and the study manual, to recruit interviewers, to supervise the fieldwork and to enter, clean, and analyse the data. The steps of this process are outlined in the following sections.

3.2 Study Population

3.2.1 Definition of MSM

The term 'MSM' describes a behavioural phenomenon that encompasses men or *Hijra* (male-to-female transgender) over the age of 18 who have ever had anal sex with another male (or *Hijra*) and who was identified in the cruising site at the time of recruitment. This included male/*Hijra* sex workers and their clients, as well as MSM seeking non-commercial sex with men.

3.2.2 Study recruitment

This cross-sectional survey was carried out between May and August 2006 among MSM seeking sex in either public places (locations where men seek other men for sex such as bus stops, train stations and public parks) or Hammams (bath houses where *Hijra* sell sex with men, which are openly advertised despite being technically illegal) in Bangalore city.

3.3 Sample size calculations

One of the key design parameters for any survey is the sample size needed to satisfy the survey's measurement objectives. The primary objective set out in the M&E grant proposal was to measure changes in selected behavioural indicators from successive cross-sectional surveys (IBBA or SBS) over two time periods following the intervention. Thus the sample size was initially calculated accordingly. In this section we first explain how sample size was calculated within the original context of the study. However, instead, in our study we compare two datasets from a single point in time. Therefore we also show that the available sample provided sufficient statistical power to detect a difference between two independent samples at a given point in time.

Original sample size calculation

Original sample size for this survey, comparing SBS or IBBA outcome at 2 different time points has been calculated using the following formula (equation 1) taken from the 'Guidelines for repeated behaviour surveys in populations at risk of HIV' [115, 116]. Since the study uses cluster random sample (section 3.6.2), the sample size formula takes into account potential correlation between individuals.

Equation 1

$$n = D\,\frac{\left[\sqrt{2P(1-P)}Z_{1-\alpha} + \sqrt{P_1(1-P_1)+P_2(1-P_2)}Z_{1-\beta}\right]^2}{\Delta^2}$$

Where:

D = the design effect can be considered a correction factor for how much impact a complex sample design such as cluster sampling differs from simple random sampling. Effectively, the design effect multiplies the sample size by the factor of D. The design effect accounts for the similarities (correlation) between people sampled within the same cluster. For example, MSM within a particular cruising site may be similar with respect to condom use because of social norm, condom availability or the intervention activities at a particular site. If the design effects is close to 1.0 then you can assume that the variance would remain the same using cluster sampling or a simple random sample. The larger the design effect, the more correlated your respondents within clusters, leading to underestimated variances.. The bigger the D, the larger the sample size needed.

P_1 and P_2 = are the measures of interest for which you wish to see a change between survey rounds, for example, to show that condom use at last sex act increased from 20% in 2006 (P_1) to 30% or greater in 2007 (proportion at a future date: P_2). Prior to the survey, P_1 needs to be estimated usually based on previous surveys in the same or similar population, pilot studies or an educated guess. P_2 is the goal to achieve. The smaller the change detected, the larger the sample size needed. Also, the closer P_1 and P_2 are to 50%, the larger the sample size required.

$$P = (P_1 + P_2) / 2$$

$$\Delta^2 = (P_2 - P_1)^2$$

$Z_{1-\alpha}$ = the z-score corresponding to the desired level of significance α. The smaller the significant level (that is, higher confidence level), the larger the sample size needed.
$Z_{1-\beta}$ = the z-score corresponding to the desired level of power, $1-\beta$. The higher the power, the larger the sample size needed.

To derive sample size, the following assumptions were made:

- Expected baseline value of a key indicator, such as consistent condom use was set at 50%. Surveys on MSM in India have shown condom use to range from 0-70% [39, 57]

- Desired change to detect between two interviewing methods: 15%.

- The alpha level has been set at 0.05, corresponding to a type 1 error, which is with a 5% probability

- The beta level has been set at 0.10, corresponding to 90% power.

- A design effect of 2 was used in the 'Guidelines for repeated behaviour surveys in populations at risk of HIV' for all Avahan sample size calculations, as recommended by FHI [115, 116]. In absence of information on the design effect, a value of 2 is often used to adjust for the difference between cluster sampling and a simple random sampling design [117].

- Since the survey is undertaken in the context of prevention effort, we are interested in detecting changes in one desired direction (e.g. an increase in condom use), and a one tailed test is used. This will result in a smaller sample size than if the corresponding value for a two-tailed test had been used but since this study is being undertaken in the context of prevention, whose aim is to produce a change in a given direction, it is reasonable to use a one-tailed test.

- A normal distribution is assumed.

- It is assumed that the SBS FTFI and ICVI surveys were carried out among two independent samples, each of whom had an equal probability of being selected to participate.

- Refusal rate was not taken into consideration.

Standard values of $Z1\text{-}_{\alpha}$ and $Z1\text{-}_{\alpha.}$ are provided in Table 3.1, and the use of the above formula is illustrated in Figure 3.2.

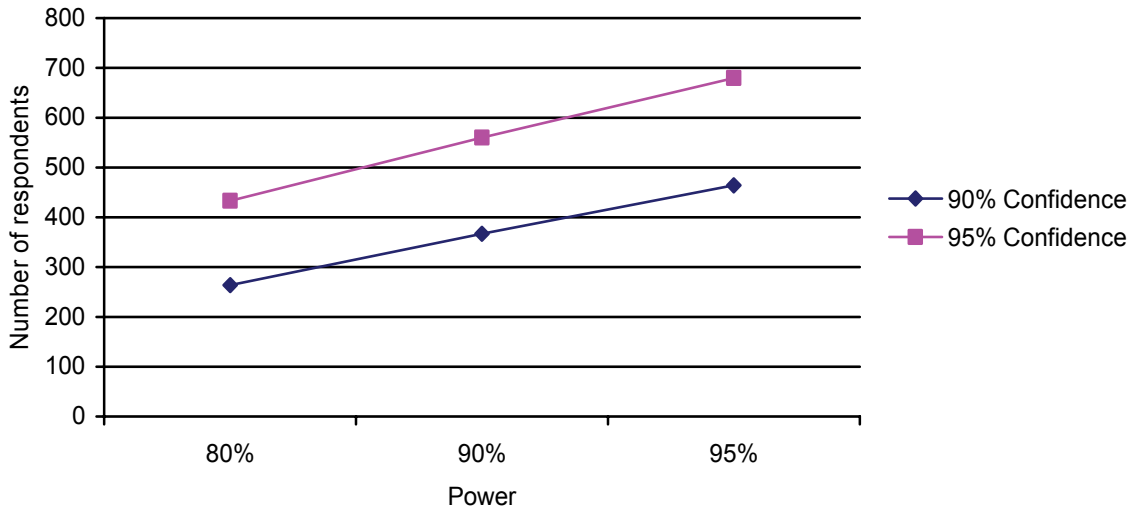
Table 3.1: Standard Values of Z1-α and Z1-β

α	$Z_{1-\alpha}$	$Z_{1-\alpha/2}$	β	$Z_{1-\beta}$
To measure change in one direction	**One-sided test**	**Two-sided Test to measure change in two directions**		
0.10 0.05 0.01	1.28 1.65 2.33	1.65 1.96 2.58	0.20 0.10 0.05	0.83 1.28 1.65

The use of the formula demonstrating minimum sample size requirements for the number of individuals required to measure a 15% change from a baseline of 50% over time at different levels of significance and power indicated is illustrated in Figure 3.2.

Given that this thesis focused on a single time frame, the sample size required for the M&E project provided sufficient statistical power for this survey.

Figure 3.2: Graphical representation of sample size
(Parameter used: lifetime condom use by MSM)



For example, in order to detect an increase of 15% in the proportion of MSM who ever used a condom (from a baseline of 50%) with male partners, and be 90% confident that if an increase of this magnitude did occur 90% power is necessary. In order to be 95% sure that an increase of 15% or more does not result from chance fluctuations in the data, the results must be significant at the 95% level.

Inserting these values into Equation 1:

$n = 2\,[[1.65\sqrt{2(.575)(.425)} + 1.28\sqrt{(.5)(.5)+(.65)(.35)}]^2]/(.0225)$

$= 2\,[(1.15+0.89)^2/.0225] = 370 \rightarrow$ 400 MSM in the SBS FTFI survey

Due to financial constraints, the sample size for the ICVI survey was limited to 200 respondents. This means that we will be 80% confident that an increase of 15% in condom use will not be a result of chance fluctuations in the data. Moreover, the results should be significant at the 90% level.

A priori calculation of power for the planned sample size in our study

In this thesis we are looking at one time frame therefore sample size calculations were performed to ensure that the study would have sufficient power. In this example the outcome of interest was 'ever selling sex', between the SBS FTFI (Πe) and ICVI (Πc) sample. We assessed what power the planned sample sizes would provide for these comparisons. We expected increased reporting in the more anonymous and confidential ICVI (P2). It was assumed that the proportion reporting consistent condom use would be around 50%, in the FTFI. This was calculated on an average of condom use reported in four studies carried out among MSM recruited in similar cruising sites in India, as summarised in Table 1.3. The equation used that of Lachin [117] outlined below:

Equation 2

$$Z_\beta = \frac{\left[\sqrt{N|\Pi e - \Pi c|}\right] - Z_\alpha\sqrt{D\Pi(1-\Pi)(Qe^{-1}+Qc^{-1})}}{\sqrt{D[\Pi e(1-\Pi e)Qe^{-1} + \Pi c(1-\Pi c)Qc^{-1}]}}$$

Where:

Z_β = Z-statistic for power (=1-β)

N = total sample size (i.e. 600 = FTFI + ICVI)

Πe = expected proportion of the outcome of interest in the FTFI (i.e. 50%)

Πc = expected proportion of the outcome of interest in the ICVI (i.e. 65%)

Π = the mean proportion of both FTFI and ICVI

Qe = the proportion of respondents in the FTFI (i.e. 400/600)

Qc = the proportion of respondents in the ICVI (i.e. 200/600)

Z_α = The alpha level has been set at 0.05, corresponding to a type 1 error, which is with a 5% probability (1.645)

D = the design effect for both surveys (assumed to be 2)

Inserting these values into Equation 2

Z_β = 0.85 → 80 % power in the survey

3.4 Study design: two-stage cluster sampling

Sampling procedures should ideally be capable of reaching all members of the population of interest in order to produce a representative sample of the population and lead to unbiased estimates of trends in HIV infection rates and risk behaviour [118]. Sampling high-risk communities such as MSM presents significant challenges because they represent a small proportion of the general population, they also engage in illegal and stigmatised behaviour, and are often reluctant to talk about these risky activities.

Over the past two to three decades, several methods for recruiting hard-to-reach populations for surveillance and other survey purposes have been used [119]. Two commonly used methods are snowball sampling, where community members recruit other individuals who engage in the same behaviour [120], and facility-based sampling (such as prisons or STI clinics) [15, 123]. The major drawback of these methods is sampling bias, where the sample is not representative of the larger population. For example, MSM attending STI clinics may have higher risk behaviours than those who do not and thus overestimate the prevalence of risky behaviour among MSM [121].

A standard survey method, called multistage cluster sampling, takes advantage of the fact that some hidden populations tend to congregate at certain types of locations such as ‘cruising areas’ [122]. Conventional cluster sampling (CCS) is a method that can be used if the number of respondents is ‘stable’ at each site, that is, there is no variation in the time or day that potential respondents visit these locations. On this

basis, CCS was used for sampling Hammam-based cruising sites in this survey since the number of *Hijra* has been shown to be stable throughout the day and night (see ethnographic mapping in Appendix B).

Time-location cluster sampling (TLS) on the other hand is used for 'floating' populations, whose numbers may vary from day-to-day and time of day at a particular site. TLS was used for the selection of public-place cruising sites to eliminate systematic bias of people with different levels of risk cruising at different times. The same site may be included in the sampling frame more than once at different times of the day in order to account for the population not being stable over time.

In summary, both CCS and TLS are part of a two-stage sampling frame in which the population was first divided into non-overlapping subpopulations defined by geographic boundaries, called clusters. In the second stage of sampling, a fixed number of individual MSM were selected at random within each cluster.

3.4.1 Stage 1: Defining the clusters

The pre-survey ethnographic mapping was carried out by Sangama, a local NGO working with MSM in Bangalore, to identify public and Hammam-based cruising sites where sufficient numbers of MSM congregate on a regular basis. The population was divided into a complete set of geographic clusters. The mapping process lasted for two weeks and was conducted by peer educators at Sangama. The NGO outreach workers stayed in the public place cruising sites and all the Hammams in Bangalore for set time periods throughout the day and night, and recorded the number of both MSM and *Hijra* seen. In this way a complete and up-to-date list of the number of MSM in each site, discerning peak and off-peak periods, was compiled to reflect the current configuration of venues where MSM could be accessed. In order to achieve slightly more than the target sample size of 400 and 200 respondents in the FTFI and ICVI respectively (to account for non-response and incomplete questionnaires), it was calculated that 85 clusters would need to be sampled with an estimated five FTFI per cluster with three ICVI for the first 40 and two ICVI for the last 45 clusters cluster. The clusters were sampled without replacement; therefore each cluster was only included in the sample once.

Selecting primary sampling units for public place cruising sites: time-location cluster sampling

In Bangalore city 112 public locations were identified in total from the list compiled by Sangama. Each of these sites was divided into two to four discrete peak and off-peak periods based on different times of the day and different days of the week; each cluster was then multiplied by the number of days of proposed sampling. For example, if a particular site was broken down into three time periods in a day and the fieldwork proposed for 22 days in total, the number of potential clusters to sample from was 66. The cluster in this case became the site at a specific time period, each of which was entered separately into the list of clusters for the sampling frame. In this way a total of 5528 time-location clusters were defined, from which 77 were selected at random.

Selecting primary sampling units for Hammam-based cruising sites: conventional cluster sampling

From a list of 12 Hammams identified in the pre-survey mapping, eight were chosen at random to sample respondents as this was proportionate to the number of TLS sites, where 85 was the total number of clusters needed to be sampled:

Public place = 112 / (112+12) * 85 = 77

Hammam = 12 / (112+12) * 85 = 8

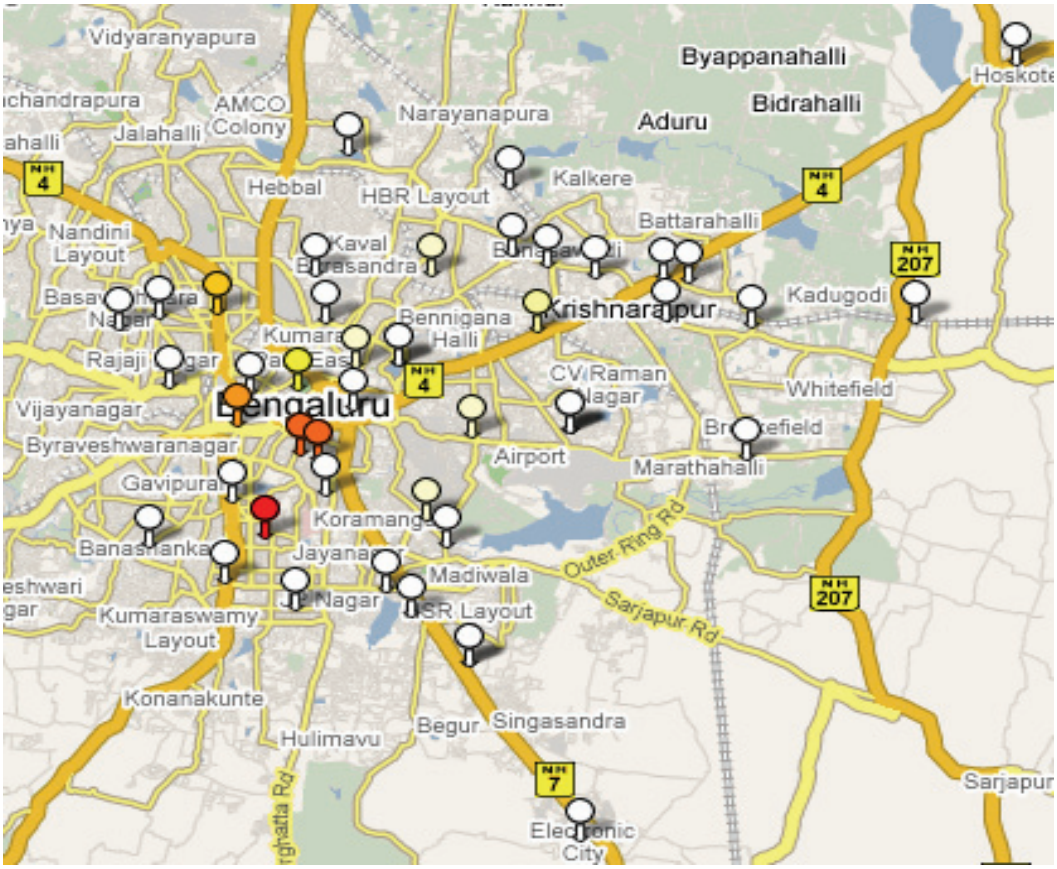
3.4.2 Stage 2: Selecting respondents within each cluster

The second phase of developing a probability sample involved a systematic approach for choosing a selection of respondents from each cluster. There were two possible scenarios for randomly selecting the target number of respondents:

1. If fewer than eight potential respondents were available, all were approached for interview consecutively, in the order the respondents appeared at the cluster. Any missing interviews were carried forward to be completed in the subsequent cluster.

2. If there were greater than the required seven/eight individuals, respondents were selected at random and every 3rd participant was assigned to the ICVI. The field team remained stationed at the sampling site to count the number of MSM who appeared at the site until the end of the allocated time frame, even after 8 respondents had been recruited.

Figure 3.3: MSM cruising spots identified in pre-survey mapping, Bangalore city[§§]



1-10 average number of MSM identified by Sangama on a daily basis

11-20 MSM

21-30 MSM

31-40 MSM

41-50 MSM

51-60 MSM

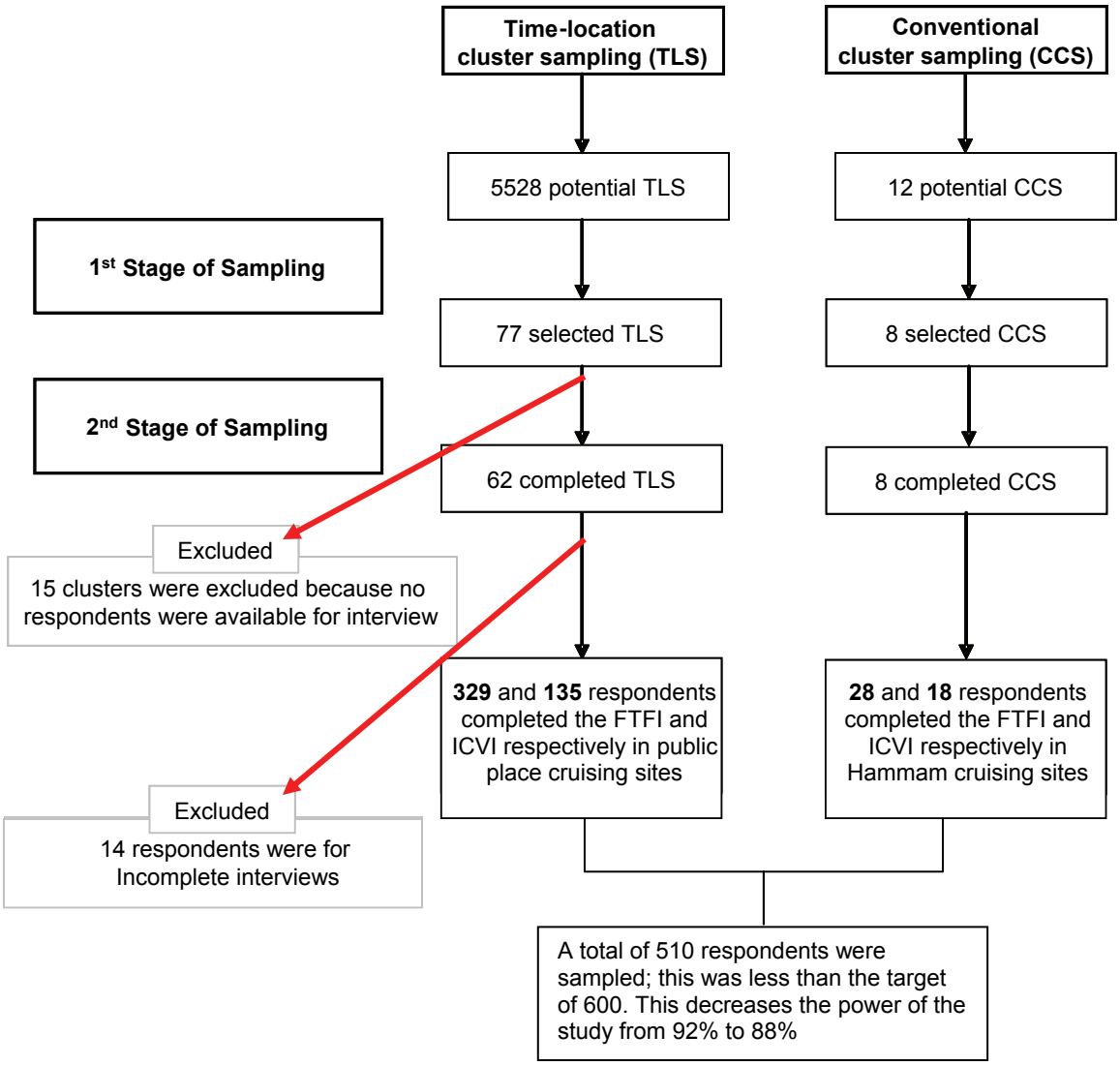
61-70 MSM

80+ MSM *

[§§] This map was created using the website http://thematicmapping.org. The index shows the number of MSM that were identified by Sangama in a whole day at each geographic location. The map serves as a rough guide to show the clustering of cruising hotspots around Bangalore city.

Where there were 80+ MSM recorded in a particular site these are areas where Hammams typically cluster, each of which may house around 25 *Hijra*.

Figure 3.4: Flowchart of sampling procedures



3.5 Study procedures

3.5.1 Content of the study questionnaire

The ICVI and FTFI interviews were both written in English and Kannada, translated by KHPT.The aim of both the FTFI and ICVI questionnaires were to gather information on sociodemographics and HIV risk behaviour such as non-condom use, partner types and numbers, and commercial sex. Questions that addressed similar topics were grouped together. A common assumption was that the sensitivity of questions should increase progressively across items because it enables subjects to gradually get desensitised to more intimate items. For this reason more sensitive questions were put towards the end of the interview in order to build the respondent's

confidence as well as a rapport with the interviewer. However, respondents may lose motivation over the course of the interview and measurement error may increase towards the end of the interview. The questionnaire needed to be tested in a pilot study in order to find the optimum balance between interview length and order requires pretesting. The purpose of the pilot was to focus on respondent's perceptions of the questionnaire as well as their actual responses to the questions.

Face-to-Face Interviews

A structured questionnaire was developed by myself in collaboration with Drs Kaveri Gurav and Catherine Lowndes, for the purpose of gathering information investigating sexual networks and concurrency. The information obtained included:

1. Sociodemographic characteristics (age, caste, religion, education, employment etc)
2. Sexual experience (age at sexual debut with male and female partners, identity, lifetime condom use etc)
3. Sexual history with cohabiting male or *Hijra* partner
4. Selling sex to men, including information on new and repeat clients
5. Non-commercial sex with men, including information on known and unknown partners
6. Buying sex from male sex workers (MSW)
7. Sexual history with cohabiting female partner
8. Buying sex from female sex workers (FSW)
9. Condom and lubricant use
10. Knowledge and attitudes toward HIV/AIDS, including information on testing
11. Injecting drug use
12. Migration, including a history of sex with men outside of Bangalore
13. Exposure to the Avahan HIV prevention intervention, including condom demonstrations and visits to the NGO STI clinic

In order to facilitate data management, questions with many possible answers were kept to a minimum and the majority of the questions were yes (1) / no (0) answers. For multiple responses the codes were numbered sequentially. For example frequency of

condom coded 1 ‘never’, 2 ‘sometimes’, 3 ‘often’, and 4 ‘always’ was used across different sexual partners.

Informal Confidential Voting Interviews

The first part of the ICVI was typically conducted as an informal variant of the FTFI method and included questions on socio-demographic characteristics only. The second part included 20 key questions, taken from the IBBA, on sexual behaviour with men and women (see Appendix A and C for the complete questionnaire and the guide to interview method).

The purpose of the ICVI (as outlined in the Avahan proposal) is to validate the findings from the IBBA FTFI. A selection of questions was taken from the IBBA, and as a result the ICVI has some different questions than the SBS FTFI. A Table 3.2 below summarises all of the behavioural questions in the ICVI, the questions ticked are those that are asked in the SBS FTFI Table 3.2 below.

Table 3.2: Comparison of ICVI with the SBS FTFI

No.	ICVI Question	SBS FTFI
SOCIODEMOGRAPHIC QUESTIONS		
1.	How old are you?	√
2.	Can you read and write?	√
3.	What is the highest grade (at school) you have completed?	√
4.	What do you mainly do to earn an income?	√
5.	What is your current marital status?	√
6.	With whom do you currently live?	√
7.	How do you identify yourself?	√
8.	How old were you the first time you had anal sex with a male?	√
9.	Who was this man?	√
BEHAVIOURAL QUESTIONS		
1.	Have you ever used a condom for anal intercourse?	√
2.	Was a condom used when you last had anal intercourse?	
3.	In the past six months was there a time when you wanted to use a condom during sexual intercourse but did not?	
4.	In the past six months have you had the experience of a condom breaking while it was being used?	√
5.	Have you ever used a lubricant while having anal sex? I mean something that that will make your penis or your partner's penis more slippery and easier to insert into the anus?	√
6.	Have you ever injected drugs for non-medical purposes?	√
7.	Do you have a main (regular) male sexual partner?	
8.	The last time you had anal intercourse with this partner was a condom used?	
9.	Have you ever received cash or gifts in return for anal sex?	√
10.	In the past one week, how many different men did you have anal intercourse with?	
11.	The last time you had anal intercourse with one of these partners was a condom used?	
12.	The last time you had anal intercourse with a known (regular) male partner was a condom used?	
13.	Was a condom used when you last had anal sex with a man that you don't know or recognise (new)?	
14.	Have you ever had anal intercourse with a *Hijra*?	√
15.	Have you paid to have sexual intercourse with a female in the last year?	√
16.	Do you have a main female sexual partner?	
17.	How many times do you have vaginal sex with your main female sexual partner in a 'normal' month?	√ ***
18.	The last time you had sexual intercourse with her was a condom used?	
19.	How many times do you have anal sex with your main female sexual partner in a 'normal' month?	√
20.	In the past one year were you ever beaten or otherwise physically forced to have sexual intercourse with someone even though you did not want to?	√

*** The SBS FTFI reports about specific partner type. For example for ICVI questions 17 & 19 the SBS FTFI asks about the respondent's wife rather than main female sexual partner.

3.5.2 Team composition and training

Two research teams, each consisting of a team supervisor and three interviewers, were employed for the SBS survey.

The supervisor was responsible for the overall management of the field team. This included ensuring that the survey protocol was followed; that questionnaires were accurately completed; that all consent forms were witnessed and signed; that all MSM members were counted in each selected cluster (including those not approached for interview); cluster information sheets were completed on a daily basis; and the questionnaires and consent forms were securely stored. The interviewers were recruited from the MSM community[†††], by advertising in Sangama's drop-in clinic. Their role was to recognise and approach potential respondents in the cruising site, explain the purpose of the survey, complete the consent forms and administer the questionnaires.

Recruiting the survey team from the MSM community had its advantages and its limitations. Although MSM were able to more easily identify respondents in the field, understand MSM linguistic terms, and reduce inhibition among respondents when talking about stigmatised sexual behaviour, they were not social science graduates and may not have all fully appreciated the concept of confidentiality and impartiality. The team underwent a 10-day training course led by myself, Drs Ramesh and Gurav. The aim of this exercise was to educate about the concept of social desirability bias; the objectives of the survey; practising mock interviews; as well as attending lectures on HIV transmission and symptoms.

Once in the field, the research team worked with peer educators from Sangama who helped identify the location of the cruising site, accompany the interviewer in recruiting

[†††] 'MSM Community' is a term used here to refer to the group of people that have come together as a result of the outreach work by Sangama. 'Community' in this context is a term used often by Sangama to refer to the social group of regular visitors at the drop-in clinic and cruising sites, whom the NGO frequently mobilise for consultation on various issues such as MSM studies, gay pride marches, or advocacy. It is not intended to include all MSM in Bangalore, It is not suggested that this term connotes a wider sense of unity between all the identities; for example *Hijra* might acknowledge a sense of community with other *Hijra*, but this is unlikely to extend to other MSM identities. The term does encapsulate the coming together of groups for outreach at the NGO level where their interests coincide. It is noted that this group tends to include men who seek sex in public places and may exclude MSM who cruise on the internet for example. This is described further in the limitations of the study in Chapter 5 and 6.

potential respondents on site, help the supervisor keep a count of the respondents in each cluster and act as a witness if required for the consent process. As soon as the respondents agreed to take part, they were taken to the nearby Sangama drop-in clinic to be interviewed in individual private cubicles. The NGO clinics ranged from a 5 minute walk to a 10 minute rickshaw journey from the cruising site where the respondents were recruited. Since no financial incentives were given, this resulted in some non-response. In a few cases where the cruising site was empty and privacy was ensured, the interviews were carried out in situ.

3.5.3 Pilot Study

One month prior to the fieldwork a pilot study was carried out at the Sangama drop-in clinic among MSM accessing the NGO facilities. The aim of this activity was:

- to inform MSM at the NGO drop-in clinic in advance about the survey and its purpose, as well as gauge their reaction to the questionnaire;
- to check for appropriate sequencing, skip patterns, accurate translation into Kannada from English, and accuracy of the back-translation to English by an official translator at KHPT;
- to practise translating the questionnaire 'on-the-spot' into other common languages such as Hindi or Tamil
- to test the questionnaire and finalise the interviewing tool by highlighting irrelevant or offensive questions and determine whether any additional information could be obtained;
- to give the interviewers practise in administering the questionnaire with an emphasis on rapport building, talking about sexuality, and the consent procedure;
- to tailor the language used in the questionnaire in order to employ appropriate and comprehensible terminology for sexual terms; and
- to help develop an instruction manual for interviewers and supervisors to go through the questionnaire, explaining in full the rationale behind each question and its intended meaning.

The issues that arose from this activity were:

- The questionnaire was too long (average 47 minutes), raising concerns that respondents might not complete the interview. The least relevant questions were removed[‡‡‡].

- There were large gaps in the completion of some questionnaires, which was attributed to insufficient training and the length of the prototype. Further training was carried out, as well as shortening of the questionnaire.

- Interviewers tended to make assumptions about the respondent before they had answered the question themselves. For example, the question on 'what is your marital status' often was often completed as 'Never' by the interviewers even though they had not asked the question to the respondent, particularly if he/she was feminine. As a result comprehensive training on this point was pursued. Since the pilot was carried out in Sangama's drop-in clinic more visible members of the MSM community were likely to have taken part, as a result the interviewer and respondent were often already acquainted. In the final survey it was ensured that respondents were not acquainted with the interviewer by asking the interviewee if they knew the interviewer and providing an alternate member of staff if they did.

- The sexual experience of the respondents was wider than expected. Separate sections on non-commercial sex, buying sex from MSW and *Hijra* cohabiting partners were added.

- Sex between MSM was not exclusively anal but includes regular oral, thigh and masturbation. Questions relating to the frequency of each type of sex were included to better understand HIV-risk in MSM sexual encounters.

- An issue addressed by the interviewers was how to motivate participants. A previous study carried out in Chennai had shown that some men recruited in public places did not engage in sex with men had tried to participate in an MSM

[‡‡‡] The CHARME modelling team were consulted to find out which questions were not necessary for the evaluation framework in order to help select questions for removal

survey for the payment (Go *et al* [65] pers comm.). On this basis no financial incentives were given to respondents.

3.5.4 Community preparation and sensitisation and ethical approvals

Initially the research proposal, questionnaire and consent forms were reviewed and approved by St Johns Medical College, Centre *hospitalier affilié universitaire* de Québec and Université Laval (Québec) as well as KHPT. In addition, a consultative committee was formed by Sangama to gain the endorsement of the 'MSM community' and to draw attention to their potential concerns.

Prior to recruitment, community sensitisation meetings were organised by Sangama staff in each drop-in clinic. The purpose of this was to inform the MSM community about the study procedures and addressed any concerns they had. The voluntary and anonymous nature of the survey were emphasized, that is, no names or other personal identifiers would be recorded, and all information shared with the interviewers would be treated as confidential. It was vital that the survey was conducted in the 'community-led' spirit of the programme.

During the study, interviewers explained the purpose of the survey to each participant and answered any questions they had. The survey staff emphasised that all the information remained anonymous and should participants decide not to participate or withdraw from the survey at any time; their decision would not affect any services from the NGO they would normally receive. If the respondents agreed to take part, a formal verbal consent form was read out with information about the study, on either the FTFI or ICVI. The consent form was then signed by a witness, who was another interviewer or member of Sangama (see Appendix D for the consent forms).

3.6 Data Processing

3.6.1 Data input and cleaning

All of the completed questionnaires were double entered (by myself and Nagaraj) into MS Access forms designed by a statistician at KHPT. The two data entries were then

merged into a single file and any discrepancies between the files were highlighted and then checked against the original completed questionnaires. The merged database was then entered into the statistical software SPSS (version 14.0).

A series of checks were used to clean any inconsistency in the data, where responses in one part of an individual's questionnaire were checked for logical agreement with related questions (see Section 4.2 for a more in-depth analysis of inconsistency). Any discrepancies were highlighted and checked against the original questionnaires.

Where results were inconsistent in the original questionnaire they were corrected in the dataset. Examples included:

1) The skip patterns: if the respondent answered 'No' to question 1, there should have been no answer to question 2. If there was an answer to question 2, then question 1 was changed to 'Yes'.

No	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	Do you ever receive cash or gifts from other men in exchange for sex?	YES.....1 NO.....0	→ 6
2	Out of the last 10 times you had sex, how many times were with men who gave you gifts or cash for this sex act?	NUMBER OF TIMES..... NO ANSWER.....99	

2) General internal inconsistencies, for example the current age of the respondent should have been greater or equal to the age at sexual debut (see Appendix E for the list of consistency checks performed and the number of inconsistencies found). If there was an inconsistent finding, the entry was not changed.

3.6.2 Statistical analyses

Clustering effect

Cluster samples raise an important statistical challenge, in that the calculation of the estimated standard error will likely be underestimated, leading to confidence intervals that are too narrow and p-values that are too small, and we will be misled into thinking our evidence is stronger than it really is [123].

As described above, the SBS survey used two-stage cluster sampling which is characterised by the following:

1. Firstly, for reasons discussed above, in the first stage of sampling, clusters of individuals were sampled. Cluster sampling typically results in larger sample-to-sample variability than sampling individuals directly. This increased variability must be accounted for in standard error estimates.

2. Secondly the respondents within each of the selected clusters were sampled at random.

All statistical analyses took into account the complex survey design using svy commands in Stata (version 10; Stata Corporation, college station, TX) [124]. The svyset command allows the specification of variables that identify the survey design characteristics (clusters) and default method for estimating standard errors by using *robust* variance estimator, as referred to in the non-survey context, otherwise known as the Huber/White/sandwich estimator in Stata [125].

The svy method, however, did alter the distributions of some statistics to account for the survey design. For example, when computing the default Pearson chi-squared statistic for two-way tables, the test of independence was transformed into an F statistic using the Rao-Scott second order correction [126]. Although the theory behind Rao-Scott is complicated, the p-value for the corrected F-statistic can be interpreted in the same way as a p-value for the Pearson chi-squared statistic for ordinary data. In addition estimating a population mean, comparing means or survey regression also follow the F distribution [127].

Univariate

Potential risk factors in the dataset were both categorical (including binary) or numerical variables. The association between sociodemographic characteristics and behavioural outcome of interest (i.e. identity, bisexual behaviour etc) was tested with the adjusted Wald test for continuous variables and Pearson chi-squared test with Rao-Scott correction for categorical variables using svy commands in Stata. A p-value of less than 0.05 was taken as statistically significant evidence of an association between exposure and outcome.

Multivariate

Univariate analysis indicates an association between an exposure and outcome, but does not take confounding by other exposures into account. Multivariate logistic regression was used to explore the relationship between a categorical outcome whilst linear was used for continuous variables, again with Rao-Scott correction.
Multivariate analysis adjusted for sociodemographic variables significant at the univariate level.
The plan of analysis for each chapter is described in more detail in the following sections.

Chapter 4: Interview mode and measurement error: methodological challenges and reliability of self-reported behaviour

4.1 Introduction

The accuracy of self-reporting of sensitive sexual risk behaviour is highly susceptible to misreporting biases such as social desirability bias, misunderstanding and poor recall [128-130]. Systematic measurement error can bias estimates of the prevalence of high-risk sexual behaviours, leading to misidentification of risk populations and thereby hindering prevention efforts [71]. As discussed in Chapter 2, innovative data collection methods have been developed in an attempt to reduce misreporting as a result of interviewer bias. One of these tools, the informal confidential voting interview (ICVI) has been shown to minimise social desirability bias by increasing the privacy of the interview setting in Zimbabwe [99, 100]. Until now the ICVI method had not been tested in the Indian context. Our main study objectives were to gain a clearer picture of the sexual behaviour and the determinants of risky behaviour among MSM and to understand misreporting biases for sensitive questions.

However, even among respondents who accurately report their sexual behaviour, problems with recall or misunderstanding can distort the reported frequency of certain behaviours [72]. There are several strategies to evaluate reliability and validity [71]. Some examples include: comparing responses to questions about the same activity asked to both partners (i.e. husband and wife); comparing responses on a repeated survey of the same population; correlating with biological biomarkers or medical records; or examining the characteristics of individuals who refuse to participate. Alternatively it is possible to check the internal consistency of the FTFI responses where responses to questions asked in one part of a respondent's questionnaire are checked for logical agreement with related questions. For example, the frequency of condom use (never, sometimes, often, always) should be reasonably consistent with the number of times the respondent used a condom in the last 10 sex acts.

Consistent condom use has been found to be one of the most effective ways to prevent the transmission of STIs, including HIV [131]. Measurement of condom efficacy necessitates an assumption that study participants accurately report their frequency of sex and use of condoms. Clearly, this assumption poses problems. In condom use research, at least two distinct measures of condom use (or non-use) have been employed: proportional (percentage of sexual encounters for which a condom was used) and absolute (the number of times a person reported protected sex). Recent publications support the value of using an absolute measure of condom use [132-134]. This may be a more appropriate measure if the outcome of interest is preventing disease such as HIV, since the number of unprotected sex acts could be yielded by subtracting the number of times condoms were used from the number of sex acts performed [132-134].

This chapter has two objectives:
1) To present an analysis of the results from two identical sets of questions on risky behaviour administered through two different interviewing techniques (ICVI and FTFI) among two comparable samples of MSM.
2) To compare proportional and absolute questions on condom use reported in the FTFI to determine whether the style and order of questioning affects the reporting of risky behaviour.

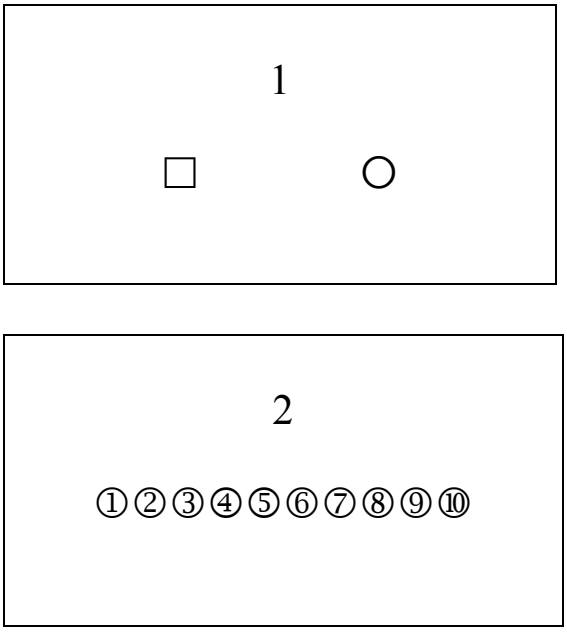
4.2 Methods

4.2.1 Objective 1: Comparison of face-to-face with informal confidential voting interview

The interview tools were described in detail in Chapter 2. In brief, the first part of the ICVI interview was conducted as an informal variant of the FTFI. Its purpose was to sensitise the respondent to the non-prejudicial viewpoint of the interviewer. This generally took 5 minutes to administer and involved asking questions on sociodemographic characteristics. The second part of the ICVI was self-completed as the interviewer, who was screened from the respondent, read out the questions to the respondent who filled in their answer on the answercard, with the study / participant

number and the question number printed on it. There were two types of questions: dichotomous (square=yes and circle=no) and numerical (see Figure 4.1). Once completed each card was put it in a locked ballot box. This section of the ICVI lasted between 15-20 minutes. The full FTFI took approximately 40 minutes to complete.

Figure 4.1: Design of the ICVI card for both dichotomous and numerical questions



As explained in more detail in Chapter 3, individuals were selected from each of the 85 clusters and randomly allocated to one of the two data collection methods: three ICVI for the first 40 clusters and 2 ICVI for the last 45 clusters, and five FTFI per cluster. However, these random allocations sometimes failed due to interviewees being short of time and were assigned to the shorter ICVI. In total there were twenty-two identical questions that were administered to both samples of MSM and which were used to compare the two methods - nine questions on sociodemographic characteristics and thirteen on risky behaviour (see Table 3.2).

4.2.2 Objective 2: Internal consistency of face-to-face interview responses

There were two possible condom comparison questions in the FTFI. 'How often is a condom used with this partner' (Q 17: proportional) and 'out of the last 10 times you had sex, how many times did you use a condom with that partner' (Q18: absolute) (see below). To make the 2 questions comparable, for the purpose of addressing our objective,

the question on 'Out of the last 10 times…' was recoded so as to be categorical: 1 (zero), 2 (1-4 times), 3 (5-9 times) or 4 (10 times). There are two different orders in which these questions were asked:

Example 1: This order of questions was used for condom use with NC male partners, sex workers and wife. If the respondent had answered 'Never' to the question on proportional condom use, the respondent would skip and not answer a question on absolute condom use and therefore the dominator differs between the two questions.

17 Proportional	In general, how often is a condom used when you have anal sex with unknown clients?	NEVER (0%) ..... 1 SOMETIMES (< 50%) ..... 2 FREQUENTLY (≥ 50%) ..... 3 ALWAYS (100%)..... 4	→ **19**
18 Absolute	Out of the **last 10 times** that you had anal sex with him, how many times was a condom used?	NUMBER..... ☐☐	
19	Do you have any known/repeat clients?	YES ..... 1 NO 0	

Example 2: These questions were asked with respect to known and unknown male clients of MSW only, on condom use during insertive and receptive anal sex independently (see example below). In this example two questions were used to derive the "absolute" level of condom use, calculated as the number of times the respondent used a condom divided by the total number of times had (insertive or receptive) sex with that partner (Q16/Q15).

15 Used to derive absolute condom use	Out of the last 10 times that you had sex with new/occasional clients how many times did you have insertive anal sex?	NUMBER OF TIMES..... ☐☐ **RECORD '00' IF NONE** → **17**	
16 Used to derive absolute condom use	Out of these times (number in Q.15), how many times did you use a condom?	NUMBER OF TIMES..... ☐☐	
17 Proporton	In general, how often are condoms used when you have insertive sex with new/occasional clients?	NEVER(0%)..... 1 SOMETIMES (< 50%)..... 2 FREQUENTLY (≥ 50%)..... 3 ALWAYS (100%)..... 4	→ **19**

4.2.3 Statistical analysis

Objective 1: An adjusted Wald test was used to compare means for continuous variables. Pearson chi-squared tests were used for categorical outcomes. A logistic regression model was created for each outcome that differed significantly by interview mode, adjusting for age, income, sexual identity, education and marital status. Adjusted odds ratios and 95% confidence intervals were used to assess the strength of the relationship between the different outcomes and interview mode, whilst taking into account the influence of potential confounders introduced by non-random allocation to interview mode.

Objective 2: The concordance for condom use reporting by question type was assessed using the kappa statistic, which is a widely used measure of reliability that measures agreement between responses having corrected for chance [135, 136]. The overall percent agreement was calculated as the total number of individuals with concordant answers divided by the total number of individuals in the sample.

By convention, values of kappa ranging from 0 to 0.20 indicate slight agreement, 0.21-0.40 indicate fair agreement, 0.41-0.60 indicate moderate agreement, 0.61 to 0.80 indicate substantial agreement, and 0.81 and above indicate nearly perfect agreement [135, 136]. Although this value describes the raw level of concordance it does not indicate which question resulted in increased reporting of condom use.[§§§] The p-value in this case tests whether the estimated kappa was not due to chance.

All statistical analysis took into account the clustering effect, to take into account the correlation between individuals, using SVY commands in STATA (vers. 10; Stata Corporation, TX) [124].

[§§§] It is important to note that the scale of agreement values is controversial (not everyone would agree that 0.57 constitutes 'good' agreement); however, it is a commonly cited scale. See Fleiss JL (1981) Statistical methods for rates and proportions (2nd Edition). New York: Wiley p.225.

4.3 Results

The interviews were written in English and Kannada, translated by KHPT, and conducted mainly in Kannada (69%) and other Indian languages including Hindi and Tamil (30%).

4.3.1 Response Rate

A total of 567 MSM were identified to participate in the FTFI part of the survey. Of these, 329 out of 526 subjects identified in public places agreed to be interviewed (response rate of 62%) and 28 out of 41 potential respondents in Hammams agreed to participate (response rate of 68%). A total of 262 MSM were identified to take part in the ICVI, of whom 135 out of 237 identified in public places agreed to be interviewed (response rate 57%) as well as 18 out of 25 identified in Hammams (response rate of 72%). Thus a total sample size of 510 MSM was achieved with an overall response rate of 65% in the FTFI and 58% in the ICVI (Table 4.1).

Table 4.1: Response rates for FTFI and ICVI surveys

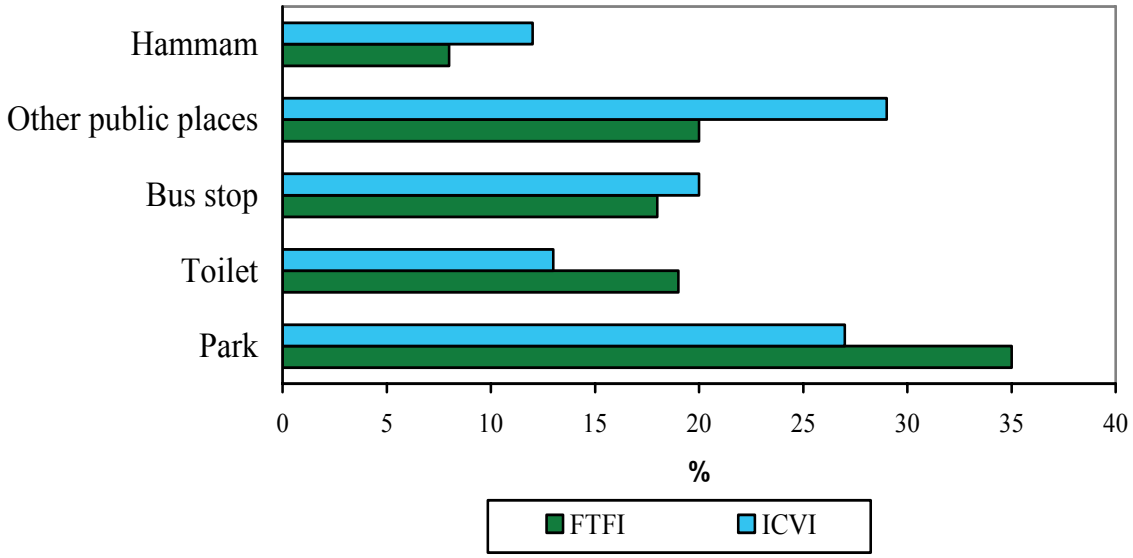
	Recruitment setting		
	Public place	**Hammam**	**Total**
FTFI			
Number invited	526	41	567
Number interviewed	329	28	357
Response rate (%)	62%	68%	65%
ICVI			
Number invited	237	25	262
Number interviewed	135	18	153
Response rate (%)	57%	72%	58%

4.3.2 Recruitment

Recruitment for both the FTFI and ICVI respondents was undertaken predominantly in 77 public places (92% and 89% of the interviewees respectively), with the remainder being recruited from 8 Hammams. The distribution of MSM respondents by place of interview showed that for the FTFI survey the majority were recruited in parks and for the ICVI more were recruited in 'other public places' (including forest, cinema, and public streets). There was no significant difference between the

participation of respondents in the ICVI and FTFI by location (see Figure 4.2 and Table 4.2).

Figure 4.2: Settings where MSM were recruited and successfully interviewed



4.3.3 Sociodemographic characteristics

There was no significant difference between any of the sociodemographic characteristics reported in the ICVI and FTFI (Table 4.2). Overall, men taking part in the survey had a mean age of 30 years; 71% were literate, with 40% having been educated above Grade 10 (16 years); a quarter (25%) reported relying on sex work as their main source of income; 28% of respondents were currently married, all of whom lived with their wife; 5% had been married in the past; and the remaining 60% had never been married. Nearly a third lived with their family (31%); 25% of respondents were living alone, with a friend or in a hotel; 9% lived with another *Hijra*, including a Guru or *Chela*; and 5% were living with a male partner. Out of the total sample 27% self-identified as *Kothi*, 16% *Panthi*, 13% *Double-Decker*, 5% *Hijra akwa* (not castrated), 9% *Hijra nirvaan*, 22% bisexual and 7% did not self-identify with any of these categories.

Table 4.2: Sociodemographic characteristics of respondents in the FTFI and ICVI

Characteristics	Survey type % (n) ICVI N=153	FTFI N=357	Total N=510	Unadjusted P-value
Cruising site where recruited Þ:				0.118
Public park	27 (41)	35 (125)	33 (166)	
Public toilet	13 (20)	19 (68)	17 (88)	
Bus station	20 (30)	18 (63)	18 (93)	
Hammam	12 (18)	20 (73)	23 (117)	
Other including train station, cinema etc	29 (44)	8 (28)	9 (46)	
Mean age	29	30	30	0.471
Education: Literate	73 (112)	71 (252)	71 (364)	0.524
Highest grade completed at school ¤	26 (29)	26 (65)	60 (94)	0.979
Up to secondary (up to 16 years)	74 (84)	74 (187)	40 (217)	
Upper secondary (16+ years)				
Main Income: Sex Work	24 (37)	26 (93)	25 (130)	0.627
Marital status				0.749
Currently married	26 (40)	29 (105)	28 (145)	
Separated/ divorced/ widowed	3 (5)	5 (18)	5 (23)	
*Never married **	58 (89)	60 (215)	60 (304)	
Living arrangements §				0.454
Living with male partner	4 (6)	6 (21)	5 (27)	
Living with wife	26 (40)	28 (101)	28 (141)	
Living with other Hijra	14 (21)	10 (32)	9 (53)	
Living alone/hotel/friend	23 (35)	25 (88)	25 (123)	
Living with family (no wife)	33 (51)	31 (110)	31 (161)	
Sexual Identity				0.728
Kothi	31 (47)	26 (93)	27 (140)	
Panthi	18 (28)	15 (55)	16 (83)	
Double-Decker	10 (16)	15 (52)	13 (68)	
Hijra akwa	6 (9)	5 (18)	5 (27)	
Hijra nirvaan	9 (14)	8 (30)	9 (44)	
Bisexual	20 (31)	23 (81)	22 (112)	
No Identity	5 (8)	8 (28)	7 (36)	

Þ As shown in figure 4.2
¤ This question was asked only to those who were literate
* *Hijra* are excluded from this question therefore the percentage does not total 100%
§ The percentage does not always total 100% as a small proportion answered 'Other'

4.3.4 Comparison of sexual risk behaviour reported in the FTFI and ICVI

The first objective of this chapter was to present an analysis of the results from two identical sets questions on risky behaviour administered through ICVI and FTFI among two comparable samples of MSM.

Socially undesirable sexual behaviour: It was expected that socially undesirable responses would be more frequently reported in the more anonymous and confidential ICVI, when compared to the FTFI. The results did not adhere consistently to this expectation, however.

ICVI participants were significantly more likely to report injecting drug use (9% vs. 1%; $p<0.001$) and ever having sold sex to men (51% vs. 41%; $p=0.004$) than the FTFI respondents. Conversely, however, FTFI respondents were more likely to report buying sex from FSW in the last year (56% vs. 30%; $p<0.001$).

There were no differences between the two interview tools in reported age at sexual debut with another man (18 years) or the relationship to the first male with whom the respondent had sex: over half of the sample had their first sexual experience with a male friend, classmate or colleague (53%); 21% with a stranger; 14% with a male relative and 8% with a male sex worker or paying client. Nearly half had experienced a condom breaking in the last 6 months during anal intercourse (46%), which may be linked to the fact that 46% of respondents had never used lubricant. In total 17% had ever bought sex from a *Hijra* sex worker and there was no difference in response between the two interview modes. Over a third said they had been beaten or forced to have sex against their will at some point whilst cruising for sex with other MSM.

Prior to analysing the results it was anticipated that the reporting of bisexual behaviour to a MSM interviewer would be skewed, as it was expected such behaviour would be considered socially undesirable by MSM. However, the proportion of respondents reporting a main female partner did not differ significantly between the ICVI and FTFI (37% and 38% respectively). In the ICVI there was a direct question on the subject (‘Do you have a main female partner’), but in the FTFI there were two questions (‘are you currently married (to a woman)’ and ‘are you currently having sex

with any female sex partners (besides a cohabiting female partner past/current)'). The results of these two FTFI questions were combined for a comparison with the ICVI.

Socially desirable sexual risk behaviour: It was expected that reported socially desirable responses would be greater in the FTFI. Contrary to expectation there were fewer FTFI participants reporting lubricant use than in the ICVI (50% vs. 64%; p<0.004 respectively). Lifetime condom use was high within both samples, with most respondents reporting having used a condom in their lifetime (79%) but with no significant difference in proportion by interview mode.

Table 4.3: Sexual experience and risk behaviour reported in the FTFI and ICVI

Characteristics	Survey type % (n) ICVI N=153	FTFI N=357	Total N=510	Unadjusted P-value
Socially undesirable answers				
Mean age at sexual debut with a male	18 (153)	18 (357)	18 (510)	0.416
Male first had sex with §				0.165
Relative	16 (25)	13 (47)	14 (72)	
Paying client/Male sex worker	12 (19)	6 (23)	8 (42)	
Friend/Classmate/Colleague	48 (73)	55 (195)	53 (268)	
Stranger	19 (29)	22 (79)	21 (108)	
Experienced a condom breaking in the last 6 months during anal sex *	51 (78)	43 (153)	46 (231)	0.072
Ever injected drugs *	9 (13)	1 (4)	3 (17)	**<0.001**
Ever sold sex to other men *	51 (78)	41 (147)	44 (225)	**0.038**
Ever bought sex from a *Hijra* *	19 (18)	16 (29)	17 (87)	0.461
Main female partner * **Þ**	37 (56)	38 (137)	38 (193)	0.881
Bought sex from a FSW in the last year *	30 (46)	56 (45)	39 (91)	**0.001**
Ever been beaten or forced to have sex with someone against their will *	35 (53)	40 (63)	37 (116)	0.458
Socially desirable answers				
Ever used a condom (for anal or vaginal sex)	80 (122)	79 (282)	79 (404)	0.830
Ever used a lubricant *	64 (98)	50 (178)	54 (276)	**0.004**

§ The percentage does not always total 100% as a small proportion answered 'Other'
Þ This question was asked in the ICVI only with their main female partner.
* Not all respondents answered these questions

Multivariate logistic regression was performed to ensure that any differences seen between the interview modes for a given behaviour remained significant once potential confounding sociodemographic variables were included in the model (see Table 4.4). The adjusted odds ratios and p-values show that after adjusting for sociodemographics, those risk behaviours that were significantly different across interview mode in the univariate analysis remain.

Table 4.4: Multivariate analysis of the odds of reporting a certain behaviour by interview mode, after controlling for sociodemographic characteristics

Individual regression models for each characteristic	AOR Þ	95% CI	p-value
Ever injected drugs	0.13	0.04-0.42	0.001
Ever sold sex to other men	0.68	0.45-1.01	0.005
Bought sex from a FSW in the last year	3.52	1.89-6.56	<0.000
Ever used a lubricant	0.57	0.38-0.85	0.006

Þ ICVI is the reference group for the multivariate logistic regression analysis adjusting for age, income, sexual identity, education and marital status.

4.3.5 Internal consistency of face-to-face interview responses

The second objective of this chapter was to compare a series of similar questions on condom use reported within the FTFI to determine whether the style and order of questioning affects the reporting of risky behaviour. The results showed that there was no significant difference in the reporting of condom use by question type.

Example 1: In this example questions on proportion of condom use was asked before absolute numbers of protected sex acts. Table 4.5 summarises concordance for the reporting of condom use for NC male partners, MSW, HSW and wives. Correlation lies on the diagonal of this 4x4 table.

Over half the sample reported always using condoms with NC partners and MSW, and the agreement of their reports was significant, with kappa estimated at above 0.85 for all partners. This represents agreement over and above what could be expected by chance alone. Inter-question concordance was reduced, but with relatively low agreement, for

reported condom use with *Hijra* sex workers (73.5% agreement, kappa 0.42) and wife, with only 38.5% agreement (kappa 0.21), although the number of individuals reporting sex with wives was low (N=13).

Overall consistent condom use was higher, regardless of question type, for known (absolute 77%, proportion 82%) than unknown NC partners (absolute 66%, proportion 73%). 'Always' using a condom was significantly higher with male (absolute 72%, proportion 79%) than *Hijra* (absolute 62%, proportion 79%) sex workers. Across all partners a greater number of respondents reported consistent condom use when asked for a proportion.

Most respondents that were currently married, (87 out of 105 respondents) reported never using a condom with their spouse. Among those who reported some condom use, few reported 'always' using a condom (15% absolute and proportion).

Example 2: In this example, questions on absolute number of protected sex acts were asked before a question on proportion of condom use. Table 4.6 summarises concordance for the reporting of condom use with male clients only.

Over 60% of the respondents in the sample reported consistent condom use during receptive anal sex with known and unknown male clients irrespective of question type with good agreement of their reports (kappa 0.83 and 0.71 respectively). Individuals were slightly less concordant in their reports of condom use during insertive anal sex with known and unknown male clients, with kappa estimated at 0.57 and 0.55 respectively.

There was little difference in the reporting of respondents who 'always' used a condom for receptive (absolute 62%, proportion 63%) and insertive (61% absolute and proportion) anal sex with unknown clients. Similarly condom use did not differ greatly for receptive (absolute 63%, proportion 66%) and insertive (56% absolute, proportion 59%) anal intercourse with known clients. Overall condom use was lowest for insertive known clients, regardless of question type.

Table 4.5: Example 1 Concordance of reported condom use by partner type

Partner type	Proportion condom use	Absolute condom use % (n)				Proportion TOTAL	Percentage agreement	Kappa (95% CI)	P-value¤
		0	1-4	5-9	10				
Unknown NC	**Never* (n=23)**	0				0	**85.7**	**0.70**	**<0.000**
	Sometimes	0	**10 (7)**	6 (4)	0	16 (11)		**(0.57-0.80)**	
	Often	0	1 (1)	**10 (7)**	0	11 (8)			
	Always	0	7 (5)	0	**66 (46)**	73 (51)			
	TOTAL	0	19 (13)	16 (11)	66 (46)	**100 (70)**			
Known NC §	**Never* (n=61)**	0				0	**89.6**	**0.69**	**<0.000**
	Sometimes	0	**6 (6)**	4 (4)	0	9 (10)		**(0.68-0.79)**	
	Often	0	1 (1)	**7 (7)**	1 (1)	8 (8)			
	Always	1 (1)	3 (3)	1 (1)	**77 (82)**	82 (87)			
	TOTAL	1 (1)	9 (10)	11 (12)	78 (83)	**100 (106)**			
Male sex workers §	**Never* (n=19)**	0					**85.4**	**0.64**	**<0.000**
	Sometimes	1 (1)	**9 (7)**	5 (4)	0	15 (12)		**(0.55-0.69)**	
	Often	0	1 (1)	**5 (4)**	0	6 (5)			
	Always	0	5 (4)	2 (2)	**72 (59)**	79 (65)			
	TOTAL	1 (1)	15 (12)	12 (10)	72 (59)	**100 (82)**			
***Hijra* sex workers**	**Never* (n=14)**	0					**73.5**	**0.42**	**0.001**
	Sometimes	0	**11 (4)**	8 (3)	0	21 (7)		**(0.11-0.43)**	
	Often	0	0	0	0	0			
	Always	0	15 (5)	3 (1)	**62 (21)**	79 (27)			
	TOTAL	0	26 (9)	12 (4)	62 (21)	**100 (34)**			
Wife §	**Never* (n=87)**	0					**38.5**	**0.21**	**0.049**
	Sometimes	8 (1)	**15 (2)**	31 (4)	15 (2)	69 (9)		**(0.00-0.30)**	
	Often	0	0	**8 (1)**	8 (1)	15 (2)			
	Always	0	0	0	**15 (2)**	15 (2)			
	TOTAL	8 (1)	15 (2)	38 (5)	38 (5)	**100 (13)**			

* Those who answered Never or 0% were excluded from the total % and the Kappa agreement statistic. The number reporting 'Never' is shown in brackets in the proportion column (n=) to show how many reported having never used a condom

§ The percentage does not always total 100% as a small proportion did not answer

¤ When P-value<0.05, the estimated kappa is not due to chance

Table 4.6: Example 2 Concordance of reported condom use by partner type in addition to Table 4.5 (clients only)

Partner type	Proportion condom use	Absolute condom use % (n)				Proportion TOTAL	Percentage agreement	Kappa (95% CI)	P-value¤
		0	1-4	5-9	10				
Unknown clients: § Insertive anal sex	**Never* (n=23)**	**16 (6)**	0	0	0	16 (6)	**76.3**	**0.55 (0.53-0.58)**	**<0.000**
	Sometimes	8 (3)	0	3 (1)	8 (3)	18 (7)			
	Often	3 (1)	0	0	3 (1)	5 (2)			
	Always	0	0	0	**61 (23)**	61 (23)			
	TOTAL	26 (10)	0	3 (1)	71 (27)	**N= 38**			
Unknown clients: § Receptive anal sex	**Never* (n=61)**	**12 (12)**	0	0	1 (1)	13 (13)	**84.5**	**0.71 (0.65-0.74)**	**<0.000**
	Sometimes	2 (2)	**5 (5)**	4 (4)	1 (1)	12 (12)			
	Often	2 (2)	1 (1)	**5 (5)**	3 (3)	11 (11)			
	Always	0	0	1 (1)	**62 (60)**	63 (61)			
	TOTAL	16 (16)	6 (6)	10 (10)	67 (65)	**N= 97**			
Known clients: Insertive anal sex	**Never* (n=19)**	**18 (6)**	0	0	0	18 (6)	**76.5**	**0.57 (0.49-0.85)**	**<0.000**
	Sometimes	3 (1)	**3 (1)**	6 (2)	6 (2)	18 (6)			
	Often	0	0	0	6 (2)	6 (2)			
	Always	3 (1)	0	0	**56 (19)**	59 (20)			
	TOTAL	24 (8)	3 (1)	6 (2)	68 (23)	**N= 34**			
Known clients: Receptive anal sex	**Never* (n=14)**	**18 (12)**	0	0	0	18 (12)	**91.2**	**0.83 (0.61-0.93)**	**<0.000**
	Sometimes	0	**3 (2)**	1 (1)	3 (2)	7 (5)			
	Often	0	0	**7 (5)**	1 (1)	9 (6)			
	Always	1 (1)	0	1 (1)	**63 (43)**	66 (45)			
	TOTAL	19 (13)	3 (2)	10 (7)	68 (46)	**N= 68**			

§ The percentage does not always total 100% as a small proportion did not answer
¤ When P-value<0.05, the estimated kappa is not due to chance

4.4 Discussion

Our primary hypothesis was that the ICVI would increase the reporting rates, especially in respect of the more sensitive of the questions asked. In summary, the ICVI had a significant influence on the reporting of some HIV risk behaviours but the results did not adhere consistently to expectation. These results differed from previous studies among the general population in Zimbabwe [99, 100], where male and female respondents interviewed by the ICVI versus FTFI were more likely to report multiple sex partners in all time frames (current, past month and past year). However, in the Zimbabwean sample, 92% of respondents were literate whilst in the Indian sample only 71% reported being able to read and write [99, 100]. Furthermore, the study in Africa sampled the general population on heterosexual behaviour, whereas in India we were investigating illegal male-with-male sex. It is possible that the FTFI may have elicited a greater reporting of risk behaviour because interviewers had a motivating effect on the respondent by providing clear definitions, probing ambiguous responses, or querying inconsistent answers in the FTFI.

It is important to note that the definition of "socially desirable and undesirable" response is subject to interpretation. What is stigmatised within a group of acknowledged MSM is likely to be different from what is embarrassing in the population more broadly. Moreover, the interviewers were MSM so social desirability is even more difficult to predict.

The results show two things therefore, that the interview mode generates some significantly different answers and the direction of those answers suggests something about what MSM are prepared to admit to in confidence and in the FTFI. Since the interviewers were MSM, it was expected that respondents would not be inhibited to report male-with-male sexual behaviour. However, there was significant increase in the reporting of selling sex in the ICVI. High rates of harassment and sexual violence have been reported against MSM who engage in paid sex in Chennai [53], which may suggest selling sex may be more stigmatised than previously realised. On the other hand it was believed reporting bisexual behaviour would be considered socially undesirable, particularly when the interviewer was MSM. Although there is no difference in the reporting of a main female sex partner, respondents were significantly more likely to report buying sex from a FSW in the last year in the FTFI. It is possible that reporting commercial sex with a woman demonstrates sexual virility to the interviewer, especially since hegemonic masculinity is the norm in India.

There are limitations to the study that have to be considered while interpreting this data, which would have restricted the validity of this comparison. One potential reason for a lack of difference between these interview methods could be explained if the interviewers had not adequately screened themselves from the respondents during the ICVI, although we have no reason to suspect this. While the interviewers had undergone training on the purpose and procedures of the voting box, this may be one disadvantage of using MSM without a social science background to administer the questionnaires as they may not have appreciated fully the significance of this explanation. Furthermore, by design participants were supposed to be systematically and randomly assigned to the ICVI. However, in reality, we realised afterwards that this was not always practised as the interviewers sometimes assigned respondents that were in a hurry to the 25 minute ICVI rather than the 40 minute FTFI, which may have introduced participation bias.

This was the first study known to have investigated the ICVI method among MSM in India, indeed outside of Zimbabwe. However a similar method to the ICVI, a polling booth survey carried out on a one-to-one basis, elicited increased reporting of risky behaviour in India among female sex workers [101]. Further research is needed to assess the quality of such low technology and inexpensive methods for collecting data on sexual behaviour among risk and general populations.

The second objective of this chapter was to investigate whether the order and type of question influenced the reporting of non-condom use. It was assumed that in the context of the intervention reporting non-condom use would be considered undesirable. Given that the questions were directly comparable, the findings of this analysis suggest that the structure of questions in a questionnaire does not influence respondent's answers. Across all types of male partners (commercial and NC) there was concordance with the reporting of condom use by question type.

Our analysis indicated highly non-concordant reports of condom use with wives. This may be a reflection of the stigma attached to having sex with women, or a result of small numbers in the comparison. It could also be due to the nature of the relationship being more longer term with their spouse and therefore more sexual contact with this partner. In example 2, condom use was somewhat lower and respondents were slightly poorer in their reporting of condom use during insertive anal intercourse, than receptive anal sex. A possible explanation for discrepancy in reporting by sexual role is insertive sex was less frequent in this sample, which is possible given that quarter of the FTFI sample were *Kothi*.

There are limitations to this analysis. Firstly, example 2 contrasted reports of condom use by role behaviour with clients of MSW only; it is possible the effect of protected insertive or receptive anal sex acts varies with NC partners or sex workers. Secondly, 29% of the whole sample was illiterate therefore the validity of quantifying inconsistent condom use in this population may be questionable. Thirdly, the number versus proportion of sex acts with a condom are confounded by a time bias, for example this may explain the decrese in consistency in reporting sex with wives rather than new male partners.

In a previous study, Binson and Catania state that one approach to establishing appropriate language is to ask each respondent to select the sexual terminology they would prefer the interviewer to use [137]. Although this has been shown to elicit higher reporting of sensitive behaviour, tailoring language to each respondent is not feasible on a large scale in a largely heterogeneous population and is made more difficult when using interviewers without social science qualifications.

In conclusion it is difficult to understand which questions elicited more 'truthful' results, where individual motivations for misreporting seem to often go against a presumed desirable norm. What is clear is that the interview mode, and the nature of a question to a lesser extent, can affect the reporting of sensitive behaviour. It would be useful to investigate further using qualitative data which topics the MSM population find difficult to discuss in the presence of MSM or non-MSM interviewers, particularly when using both FTFI and ICVI tools. Multiple approaches may be especially important among MSM, particularly where non-condom use is discouraged in the intervention context and male-with-male sex is illegal, in order to get a more accurate picture of HIV risk behaviour. What is evident from this chapter is that overall the FTFI data appears reliable in its consistency across both interview mode and question type.

Chapter 5: Sexual identity and its contribution to MSM risk behaviour in Bangalore, India: the results of a two-stage cluster sampling survey

(Journal of LGBT Health Research: 2009; Vol 4 pp 113-128)

5.1 Introduction

Throughout middle- and low-income countries in Asia, men who have sex with men are at an elevated risk of HIV infection when compared with the general population [153]..Until recently the focus of HIV prevention in India has predominantly been on heterosexual transmission, particularly on commercial sex between men and women [66]. In part, this reflected concern over the potential for generalised HIV spread from this focus, which was believed to be taking place. However, there has been increased recognition in the last decade on the importance of male-with-male sex, with up to 10% of the general male population [56] and as much as 29% in specific segments of society reporting same sex behaviour [62]. Concomitantly, studies have increasingly documented a high HIV prevalence specifically among MSM in India, which has led to further research to better understand their role in the overall HIV/AIDS epidemic [39, 48, 57, 65].

The term 'MSM' used in this chapter describes a behavioural phenomenon that encompasses men and male-to-female transgenders (*Hijras*).Although *Hijras* do not socially and psychologically identify themselves as men, they are included in this term for two reasons. Firstly, the NGO through which respondents were recruited targets both men and *Hijras*, thereby creating a degree of overlap between their social networks. Secondly, because many *Hijras* display similarities in sexual behaviour with other MSM identities – significantly, *Hijras* have been shown to engage predominantly in (receptive) anal intercourse [49]. It is acknowledged that this simple classification misses many nuances, and in India, as elsewhere, different identities have been recognised, both as a function of gender and sexual behaviour [41, 50]. The sexual behaviours that put individuals at risk of acquiring and transmitting HIV and other sexually transmitted infections may differ within and between such groups. It has been noted for example in Latin America that

insertive and receptive penile anal sexual practices, as well as frequency of bisexual activity, varies between different MSM groups [138], which can influence the potential for HIV spread, given the differences in transmission risk according to the behaviour within acts [2].

A predominant tendency of HIV prevention interventions in India has been to assert MSM identities typically described as *passiv*e (receptive) or *activ*e (insertive) in terms of sexual role in anal sex using indigenous terms [50]. Five categories of MSM identities were stipulated by the local NGO at the outset of the study, and confirmed by respondents in the pilot study, all of which have been described in much policy-oriented and epidemiological work among MSM in India: *Hijras*, *Kothis*, *Panthis*, *Double-deckers*, and bisexuals. Western paradigms of identity—such as *ga*y and *heterosexual/straight*—do not always align neatly with these indigenous terms and, therefore, were not included in the questionnaire.

The categories adopted in this study are defined as follows: *Hijras* are male-to-female transgenders who although traditionally held a special status in society performing at births and festivals, now mostly survive by begging and selling sex to men [48]. *Hijras* in Bangalore can be classified as *nirvan* (ritually castrated) or *akwa* (not castrated); *Kothis* are effeminate men who may cross-dress but remain biologically male [51]; *Double-Deckers* and bisexuals are primarily sexually oriented towards men, but their gender identity is more masculine or neutral than *Kothi* [41][65]; *Panthis* have a masculine identity and do not necessarily self-identify but are identified as such by *Kothis* and *Hijras* [41]. In the literature, commonly reported reasons for heterosexual men seeking other men to have sex with include the taboo on premarital heterosexual sex, the high cost of female sex workers, a desire for sexual activities not offered by wives, or desiring sex with men whilst marrying women due to social pressure [41].

The Avahan Initiative is underway in India to control the spread of HIV by concentrating on prevention activities amongst core and bridging groups, including MSM and their sexual partners. The evaluation of this programme is through studies of HIV and STI prevalence and risk behaviour, in conjunction with mathematical modelling [116]. Part of this assessment involves collecting data from MSM, enabling exploration of the relationship between sexual identity and risk behaviour, as presented in this chapter.

Previous studies that have critically examined the use of indigenous paradigms popularised by local HIV-prevention programs based on sexual roles, and have argued that individuals cannot be pigeon-holed into such categories with fixed behaviour [50-51]. Our null hypothesis, therefore, is that the behaviour within these predetermined and fixed categories of sexual identity would conform to stereotype.

5.2 Methods

Study design & population

The two-stage cluster sampling method is described in detail in Chapter 3. In brief, the basic sample design used was a two-stage strategy, firstly the selection of clusters and secondly selection of MSM within each cluster. One of two sampling procedures was used depending on the type of cruising site. Time Location Cluster sampling (TLC) was used for the selection of public-place cruising sites to eliminate systematic bias based on local cruising patterns. Conventional cluster sampling (CCS) was used for the selection of Hammams since the number of *Hijras* in a Hammam is stable throughout the day.

In total 5528 time-location clusters were defined, from which 77 were randomly selected. From a list of 12 Hammams, eight were chosen to sample respondents, as this was proportionate to the total number of potential sites. To achieve slightly more than the target sample size of 400, we aimed to carry out an average of 5 interviews per cluster with a total of 85 clusters.

From July to August 2006, men/*Hijras* over the age of 18 years who reported anal sex with another man in their lifetime were recruited from each of the selected clusters as available. Self-reported homosexual and bisexual behaviour of MSM in Bangalore was assessed using approximately 45 minute face-to-face interviews conducted in private cubicles in the NGO's nearby drop-in clinic. Respondents were not offered financial incentives to take part, as it was important that non-MSM were not motivated to participate for monetary reasons. MSM interviewers were employed to identify and approach respondents in the cruising sites, because they could not only understand the MSM slang but also reduce inhibition among respondents when discussing stigmatised sexual

behaviour. As part of the training, supervised mock interviews were conducted at the Sangama drop-in clinic to test the comprehension of the interview questions, check the accuracy of the translation, and gauge reactions to the sensitive questions asked. The pilot was part of a wider initiative to sensitise the MSM community to the study. The questionnaires were translated from English into Kannada by the Karnataka Health Promotion Trust, printed in both English and Kannada, and conducted mainly in Kannada (69%), other Indian languages including Hindi and Tamil (30% - whose translation was carried out at the time of the interview), or English (1%).

Statistical Methods

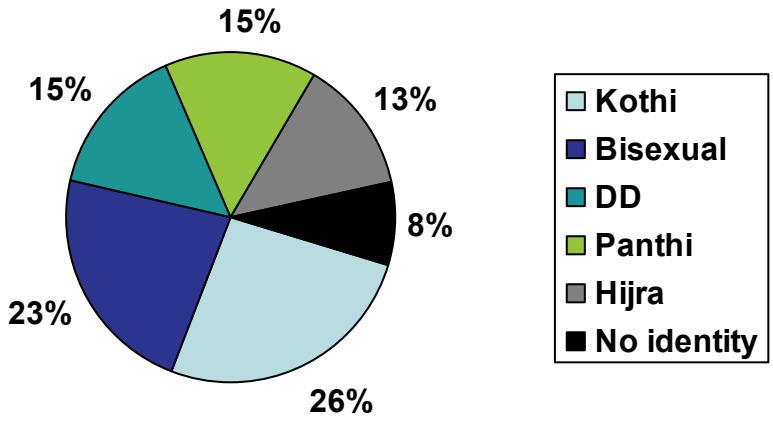
The univariate association between sociodemographic characteristics and sexual identity was tested with the adjusted Wald test for continuous variables and Pearson chi-squared tests with Rao-Scott correction for categorical variables [126]. Multivariate logistic regression were used for comparison of dichotomous and multinomial behavioural variables, whereas linear regression was used for continuous variables, again with Rao-Scott correction. A multivariate model was used to assess the relationship between each behavioural outcome (dependent variable) with identity (as an independent variable) while adjusting for sociodemographic characteristics.

For the multiple regression all variables with a p-value of 0.25 or less in the univariate analyses were selected, with the variable with the smallest p-value chosen as the first independent variable in the multivariate regression model. Variables were added one at a time, dropping any that were not statistically significant ($p<0.05$) unless there were noticeable changes in the coefficient values, which were indicative of confounding. All statistical analyses took into account the complex survey design (clustering) using SVY commands in STATA (vers 10; Stata corporation, TX) [139].

5.3 Results

357 of the 572 men approached agreed to be interviewed giving a participation rate of 62%. Out of the total sample 26% self-identified as *Kothis*, 15% as *Panthis*, 15% as *Double-Deckers*, 23% as Bisexuals, 13% as *Hijras* and 8% reported no identity.

Figure 5.1: Proportion of sexual identities in the total sample



5.3.1 Comparison of socio-demographic characteristics and sexual experience by identity **(Table 5.1)**

Religion, highest grade completed at school, respondent's place of birth, and mean age at first sex with a woman did not vary according to identity.

The average age of the sample was 30 years; most were Hindu (71%); many were literate (71%), with over half educated to secondary school level; 49% were born outside Bangalore, of whom few (1%) lived outside the city at the time of interview; 27% of the total sample reported sexual activity with men outside Bangalore. Thirty-five percent of the men had ever been married and 82% of these men lived with their wives at the time of interview. A quarter of the sample was circumcised (23%), excluding 30 *Hijra* who were castrated. Overall, 79% of the sample had ever

used a condom for anal or vaginal sex: this proportion was highest among *Hijras* at 98% and lowest among *Kothis* at 72%.

There were some differences among the identities. *Hijras* have a significantly lower literacy rate (51%) than other identities, many rely on sex work as a main source of income (94%), and they were more likely to live with a male partner (19%) or other *Hijras* (55%). Over a third of *Kothis* were also sex workers (37%). In general, men with a more masculine identity such as *Panthis*, *Double-Deckers*, and bisexuals, were highly literate often with an upper secondary education (73%, 73% and 85%), were more likely to have ever been married (38%, 27% and 63% respectively); and likely to live with a wife or female partner (31%, 29% and 57%). The mean age at first sex with a man (18 years) was lower than with a female (22 years), with *Kothis* and *Hijras* having had sex with a man at a younger age and no *Hijra* reported sex with women. Nearly half of the total sample had their first sexual experience with a male friend, classmate or colleague. The greatest proportion of *Kothi* (40%) and *Double-Decker* (37%) reported sex with men outside of Bangalore compared to men with no sexual identity (7%).

Table 5.1: Sociodemographic characteristics and sexual experience among men who have sex with men (MSM) by sexual identity

Characteristic	*Hijra* Mean or %* (n=47)	*Kothi* Mean or %* (n=94)	*Double Decker* Mean or % * (n=52)	Bisexual Mean or %* (n=81)	*Panthi* Mean or % * (n=55)	No Identity Mean or % * (n=28)	Total Mean or %* (n=357)	p-value ¤
Sociodemographic characteristics								
Mean age (years)	27 (47)	29 (94)	29 (52)	32 (81)	29 (55)	36 (28)	30 (357)	0.000
Religion ∞ (N=357)								0.211
Hindu	66 (31)	77 (72)	63 (33)	73 (59)	60 (33)	89 (25)	71 (253)	
Islam	21 (10)	17 (16)	21 (11)	22 (18)	33 (18)	4 (1)	21 (74)	
Christian	11 (5)	6 (6)	13 (7)	5 (4)	5 (3)	7 (2)	8 (27)	
Literate (read and write) (N=357)	51 (24)	64 (60)	85 (44)	80 (65)	67 (37)	79 (22)	71 (252)	0.000
Highest Grade Completed(N=252)§								0.245
Up to 16 years	38 (9)	32 (19)	27 (12)	15 (10)	27 (10)	23 (5)	26 (65)	
Upper Secondary School +	63 (15)	68 (41)	73 (32)	85 (55)	73 (27)	77 (17)	74 (187)	
Birth Place is Bangalore (N=357)	34 (16)	57 (54)	40 (21)	52 (42)	56 (31)	39 (11)	49 (175)	0.087
Main Source of Income: Sex Work (N=357) §	94 (44)	37 (35)	12 (6)	5 (4)	2 (1)	11 (3)	26 (93)	0.000
Ever married to a woman (N=356)	0	22 (21)	27 (15)	63 (51)	38 (21)	54 (15)	35 (123)	0.000
Living Arrangements ∞ (N=357)								0.000
Living with Male Partner	19 (9)	2 (2)	8 (4)	4 (3)	0	11 (3)	6 (21)	
Living with Wife/Female Partner	0	15 (14)	29 (15)	57 (46)	31 (17)	32 (9)	28 (101)	
Living Alone/Hotel/Friend	23 (11)	30 (28)	31 (16)	15 (12)	25 (14)	32 (9)	25 (90)	
*Living with other Hijra**	55 (26)	9 (8)	0	0	0	4 (1)	10 (35)	
Living with Family (no wife)	2 (1)	45 (42)	33 (17)	25 (20)	44 (24)	25 (6)	31 (110)	
Sexual experience								
Ever used a condom for anal or vaginal sex (lifetime) (N=357)	98 (46)	72 (68)	77 (40)	79 (64)	73 (40)	86 (24)	79 (282)	0.033
Mean age at first sex with a man (years)	14 (47)	16 (94)	18 (52)	19 (81)	19 (55)	19 (28)	18 (357)	0.020
Male first had sex with ∞ (N=357)								0.028
Relative	30 (14)	15 (14)	8 (4)	11 (9)	4 (2)	14 (4)	13 (47)	
Paying Client/Male Sex Worker	4 (2)	2 (2)	2 (1)	11 (9)	11 (6)	11 (3)	6 (23)	
Friend/Classmate/Colleague	55 (26)	53 (50)	65 (34)	47 (38)	55 (30)	61 (17)	55 (195)	
Stranger	11 (5)	24 (23)	21 (11)	28 (23)	27 (15)	7 (2)	22 (79)	
Mean age at first sex with a female (years) (N=356)§	0*	22 (30)	22 (28)	22 (77)	21 (39)	22 (23)	22 (197)	0.916
Ever had sex with another man outside of Bangalore (N=355)	17 (8)	40 (38)	37 (19)	23 (19)	18 (10)	7 (2)	27 (96)	0.000

(N) Denominator
(n) Numerator
* Column percentage
¤ Unadjusted P-value: test of significance between identity groups for each behaviour
§ The denominator refers to all of those respondents for whom the question is relevant
≈ *Hijra nirvana* (castrated) are excluded from this question
∞ The percentage does not always total 100% as a small proportion answered 'Other'

5.3.2 Comparison of commercial sexual behaviour of MSM with different sexual identities

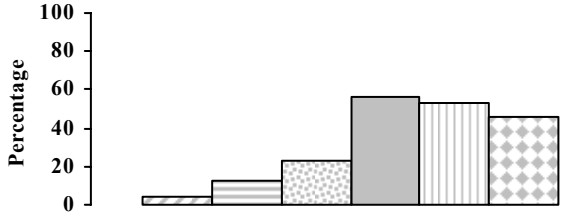
Figure 5.2 shows the proportion of subjects reporting different types of sexual partner by identity. A higher proportion of *Kothis* (69%) and *Hijras* (94%) reported having ever sold sex to other men, however few had bought sex from a male sex worker (MSW). Roughly half of *Panthis* and bisexuals had bought sex from men and in the case of *Panthis,* also had sex with women.

Most commercial sex variables did not vary significantly by identity including condom use with new clients, MSW, and female sex workers (FSW); ever had sex with repeat clients; mean number of days sold and bought sex in the last month; and physical abuse whilst selling and buying sex (Table 5.2).

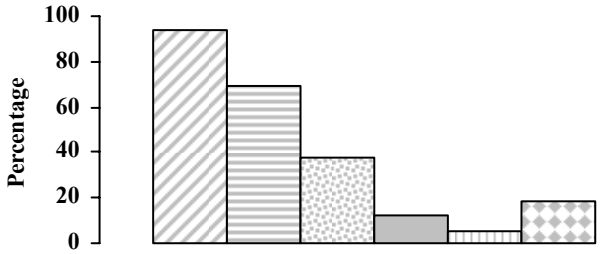
As would be expected, the mean number of days in the last month where sex is being sold (16 days) was higher than the reported number of days where sex was being bought (3 days). Only two *Panthi* respondents reported selling sex to men in the last month, and so were excluded from the analysis on selling sex. Most MSW had new clients (89%) with whom the majority (82%), particularly *Kothis* and *Double-Deckers,* reported anal sex. Over two-thirds of the sample also reported having repeat clients, with whom 74%, particularly *Kothis* and *Double-Deckers,* reported anal sex. Overall condom use was not consistent, with only 66% and 63% reporting 'always' using condoms with new and repeat clients respectively. This proportion was highest among *Hijras* (85% and 89%) but of the few *Double-Deckers* and bisexuals who reported selling sex, condom use was consistently below 60%. Sixty-four percent and 56%, respectively, of the sample reported consistent condom use with MSW and FSW. Many respondents, particularly *Hijras*, reported being beaten or forced to have sex whilst selling sex (36%) compared to the number reporting abuse whilst buying sex (15%), particularly *Kothis*.

Figure 5.2: Proportion of MSM identities reporting ever A) selling sex to other men B) buying sex from a male sex worker C) having non-commercial sex with another male D) having sex with a woman E) buying sex from a female sex worker (FSW) F) HIV prevalence

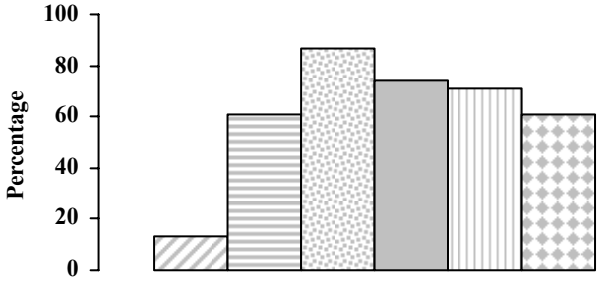
A) Selling Sex to Men



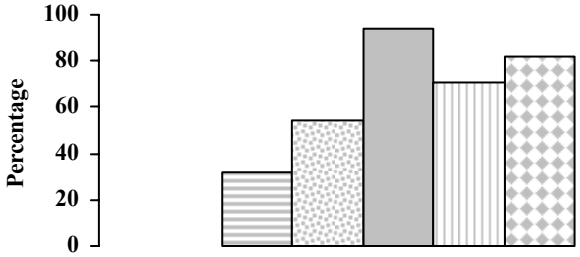
B) Clients of Male Sex workers (MSW)



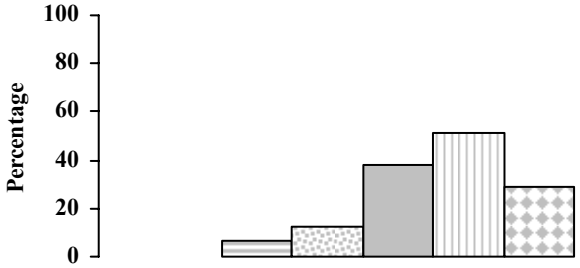
C) Non-Commercial sex with a man



D) Sex with a woman



E) Sex with a Female Sex Worker (FSW)



F) HIV prevalence
(no data for 'No Identity')

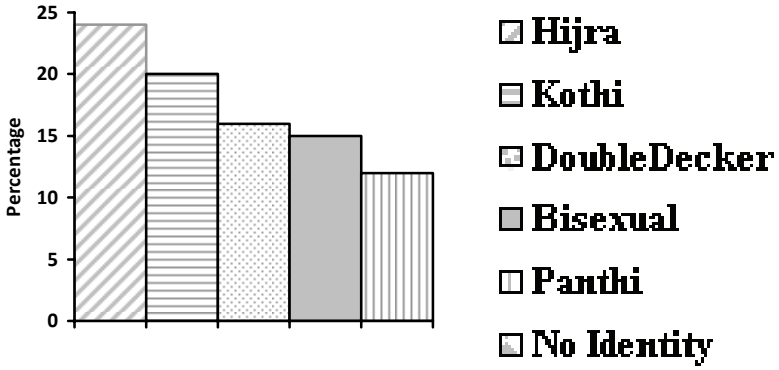


Table 5.2: Commercial sexual behaviour among men who have sex with men (MSM) by sexual identity

Characteristic	*Hijra* Mean or %* (n=47)	*Kothi* Mean or % * (n=94)	*Double Decker* Mean or %*(n=52)	Bisexual Mean or % * (n=81)	*Panthi* Mean or % * (n=55)	No Identity Mean or % * (n=28)	Total Mean or % * (n=357)	Unadjusted p-value
Men/*Hijra* selling sex								
Ever sold sex to other men (N=357)	94 (44)	69 (65)	38 (20)	12 (10)	5 (3)	18 (5)	41 (147)	0.000
Mean days sold sex in last month (N=147) Þ	22 (44)	16 (65)	11 (20)	8 (10)	21 (3)	10 (5)	16	0.212
Sex with a new client in the last 10 clients (N=147) §	91 (40)	95 (62)	95 (19)	50 (5)	100 (2)	60 (3)	89 (131)	0.000
Reported anal sex with new clients, in general (N=131) §	59 (23)	98 (61)	84 (16)	80 (4)	100 (2)	67 (2)	82 (108)	0.000
Always uses condoms with new clients, in general (N=108) §¶	85 (34)	58 (36)	58 (11)	60 (3)	0	67 (2)	66 (86)	0.076
Ever had repeat clients (N=147)§	64 (28)	77 (50)	70 (14)	80 (8)	100 (2)	20 (1)	70 (103)	0.074
Reported anal sex with the last repeat client (N=120) §	54 (15)	80 (40)	100 (14)	88 (7)	100 (2)	100 (1)	77 (79)	0.026
Always uses condoms with the last repeat client (N=120) §¶	89 (24)	56 (28)	50 (7)	50 (4)	0	100 (1)	63 (64)	0.012
Ever forced to have sex or beaten while selling sex (N=199)§	43 (19)	42 (27)	20 (4)	20 (2)	0	20 (1)	36 (53)	0.293
Men buying sex								
Ever bought sex from a male sex workers (MSW) (N=357)	4 (2)	12 (11)	23 (12)	56 (45)	53 (29)	46 (13)	31 (112)	0.000
Mean days bought sex in last month (N=112) Þ	0	3 (11)	4 (12)	3 (45)	3 (29)	3 (13)	3	0.897
Always uses condoms with MSW, in general (N=101) § ¶	50 (1)	60 (6)	55 (6)	64 (27)	73 (19)	60 (6)	64 (65)	0.878
Ever forced to have sex or beaten while buying sex (N=101)§	0	50 (5)	9 (1)	17 (7)	4 (1)	10 (1)	15 (15)	0.027
Ever bought sex from a *Hijra* sex worker (HSW) (N=357) §	2 (1)	6 (6)	12 (6)	22 (18)	25 (14)	46 (13)	16 (58)	0.001
Ever bought sex from a female sex worker (FSW) (N=357)	0	7 (7)	12 (6)	38 (31)	51 (28)	29 (8)	22 (80)	0.000
Always uses condoms with FSW, in general (N=32) ¶ §	0	67 (2)	0	69 (11)	45 (9)	60 (3)	56 (25)	0.473

(N) Denominator
(n) Numerator
* Column percentage
Þ Mean number of days sold/bought sex includes those that answered 0 to selling/buying sex in the last month, those that answer 0 also skipped the next question
§ The denominator refers to all of those respondents for whom the question is relevant for example, those who had never sold sex skipped the question on mean number of days sold sex in the last month
¶ Condom use was categorised into two groups: Always vs. Never/Sometimes/Frequently

5.3.3 Comparison of non-commercial sexual behaviour of MSM with different sexual identities **(Table 5.3)**

Non-commercial (NC) sexual behaviour such as mean number of NC male partners in the last month, condom use with both known and unknown NC male partners, and the mean number of monthly sex acts and condom use with a wife did not vary significantly by identity. High numbers of lifetime NC partners (with a mean of 206) were reported, particularly by *Panthis*, *Double-Deckers* and bisexuals, but few *Hijras* reported NC sex with men. Eighty-seven percent and 88% of the sample reported anal sex with both known and unknown NC partners, with inconsistent condom use (52% and 54% respectively).

As expected the type of anal sex with NC partners varied significantly by identity, with *Kothis* and *Hijras* mostly reporting receptive anal sex; *Panthis* and bisexuals insertive sex; and *Double-Deckers* and those with no identity, both insertive and receptive anal sex. As shown in Table 5.2 and Figure 5.2, behaviour did not always conform to identity stereotype , with 25% and 15% of the sample (not all *Double-Deckers*) reporting both insertive and receptive anal sex with known and unknown NC partners respectively. Furthermore a significant number of bisexuals and *Panthis* reported receptive anal sex with known (16% and 9% respectively) and unknown (22% and 19% respectively) NC partners.

Bisexual behaviour was common, with 30% of the sample reported being currently married and living with their wife, particularly bisexuals (56%) and *Panthis* (33%). The mean number of monthly sex acts was higher with wives (10 acts) than with NC male partners (5 acts), yet only 2% of those with wives reported consistent condom use.

In the multivariate analyses, even after controlling for significant sociodemographic variables (age, literacy, marital status, living arrangements and age at first sex with a male), the association between 15 behaviour variables, which were significant in univariate, and identity remains significant. Five selected variables, which showed considerable variation between identity are shown in Table 5.4. The reference category for the multivariate analysis was *Kothi*. There was no significant difference between *Kothi* and *Hijra* in reporting selling sex and sex with new clients. There was no significant difference between *Kothi* and bisexual or *Panthi* in reporting NC sex with men or anal sex with clients.

Table 5.3: Non-commercial sexual behaviour among men who have sex with men (MSM) by sexual identity

Characteristic	*Hijra* Mean or %* (n=47)	*Kothi* Mean or % * (n=94)	*Double Decker* Mean or %*(n=52)	Bisexual Mean or %* (n=81)	*Panthi* Mean or %* (n=55)	No Identity Mean or % *(n=28)	Total Mean or % * (n=357)	Unadjusted p-value
Ever had non-commercial sex with a man/*Hijra* (N=357)	13 (6)	61 (57)	87 (45)	74 (60)	71 (39)	61 (17)	63 (224)	0.000
Mean number of lifetime NC male partners (N=224)§	185 (6)	91 (57)	278 (45)	192 (60)	292 (39)	48 (17)	206	0.003
Mean number of NC male partners in the last month (N=224) Þ	4 (6)	5 (47)	6 (29)	1 (53)	5 (23)	4 (13)	5	0.715
Type of NC male partners in the last month (N=224) §								0.000
Known NC only	0 (0)	28 (16)	64 (29)	33 (20)	51 (20)	76 (13)	44 (98)	
Unknown NC only	50 (3)	47 (27)	31 (14)	35 (21)	18 (7)	18 (3)	33 (75)	
Known and Unknown NC	17 (1)	12 (7)	0 (0)	17 (10)	21 (8)	6 (1)	12 (27)	
Reported anal sex with the last known NC male (N=191)§	67 (2)	94 (46)	77 (34)	90 (44)	100 (30)	69 (11)	87 (167)	0.014
Type of anal sex with the last known NC male (N=167) §								0.000
Insertive	50 (1)	7 (3)	12 (4)	64 (28)	87 (26)	18 (2)	38 (64)	
Receptive	50 (1)	91 (42)	21 (7)	16 (7)	9 (3)	9 (1)	37 (61)	
Both	0	2 (1)	68 (23)	20 (9)	3 (1)	73 (8)	25 (42)	
Always uses condoms with the last known NC male (N=167) ¶ §	50 (1)	48 (22)	56 (19)	50 (22)	60 (18)	45 (5)	52 (87)	0.914
Reported anal sex with unknown NC men, in general (N=117) §	50 (2)	87 (34)	95 (18)	81 (26)	100 (17)	100 (6)	88 (103)	0.055
Type of anal sex with unknown NC men, in general (N=94) §								0.000
Insertive	0	3 (1)	11 (2)	61 (14)	75 (12)	60 (3)	34 (32)	
Receptive	100 (1)	97 (31)	35 (6)	22 (5)	19 (3)	20 (1)	50 (47)	
Both	0	0	53 (9)	17 (4)	6 (1)	20 (1)	16 (15)	
Always uses condom with unknown NC men, in general (N=94): ¶ §	100 (1)	56 (18)	65 (11)	52 (12)	44 (7)	40 (2)	54 (51)	0.865
Non-commercial sex with female partners (wife)								
Currently married and living with wife (N=357)	0	16 (15)	29 (15)	56 (45)	33 (18)	36 (10)	29 (103)	0.000
Mean number of sex acts with wife in the last month (N=103 Þ§	0	8 (15)	13 (15)	9 (45)	11 (18)	7 (10)	10 (103)	0.290
Always uses condom with wife, in general (N=100): ¶ §	0	0	0	3 (1)	6 (1)	0	2 (2)	0.691

(N) Denominator
(n) Numerator
* Column percentage
Þ Mean number of days sold/bought sex includes those that answered 0 to selling/buying sex in the last month, those that answer 0 also skipped the next question
§ The denominator refers to all of those respondents for whom the question is relevant
¶ Condom use was categorised into two groups: Always vs. Never/Sometimes/Frequently

Table 5.4: Multivariate analysis of the association between selected commercial and non-commercial sexual behaviour of MSM and sexual identity after controlling for sociodemographic characteristics

Identity	Ever sold sex to other men			Ever had sex with NC male			Ever bought sex from a MSW			Reported sex with a new client in the last 10 sex acts			Reported anal sex with new clients		
	OR	**95%CI**	**p-value**	**OR**	**95%CI**	**p-value**	**OR**	**95%CI**	**p-value**	**OR**	**95%CI**	**p-value**	**O.R**	**95%CI**	**p-value**
Hijra	1.42	0.32-6.23	0.64	0.23	0.07-0.77	0.02	0.83	0.25-2.76	0.01	0.30	0.05-1.88	0.19	0.01	0.00-0.55	0.02
Kothi Ξ	1			1			1			1			1		
Double Decker	0.47	0.20-1.09	0.08	2.90	1.08-7.80	0.04	1.29	1.01-5.19	0.05	1.04	0.10-10.7	0.97	0.05	0.00-0.87	0.04
Bisexual	0.10	0.04-0.21	0.00	1.30	0.60-3.02	0.54	8.95	3.54-22.6	0.00	0.02	0.00-1.57	0.08	0.08	0.00-4.42	0.22
Panthi	0.03	0.01-0.19	0.00	1.07	0.45-2.54	0.88	7.82	3.64-16.8	0.00	0.07	0.01-0.75	0.03	*	*	*
No Identity	0.08	0.02-0.31	0.00	0.90	0.33-2.48	0.94	6.93	2.21-21.7	0.00	0.05	0.00-0.59	0.02	*	*	*

Ξ *Kothi* is the reference group for the multivariate logistic regression analysis
* *Panthis* and men with no identity have been excluded from the analysis due to small numbers

5.4 Discussion

Our study confirms important differences in behaviour between self-identified groups of MSM in India as well as ongoing risk with the potential for HIV spread. Distinctions between MSM can be broadly made according to whether they are more likely to sell or buy sex, have non-commercial sex, and practise insertive or receptive anal sex. There is some overlap here as those who sell sex are also more likely to practise receptive anal sex.

To summarise the differences that emerged between the groups: *Hijras* are less literate and frequently sell sex for their living but rarely buy sex. *Hijras* often live in family groups with gurus and are Hammam based, thus, their lifestyle revolves around their sexual identity, which makes them an easier target for stigma and violence [53]. They are highly vulnerable to HIV infection as they more likely to exclusively have receptive anal sex and have a high turnover of both clients and non-commercial male partners. *Kothis* are similar to *Hijras* in their reported risk behaviour, including being likely to sell sex, first having had sex with a relative, living with a male partner, less likely to have married a woman than *Panthis* or bisexuals and to have had receptive anal sex. Studies among MSM in India have shown that engaging in sex for money is associated with an elevated risk of both sexual violence and risk of HIV infection [39][50].

More masculine *Panthi,* bisexuals and men with no identity are more likely to buy sex, rather than sell sex, and conform to societal pressures and marry [41]. *Panthis* and bisexuals predominantly take the penetrative role in sex, which is less risky in contracting HIV than insertive sex but still high risk, but are more likely to report sex with multiple genders (men, women and *Hijras*). Unlike the other identities described, few *Double-Deckers* report buying or selling sex to men, but 84% reported NC sex, during which most had both insertive and receptive anal sex. It is possible, therefore, that masculine *Double-Deckers* can have relations with *Hijras* or *Kothis*, yet the same men may take a receptive role during anal sex with a *Panthi* [41].

Across all these categories, HIV risk behaviour is high. The lifetime reported numbers of sexual partners is frequently over 100, and consisten condom use is low. The frequency of anonymous sex is a particular concern in HIV control, where infection status is likely

unknown and partner testing is not possible. It is also noticeable that many of the sample originated from outside Bangalore, which suggest that many may have migrated to this cosmopolitan city to adopt this preferred lifestyle.

Sexual partnerships with women are common, especially for bisexuals and *Panthis*, and condom use with female partners is low. Given that anal sex carries a high risk of transmission per sex act [2] the risk of further onwards transmission of HIV infection to women would be expected following HIV spread in the MSM community. Extrapolating from the data it may be the case that receptive *Hijras* and *Kothis* acquire infection from insertive *Panthis* and bisexuals who acquire infection from other *Hijras* and *Kothis*, but with a lower risk per contact because they are insertive [140]. *Double-Deckers* carry both the risks of receptive and insertive anal sex and could increase the spread of HIV beyond what would be observed when men are either exclusively insertive or receptive [141]. There is however some overlap between identities in terms of stereotypical behaviour, and the roles are not as rigid as is often thought. For example, 15% of *Kothis* report currently living with a wife/female partner, as well as some bisexuals and *Panthis* reporting exclusive receptive anal sex with known (16% and 9%) and unknown (22% and 19%) NC partners. Furthermore, 7% of *Kothis* reported buying sex from FSW. Only one study has previously documented such behaviour, with 1.5% of *Kothis* ever having paid to have sex with a woman [58]. There are two possible explantations for this. First, it may be because either there is less stigma and shame associated with buying sex from FSW than MSW among general society. Second, being married is a source of stigma within the *Kothi* community [52]; therefore, some *Kothis* may buy sex from women so that their bisexual behaviour remains anonymous and private.

Some studies have been published in the Indian setting recognising *Kothis, Hijras*, and *Panthis* as basic self-descriptors of MSM, which correspond with the policy-oriented idea of role segregation [53][58]. Empirical data examining self-identity and sexual behaviour among MSM, particularly in India, are lacking, but the idea of identity has been recognised cross-culturally. In Peru there is also evidence of strong role segregation and behaviour intertwined with, but not identical to, role identity [140]. Ethnographic reports on men at risk of HIV in Senegal have also found that MSM have identities that also serve as a basis for social organisation and sexual roles. Authors describe *ibbi* as men who tend to adopt feminine mannerisms and to be less dominant in sex, whereas *yoos* are men who are

generally insertive. They also stress that categories have more to do with social identity and status than sexual practices [142].

Study Limitations

In our study, there are likely to be a number of biases. Apart from the constraints placed upon the study by location, reliance upon self-reporting carries an inherent risk of bias. As these MSM are self-identified there are potential biases in terms of reporting socially desirable behaviours, particularly those with a lower risk of HIV infection, following the promotion of safer behaviours through interventions. Whilst we measured behaviours that could lead to HIV spread, infection data makes it clear how real current risk of infection is. A similar survey carried out among 298 MSM in Bangalore at the same time shows HIV prevalence at 17% [58]. Broken down by identity, results showed that HIV was highest in *Hijras* (24%) and *Kothi* (20%) compared to *Double-Deckers* (16%), bisexuals (15%) and *Panthi* (12%).

The sample of MSM in this study is only representative of MSM who frequent such public sites where MSM congregate. This is likely to be a very different population from those who would identify as MSM in a household or internet based survey. Furthermore, the overall participation rate was only 62%, which led to concern about the representativeness of the study, and consequently, about the generalisability of the results. A possible reason for non-participation may have been not wanting to spend time going to the drop-in clinic as well as the time taken to complete the questionnaire. There was no information given on why respondents did not take part in the survey.

Other studies recruiting MSM in public place cruising sites have shown response rate to range from 55%, also in Bangalore [58], to 92% in rural Andhra Pradesh [39]. It is noticeable that the majority of the sample were easily identifiable *Hijras* and *Kothis*, with about a third fewer *Panthis* and *Double-Deckers*. This identity bias suggests that there may be less focus by prevention programs on less visible Panthis and bisexuals, despite their risk behaviour and potential to bridge to the general population. One would have expected more clients than sex workers if this was a representative sample of MSM, suggesting that many clients have not been captured here. The disproportionate number of sex workers would be a result of them being more identifiable, more willing to participate in the survey or spending a longer duration of time in each of the cruising locations.

Although it is understood that there are individuals who identify themselves as gay or heterosexual/straight in Bangalore and who may visit the same cruising sites as those recruited in the study, it is thought that such individuals inhabit different social networks from the MSM identities examined in this article. As a result, they are not targeted by the NGO through whom we recruited and, accordingly, are not considered in this study. The question posed on this topic in the questionnaire was open-ended: 'How do you identify yourself?' Based on the responses in the pilot study, the options listed did not include gay, heterosexual, or straight. Allowing respondents to select identities might have offered additional scope for analysis in this thesis.

Future Research

The category MSM was established to refer to homo-bisexual behaviours and identities. The potential cultural difficulties posed by this definition are not addressed here. In future studies, Hijras should not be included in studies on MSM as participants, but studied as a separate group. This recommendation was taken into consideration for the Avahan IBBA and SBS studies in Bombay who carried out individual research among MSM and *Hijra* individually. Furthermore, anecdotal evidence during the fieldwork suggested that identity may evolve over time in response to social, political and cultural developments. Only one study has examined changes in sexual identity over time in women, although no comparable studies exist on sexual identity development of men [144]. It would be interesting therefore, for qualitiative research to investigate both how respondents conceptualise the term MSM and also how static sexual roles are and if, and how often, they change over an individuals lifetime.

Conclusions

This chapter highlights the importance of quantifying role behaviour to help design interventions that address different risk factors associated with identity. The conclusion that HIV prevention discourses need to be sensitive to different categories of MSM has long been the mantra of HIV interventions in India. However, the results of this article reject our null hypothesis that the identities conformed to stereotype but, in fact, fluiditiy in behaviour was demonstrated within these sexual categories. It is important, therefore, that MSM do not get pigeon-holed into static sexual roles but accommodate the concept that behaviour, and its associated risk, is fluid within these identities.

Chapter 6: Men who have sex with men and women in Bangalore, India and the impact on the HIV/AIDS epidemic

6.1 Introduction

Studies in India have shown that MSM are a highly complex and diverse group, many of whom may have frequent sexual relations with women [49, 50, 58, 61]. A study in Andhra Pradesh found that 42% of MSM were married and that 50% had reported sexual relations with a woman in the past three months [39]. Some men might turn to men for sex due to difficulties accessing females. On the other hand, given the stigma associated with homosexual behaviour and the Indian penal code, which until recently cited 'sodomy' as an offence, the pressure to deny male-with-male sex is pronounced and many MSM marry women [41].

It has been reported that condom use by MSM with spouses tends to be low, even more so than with male partners, which suggests that through bisexual behaviour, men could link circuits of high risk male-with-male activity with the general female population [49]. Studies have shown that the number of cases of women infected with HIV through heterosexual transmission within marriage is increasing in India and that the behaviour reported by the husband was an important risk factor for infection among many of these women [144]. The frequency of bisexual behaviour among MSM, coupled with low condom use with both male and female partners, high HIV prevalence among MSM in India and increased transmission efficiency of anal sex means that the contribution of men who have sex with men and women (MSMW) to the HIV epidemic, through transmission to their female partners, could be substantial [66]. On the other, at the national level the overall HIV prevalence continues to suggest a concentrated HIV epidemic in India, primarily among risk groups. For example, a very high prevalence among MSM (7.4%), this is more than 15 times the prevalence among ANC clinic attendees (0.48%). [2]

Despite high rates of marriage among MSMW, prevention efforts in India have tended to consider bisexual and homosexual men as a single group, with less attention given to understanding the impact of their sexual relations with women. This may be in part because bisexual men do not identify socially with the 'MSM community', that is a regular group of visitors at public place cruising sites and NGO drop-in clinics who have come together as a result of the outreach work by Sangama, but rather tend to limit their interactions to the sexual arena.

There is evidence from Latin America that MSMW are more likely to engage in insertive rather than receptive anal sex with other men and have unprotected sex with their female partners [55]. Some have argued that MSMW with a non-'gay' identity may be at higher risk of HIV infection because of a lack of peer support and limited access to prevention services that are available to MSM who are more open about their sexuality [149].

In order to develop more effective preventive responses, we need to better understand sexual risk behaviour, and the extent to which bisexual behaviour serves as a bridge for infection into the heterosexual population. In Chapter 5, we have explored identities of MSM, including transgenders, and how their sexual behaviour is related to identity. The objective of this Chapter 6 was to disentangle the risk behaviour of men who have sex with men only versus those who reported sex with men and women, which has important implications for both the HIV epidemic and prevention interventions in India. Firstly, we quantified differences in the characteristics and sexual risk of MSMW and men who have sex with men only (MSMO), and then explored differences in risk behaviour of MSMW with their female partners compared to that with their male partners.

6.2 Survey methods

The two-stage cluster sampling method is described in Chapter 3 and Chapter 4. In brief, following pre-survey mapping of public cruising sites and Hammams, time-location and conventional-based sampling, respectively, of 85 clusters was carried out with five respondents approached in each. Men were eligible to participate in the study if they had had sex with a man at least once in their lifetime and were at least 18 years of age. Men were classified as MSMW if they reported sex with a female within a year prior to interview. The

term MSM used in this chapter encompasses both men and male-to-female transgender (*Hijra*). Although *Hijras* do not socially and psychologically identify themselves as men, they are included in this study as (1) the program through which respondents were recruited target men and *Hijras*, thereby creating a degree of overlap between their social networks; and (2) many *Hijras* engage in receptive anal intercourse (see Chapter 5).

.

Statistical Analysis

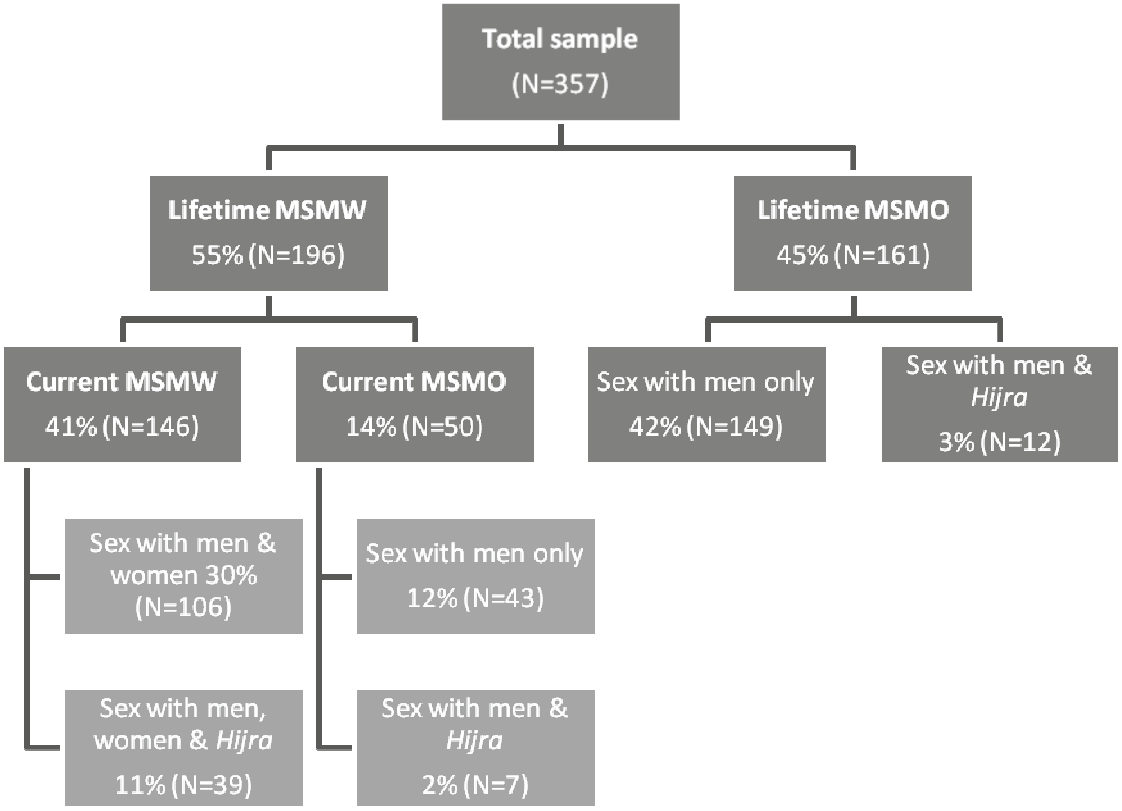
The association of sociodemographic characteristics with bisexual behaviour was examined using the Wald test for continuous variables and Pearson chi-square tests with Rao-Scott correction for categorical variables [126]. Each indicator of HIV-related risk behaviour was related individually to the outcome, bisexual behaviour. A logistic regression model was created, adjusting for sociodemographic variables shown to be significantly associated with bisexual behaviour. In constructing the multiple regression models for the adjusted analyses, all variables with a p-value of 0.25 or less in the univariate analyses were selected, with the variable with the smallest p-value chosen as the first independent variable in the multivariate model. Variables were added step-wise, dropping any that were not statistically significant ($p<0.05$), unless there were noticeable changes in the coefficient values, which were indicative of confounding. All statistical analyses took into account the complex survey design (clustering), in order to take into account the correlation between individuals, using SVY commands in STATA (vers 10; Stata corporation, TX)[124].

6.3 Results

In total, 357were interviewed. Figure 6.1 shows the extent of lifetime and current (past year) bridging behaviour by partner type. Over half of the sample (55%) reported sex with men and women in their lifetime; 45% reported sex with men only; and 3% reported sex with men and *Hijra* only. No men reported having had sex with *Hijras* only.

Over the last year 41% reported sex with men and women, including 30% reported sex with men and women and 11% reported sex with all partner types - men, women and *Hijra*. On the other hand 14% of those previously reporting bisexual behaviour now only reported sex with men, including 2% had sex with men and *Hijra* (Figure 6.1).

Figure 6.1: Lifetime and current (in the past year) bridging behaviour



6.3.1 Sociodemographic characteristics

Over a third of MSMW (38%) and MSMO (33%) were recruited into the survey in public parks, and 12% of MSMO were recruited in Hammams due to the higher proportion of *Hijras* in this group (Table 6.1). Those who reported bisexual behaviour in the last year were older on average than exclusive homosexuals. Age at first sex was significantly higher among MSMW than MSMO (19 vs. 17 years).

Most of the sample was Hindu and literate (71%) and this did not vary significantly between MSMW and MSMO. A third (34%) of all respondents had been married to a woman at some stage in their life. The majority of MSMW were currently married (68%), most MSMW (66%) lived with their wife. Among men not reporting sex with a woman in the last year, 3% were currently married.

Slightly fewer MSMW originated from Bangalore (52% vs. 47%) and have ever had sex with another man outside Bangalore (25% vs. 28%). Considerably more MSMW concealed their

same-sex behaviour from their families than MSMO (96% vs. 74%), although the percentage is high in both groups which highlights the social stigma of male-with-male sex. Significantly fewer MSMW than MSMO perceived themselves to be at risk of contracting HIV (32% vs. 46%). Despite this, there was no significant difference between MSMW and MSMO in the rates of HIV testing, with high levels of HIV testing in both (42% and 46% respectively).

Sexual identity and bisexual behaviour

As described in detail in Chapter 5, MSM in India define themselves by identity based on gender and role behaviour. As previously described (chapter 5), and in the present study, self-reported sexual identity (see Table 6.1 footnote) was strongly associated with having sex with women. Of those who reported sex with men and women, only 43% self-identified as bisexual; 23% as *Panthi*, 12% as *Double-Decker*, 11% as *Kothi*, while 11% of MSMW did not self-identify with any group. No *Hijra* reported sex with women.

Table 6.1: Sociodemographic characteristics and behaviours of MSMW and MSMO

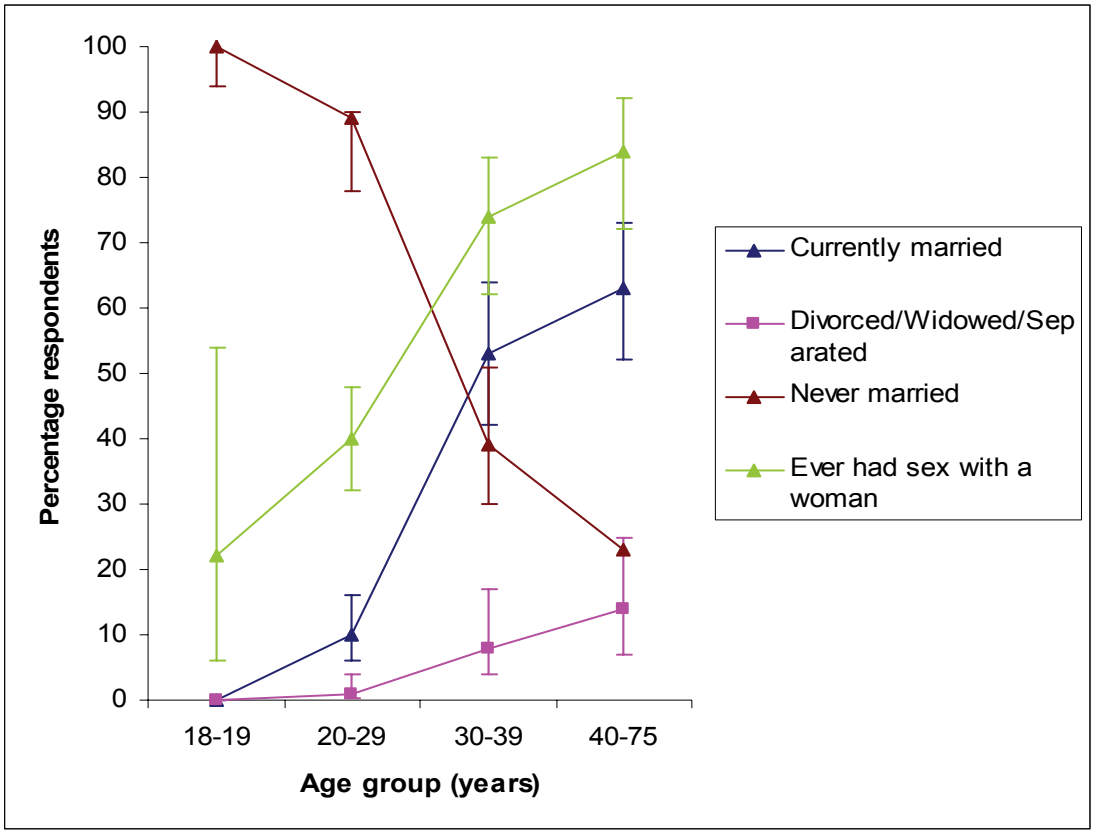
Characteristic	Total N=357	MSMW * % (N=146)	MSMO % (N=211)	P-Value
Cruising site where recruited:				0.031
Public Park	125	38	33	
Public Toilet	68	21	18	
Bus station	63	16	18	
Hammam	28	2	12	
Other including train station, cinema etc	73	23	18	
Self-reported sexual identity Þ				<0.001
Hijra	47	0	22	
Kothi	94	11	37	
Panthi	55	23	10	
Double-Decker	52	12	16	
Bisexual	81	43	9	
No Identity	28	11	6	
Age (Median)	(30)	(33)	(28)	<0.000
18-19	23	3	9	
20-29	181	34	62	
30-39	96	40	18	
40-75	57	23	11	
Median age at first sex with a man (years)	18	19	17	0.007
Religion §				0.656
Hindu	253	72	70	
Islam	74	21	21	
Christian	27	6	9	
Literate: can read and write	252	74	68	0.265
Marital Status				<0.001
Currently married	105	68	3	
Separated/Divorced/Widowed	18	3	6	
Never married (including all Hijra)	233	29	91	
Living Arrangements §				<0.001
Living with Male Partner	21	2	9	
Living with Wife	101	66	2	
Living Alone/Friend/Hotel	90	13	34	
Living with Guru/Hijra	35	0	17	
Living with Family (no wife)	110	18	39	
Born in Bangalore	175	52	47	0.331
Ever had sex with men outside Bangalore	96	25	28	0.382
Family does not know respondent has sex with men ‡	296	96	74	<0.001
Feel at risk of being infected with HIV	144	32	46	0.027
Had an HIV test ever	157	42	46	0.523

* MSMW refers only to men who had sex with men and women in the last year
§ May not add up to 100% as some respondents answered 'Other'
Þ *Kothis* and *Hijras* (transgender) are have feminine characteristics and predominantly engage in receptive anal sex; *Panthi*s and bisexuals are more masculine (identified as such by *Kothis* & *Hijra*s) who mainly engage in receptive sex; whilst *Double-Decker* are more gender neutral and have both receptive and insertive anal sex.
‡ A definition of 'family' was not given and may have been interpreted differently by different respondents. For example it may include wives, but be restricted to parents for others.

Age and bisexual behaviour

The association of having sex with women and marital status was related to age. The proportion of the sample that had never been married decreased with age whereas the proportion currently married increased with age (Figure 6.2). As expected with a rise in those currently married, the percentage of respondents who have ever had sex with a woman also increased as does the number of respondents' divorced/separated/widowed. This indicates that most sex with a female is mostly to due to marriage at some point.

Figure 6.2: Association of behavioural bisexuality or marital status with age



6.3.2 Sexual risk behaviour of MSMW and MSMO

As shown in Table 2, there was no significant difference between MSMW and MSMO in terms of the type of male partner they first had sex with and reporting anal sex with known or unknown NC partners.

Men who sold sex were less likely to be MSMW than those who did not sell but those who ever bought sex from males and *Hijras* (sex workers were more likely to be MSMW. Men who reported ever having non-commercial (NC) male partners were more likely to be MSMW than those who did not . Men who reported receptive intercourse were less likely to be MSMW than those who had insertive anal sex, with both known and unknown NC male partners.

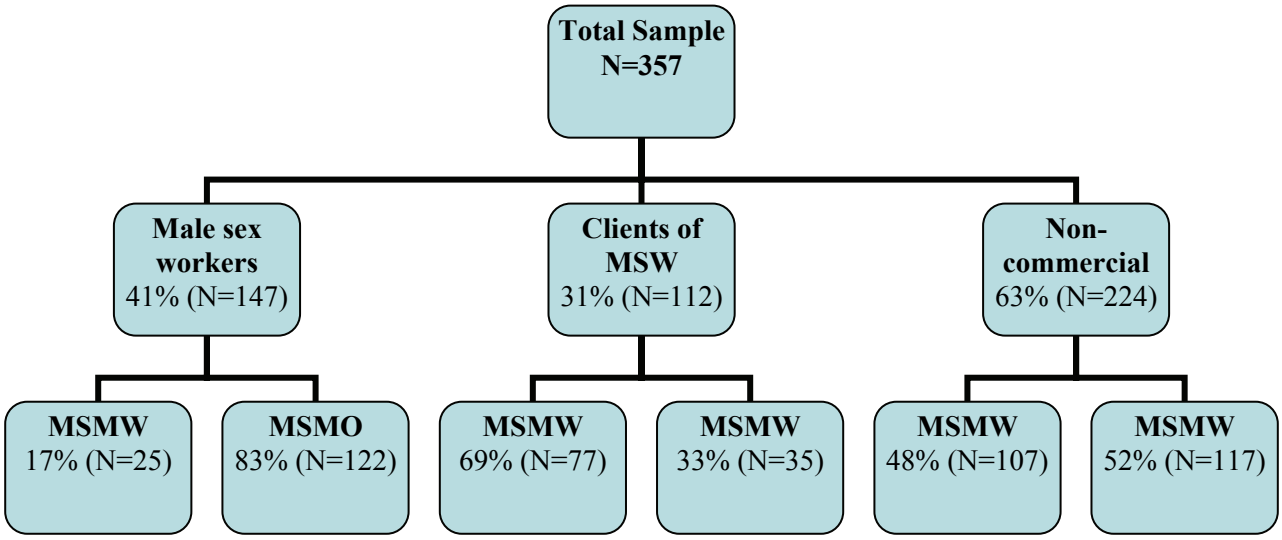
Results of the multiple logistic regression model are shown in Table 2. Buying sex from male sex workers remained significantly higher among MSMW as well as lower reporting of receptive sex with unknown NC partners, in comparison to MSMO, regardless of sociodemographic characteristics. Buying sex from *Hijra* sex workers also remained borderline significant in the multivariate analysis. Reporting selling sex, non-commercial sex with men, and type of anal sex with known and unknown NC partners was all confounded by sexual identity and was no longer significant.

Table 6.2: Sexual risk behaviour of bisexual (MSMW) versus homosexual (MSMO) men

Characteristic	Total N	% MSMW	% MSMO	Univariate OR (95% CI)*	Univariate P-Value	Adjusted OR Þ (95% CI)	Adjusted P-value
Male first had sex with §:							
Classmate/Friend/Colleague	195	56	54	1		1	
Relative	47	10	15	0.65 (0.32-1.31)	0.220	1.06 (0.53-2.12)	0.886
Paying client/Male sex worker	23	10	4	2.58 (0.95-7.01)	0.062	1.30 (0.39-4.32)	0.665
Stranger	79	21	23	0.84 (0.51-1.40)	0.507	0.48 (0.26-0.88)	0.019
Ever sold sex to another man							
No	210	83	42	1		1	
Yes	147	17	58	0.15 (0.08-0.27)	<0.001	0.28 (0.28-1.10)	0.081
Ever had non-commercial (NC) male partners							
No	132	27	44	1		1	
Yes	224	73	55	2.16 (1.27-3.68)	0.005	1.19 (0.62-2.27)	0.745
Ever had anal sex with known NC men							
No	24	15	10	1		1	
Yes	167	85	90	0.66 (0.28-1.54)	0.327	0.46 (0.18-1.18)	0.109
Type of anal sex with known NC men							
Insertive	64	56	22	1		1	
Receptive	61	21	51	0.16 (0.07-0.39)	<0.001	0.55 (0.19-1.59)	0.350
Both insertive & receptive	42	23	28	0.34 (0.13-0.77)	0.013	0.55 (0.16-1.94)	0.355
Ever had anal sex with unknown NC men							
No	14	12	12	1		1	
Yes	103	88	88	1.03 (0.36-2.96)	0.949	1.17 (0.22-6.16)	0.643
Type of anal sex with unknown NC men							
Insertive	32	45	25	1		1	
Receptive	47	33	63	0.29 (0.11-0.78)	0.015	0.31 (0.11-0.91)	0.027
Both insertive & receptive	15	21	12	1.03 (0.34-3.07)	0.962	0.83 (0.26-2.67)	0.751
Ever bought sex from male sex worker							
No	245	47	83	1		1	
Yes	112	53	17	5.61 (3.34-9.42)	<0.001	2.48 (1.40-4.41)	0.003
Ever bought sex from *Hijra* sex worker							
No	298	73	91	1		1	
Yes	58	27	9	3.81 (1.94-7.51)	<0.001	2.12 (0.99-4.57)	0.021

§ Does not add up to 100% as some respondents answered 'Other'
* The reference category for the OR is MSMO with MSMW as the comparison group
Þ Odds ratio adjusted for age, age at first sex with a male, cruising site, and sexual identity

Figure 6.3: Distribution of MSMW and MSMO reporting non-commercial and commercial sex with male partners only



6.3.3 Consistent condom use and mean number of monthly sex acts by different types of partner

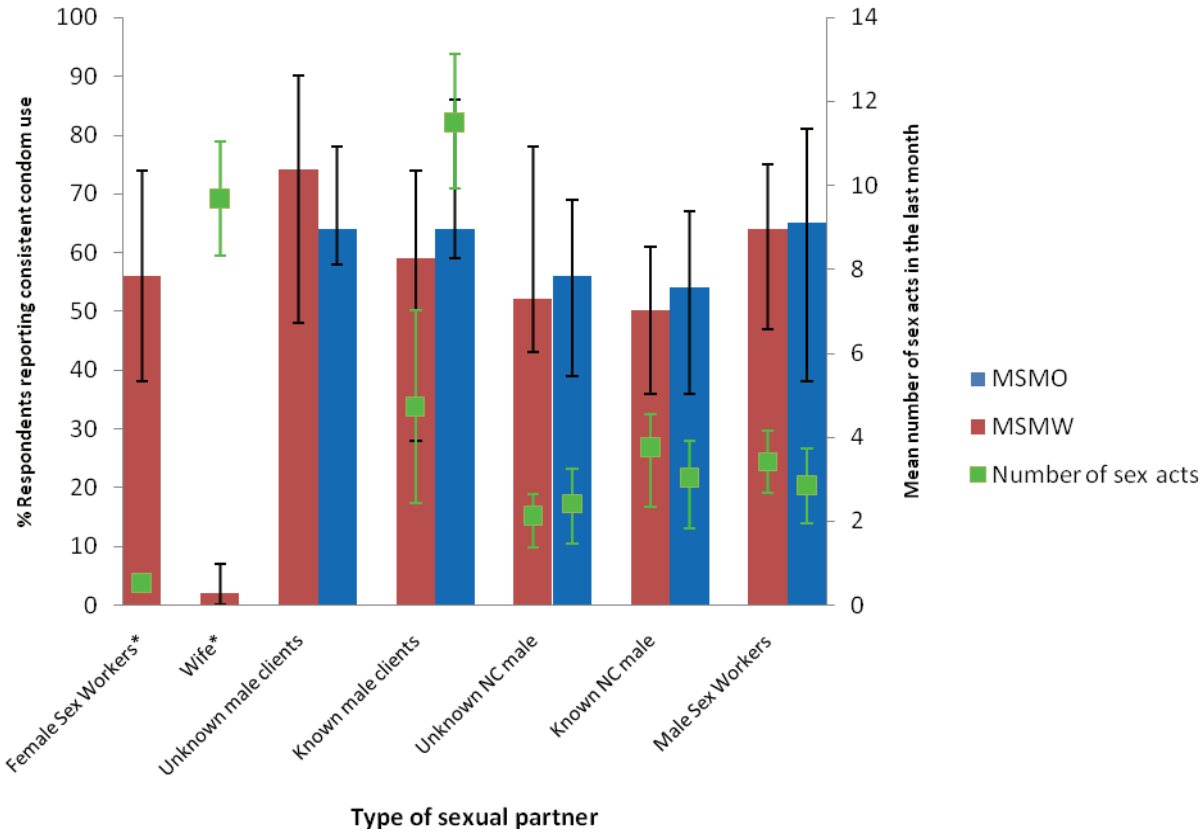
Consistent condom use was defined as '*always*' using a condom in general with that partner. There were no significant differences in the consistency of condom use between MSMO and MSMW by type of male partners, either commercial or non-commercial partners (Figure 6.4).

Of those who had ever sold sex to men, consistent condom use was lower for known male clients compared with unknown male clients for MSMW (59% vs. 74%; p=0.48) but the same for MSMO (64% for both known and unknown clients). Condom use with known non-commercial male partners was slightly lower with known than unknown male partners for both MSMW (50% vs. 52%; p=0.85) and MSMO (54% vs. 56%; p=0.88). Of those who had ever bought sex from a male sex worker (MSW), condoms were used consistently by 64% and 65% of MSMW and MSMO respectively. This was lower than condom use with FSWs (56%).

Condom use was particularly low with wives (only 2% always used a condom with wives), even though the highest average of monthly sex acts were performed with wives (average 10 acts per month). MSMW reported fewer sex acts with known clients (5 per month) than

MSMO (12 per month). However, the mean number of monthly sex acts with both unknown and known NC male partners was similar for MSMW (2 and 4 respectively) and MSMO (2 and 3 respectively). Both MSMW and MSMO reported an average of 3 sex acts per month with MSW. As shown in Figure 6.4, inconsistent condom use did not necessarily correspond with the partner with whom they have the least number of sex acts.

Figure 6.4: Percentage respondents reporting consistent condom use and mean number of monthly sex acts by different types of sexual partner for MSMW and MSMO



6.3.4 Sexual behaviour patterns of MSMW with female partners

The mean age at first sex with a woman (22 years) was higher for MSMW than the mean age at first sex with a man (19 years). The majority of MSMW reported that their first sexual partner was male (66%). Most men reported vaginal sex with their wives (95%) and FSWs (100%), and few reported anal sex with wives (5%), although this was higher with FSWs (20%). Consistent condom use was lower for anal sex with both wives (0%) and FSWs (33%) than for vaginal sex (see Figure 2: 2% and 56% respectively), although the numbers of MSMW reporting anal sex with wives and FSW were low. Twenty-two percent of all MSMW were currently having sex with other female partners (besides cohabiting females and FSWs).

Table 6.3: Bisexual behaviour of men who had sex with men and women in the past year

Variable	MSMW % (N=146)
Mean age at first sex with a woman (years)	22
Female first had sex with §: *Wife* *Relative* *FSW* *Classmate/Friend/Colleague*	 37 17 23 19
First sexual partner *Male* *Female* *Male and Female same year*	 66 21 13
Type of sex with wife in the last month (N=103) *Vaginal* *Anal*	 95 5
Ever bought sex from a female sex worker (FSW) (N=357)	55
Bought sex from a FSW in the last year (N=62)	31
Type of sex with FSW in the last year (N=45) *Vaginal* *Anal*	 100 20
Currently having sex with 'other' female partner	22
§ Does not add to 100% as some respondents answered 'Other'	

6.5 Discussion

Men who have sex with men link circuits of high risk activity with the general population. Bisexual behaviour is a commonly reported among men who seek sex with men in the public places sampled in this survey. The findings from this chapter correspond with other research findings from India, where the proportion of MSM currently married to women has ranged from 23% to 42% [39, 50, 60].

Being married to women is associated with age. This pattern could be due to people more likely to get married as they get older or a generational divide. Economic growth and consequent shifts in social attitudes have enabled the emergence of visible homosexual communities, particularly in large cities such as Bangalore. In this current climate younger men may be increasingly empowered not to yield to the norm of heterosexual marriage.

Some differences were found between sexual identity and behaviour reported in this study, compared to others. It has been previously reported in qualitative research in Chennai (India) that engaging in sex with women is a source of stigma within the *Kothi* community [52]. In this study 11% of MSMW self-identified as *Kothis* and only 43% as bisexual. Selection of participants based on self-identification as bisexual rather than current sexual practices would have underestimated the prevalence of bisexual behaviour.

Although considerably more MSMW concealed their same-sex behaviour from their families than MSMO (96% vs. 74%), the percentage is high in both groups which highlights the social stigma of male-with-male sex. It is clear from this statistic that the cultural pressure against same-sex relations, and the norm of heterosexual marriage, remains particularly strong in India. As a result the vast majority of Indian MSM do not identify as homosexual [41, 46].

MSMW reported less risky behaviour than MSMO, with a lower likelihood of selling sex to men, and lower rates of receptive anal intercourse, in both adjusted and unadjusted analyses. This is a reflection of the many MSMO that are *Kothis* and *Hijras,* who have previously been shown to be more likely to sell sex in Chapter 5. However, a significant proportion of MSMW buy sex from sex workers (male, female and *Hijra*), and of those who reported insertive and receptive anal sex with unknown non-commercial partners, 60% were MSMW.

Condom use with wives was inconsistent among MSMW,. Indeed a similar study carried out at the same time in Bangalore in the same cruising sites showed a high HIV-1 prevalence in both MSMO (20%) and MSMW (19%) [150]. This was surprising given that MSMW have are less likely to sell sex than MSMO, on the other hand, there is no significant difference in condom rates between the two groups. In addition over half of MSMW reported sex with FSW in their lifetime, with 20% reporting anal sex with a FSW in the last year. The risk of HIV transmission to wives is therefore significant.

A limitation of this study is that it included only men who seek sex with men in public places, and this may not reflect the population of MSM in the larger community. For example, many MSMW are unlikely to acknowledge that they have male-with-male sex, as reflected by the few respondents who had informed their families that they had had sex with men, and the substantial proportion married to women. However, the study does highlight the diverse range of homosexual and bisexual behaviours among MSM in India, which may have significant implications for the risk of HIV transmission to female sexual partners. Changing behaviour in this bridging population could slow the progression of the HIV epidemic.

In this regard, at least two prevention efforts must occur: one that focuses on MSM who identify as such, and another that reaches out to men who have male and female partners, but who may not identify as bisexual, and who seek sex in locations such as public parks. The latter group could be better reached by outreach workers with more behaviourally bisexual (and generally more masculine) MSM identities, such as *Panthis* and bisexuals, rather than the often used *Kothi* and *Hijra* outreach workers [53].

It is also important to increase condom use with the female partners of MSMW, who are generally perceived as low risk. This may be difficult to achieve and sustain, however, because the desire for children may compete with the concern to protect partners from HIV infection. Although the extent to which bisexual behaviour has contributed to the National HIV rates in India has not been quantified, bridging to the general population will continue to have a high potential for contributing to the HIV epidemic unless condom use with higher-risk partners becomes more consistent.

Chapter 7: Conclusions and future work

Detailed discussions of the topics covered in this thesis have been presented at the end of each relevant chapter. This chapter provides an overview of the findings presented, together with suggested directions for future work.

7.1 Summary of research findings

This study is unique in terms of its subject matter (urban male-with-male sexual behaviour) and interviewing tools (both face-to-face and informal confidential voting method) in Bangalore, South India. The findings of this thesis provide evidence about a subject for which there has been little published data.

People in HIV associated 'risk' groups – notably MSM, FSW and IDU - face social marginalisation and deep stigma in India. While the epidemic has spread to the general population in some states, these core groups remain crucial to the national AIDS control strategy. Describing how behaviour is distributed and understanding the conditions that give rise to HIV risk is important to identify the groups and behaviours that have to be addressed. This study provides a detailed description of behaviours of MSM and how they are inter-related. In doing so it tackles issues of defining and measuring same sex behaviours. Apart from the use of biomarkers such as incidence of sexually transmitted infections (which is limited and not always practical), the only source of data depends on reliable and valid self-reporting. Although many acknowledge that the reporting of sexual behaviour is problematic, few have attempted to overcome this by comparing multiple interviewing methods in a single population, with individuals of lower literacy.

Face-to-face interviews (FTFI) are the most frequently used method of obtaining information on HIV risk behaviour in resource poor countries. However, they may lead to under-reporting for example of multiple partners, because of concerns over privacy, fear of judgement by the interviewer and social desirability bias (i.e. presenting oneself in a manner that is viewed favourably by others). In contrast, some may embellish their sexual performance and, if in the era of heightened awareness about HIV condom use is considered to be 'normative', then some respondents may over-report condom use to conform to expectations. The conventional

notion in survey research is that the more anonymous and confidential the interview process, the more likely the respondent is to divulge stigmatised behaviour.

Chapter 2 provided a systematic review and meta-analysis of the existing literature comparing innovative interviewing techniques that aim to minimise reporting bias in low- and middle-income countries. Our hypothesis was based upon previous research indicating that a method providing greater anonymity and privacy than conventional interviewer-administered methods, were more likely to yield higher affirmative response rates to sensitive questions. The results showed that the mode of interviewing can affect the reporting of sexual activity but the results are not always in accordance with expectations and tend to be context specific. Non-interviewer administered methods have proved more successful in yielding increased reporting of forced sex and increased number of sexual partners (compared with FTFI). This finding was synonymous across all subgroups. There was no significant difference by interview tool in the reporting of 'ever had sex' or non-condom use. However, some trends did appear.

A significantly greater proportion of more educated respondents did have a higher pooled estimate for reporting 'ever had sex' and number of partners in the non-FTFI methods. Moreover non-interviewer administered methods yielded increased reporting of 'ever had sex', non-condom use and forced sex in most Asian and urban studies, although the summary effect did not reach statistical significance. On the other hand, higher levels numbers of partners were reported in non-FTFI studies in African, rural areas. The timeframe of the question seems to have been important, with questions using a shorter recall resulting in increased reporting of non-condom use and higher number of partners.
The findings from this review highlight the need for further quantitative studies on the effect of the interview-mode across different question types. Additional qualitative research is also needed to explore the interaction between interviewers and respondents as well as the reactions among developing country populations to the interview tool. In part to address this need it was decided that a technique successfully trialled in Zimbabwe, the informal confidential voting interview (ICVI), would be used to complement the FTFI in this thesis. Chapter 3 describes the process through which the ICVI and FTFI interviewing tools, as well as the sampling strategy, of this study were finalised.

Chapter 4 summarises the results of identical questions on sociodemographic and sexual behaviour administered through ICVI, a tool not previously tested in an Indian context, and FTFI. Contrary to previous studies in Zimbabwe however, the relationship between ICVI and increased reporting of sensitive information was not clear cut among MSM cruising in public places in Bangalore. There were significant differences but their direction was unpredictable. Out of 13 questions, only three showed a significant increase in reporting of risk behaviour in the ICVI (lubricant use, injecting drug use and selling sex). The results of this comparison indicate that the respondents may have been able to establish a rapport with the interviewer, which perhaps reflect the advantages of using MSM interviewer.

The following two data analysis chapters described in this thesis were designed to explore sexual behaviour using FTFI data only, as the interviewer-administered questionnaire contained more in-depth information about HIV risk of MSM in the sample than the ICVI.

Chapter 5 quantified to what extent behaviour conformed with established sexual identifies of MSM that prevail in policy orientated and epidemiological work. HIV prevention activities among MSM in India are increasingly asserting the use of indigenous non-gay sexualities typically characterised in terms of passive and active sexual roles in anal sex as well as a sense of gender. In brief, *Kothis* and *Hijras* are characterised by passive roles in anal intercourse and a feminine sensibility that may involve wearing female clothing and make-up. On the other hand, *Panthi* is a term used by *Kothis* as a designation for men in general, especially potential (insertive) sexual partners. *Panthis* do not generally self-identify and consequently are not commonly targeted by HIV prevention activities.

The findings of this study were that behaviour reported did often comply with these commonly used definitions of identity. *Hijra* and *Kothi* were found to be highly vulnerable to HIV infection as a significant number of them reported paying male partners and exclusive receptive anal sex. Whereas MSM with more masculine identities, such as *Panthi* and Bisexual, mostly bought sex from MSW and reported insertive non-commercial sex with both male and female (often wives) partners. Despite these findings, it became clear that these categories of self-identity are more fluid that initially thought and there was overlap of behaviour, with some feminine MSM reporting insertive anal intercourse and vice versa. Contrary to expectation *Hijras* were less likely to report anal sex and more likely to report condom use compared to other sex workers, despite a higher STI prevalence found in this

group by the IBBA. This can be explained either by social desirability bias, behaviour change in response to the intervention, or a result of the few unprotected receptive anal sex acts performed. These results suggest a better understanding of these categories in an intervention context so that MSM are not 'pigeon-holed' into behavioural sex roles.

Ethnographic research of male-with-male sexual activity supports our findings that the way 'homosexual' behaviour is constructed in India lead not only to differences in sexual partnerships and practices but also to different sexual identities and communities [41, 51]. Until recently, this was the first study to have quantified differences in risk behaviours across MSM categories and to have demonstrated fluidity compared to the perception of these identities in mainstream HIV prevention discourses. However in a recent AIDS supplement, Brahman *et al* reported sexual risk behaviour of different identities of MSM across four states in India [58]. Their findings were consistent with ours, where a significantly higher proportion of *Kothi* and *Hijra* sold sex to men and reported younger age at sexual debut, compared with other categories of MSM. However role behaviour was not analysed by identity.

Chapter 6 addresses bridging behaviour of men who have sex with men and women (MSMW). The powerful prejudice against homosexuality as well as family pressure to get married and have children, particularly in rural India, has resulted in many MSM leading ostensibly 'heterosexual' lives. The findings from this study suggested that in India a large proportion of MSM became husbands and commit to fatherhood. Many MSM therefore are almost invisible and do not share a common notion of sexual identity. Moreover, this study has shown that MSMW have different behavioural patterns to MSM who do not have sex with women. MSMW are more likely to have non-commercial sex with men and pay for sex with a male sex worker. Although there are behavioural differences between MSMW and MSMO, once adjusting for identity some of these differences became non-significant. This is because nearly over half of the MSMO in this study were *Hijra* or *Kothi*, compared to 11% of the MSMW. Furthermore, there are low rates of condom use with wives and FSW, which adds to the vulnerability of their female partners. This high rate of unprotected sex with both men and women suggests that MSMW constitute a bridge population for HIV transmission to the general population. Successfully identifying the characteristics of this behaviourally bisexual population and understanding their risk behaviour is critical for designing interventions that diminish the spread of HIV. It is important to note however, that levels of

HIV testing were high in both MSMW and MSMO, which highlights the success of the NGO in mobilising both groups.

This was the first study to quantify and compare sexual behaviour of MSMW and men who have sex with men only (MSMO) in India. Several papers have supported the idea that homosexually active men in India link 'risk' sexual networks with the general population, with levels of marriage ranging from 18% [58] to 55% [60] amongst MSM and many report inconsistent of condom use with female partners. Other studies in Asia have also shown that many MSM have sex with women and the prevalence of condom use for sex with both their male and female partners is often very low [151, 152]. Given the prevalence of HIV and STIs among MSM, the much higher transmission efficiency of anal sex [2] and that the context of behaviours (including stigma and violence) which pose a greater risk for transmission, the contribution to the HIV epidemic from MSM to their female partners may therefore be signficant [66].

It was estimated in the power calculation on sample size that consistent condom use would be around 50%. The results have shown that consistent condom use was reportedly around 50% with known or unknown NC male partners; of those men selling sex, 55% and 63% always used condoms with new and repeat male clients respectively; for men buying sex 64% always used condoms with MSM and 56% with FSW. There were no significant differences in the consistency of condom use between MSMO and MSMW by type of male partners, either commercial or non-commercial partners. However, only 2% if MSMW reported consistent condom use with their wife. Other studies in India recruiting MSM in public place cruising sites have shown condom use lower than 50% [57-58] as well as greater than 70% [39][59]. This suggests that Sangama's activities have been successful in promoting condom use.

In a recent systematic review of the literature from 2000 to 2006 on HIV among MSM in low and middle income countries, an overall odds ratio of 19.3 for MSM compared with the general population reproductive age adults [1]. Despite this data on HIV transmission through sex between men are very poor in most of the developing world, perhaps with the exception of Latin America [153]. There are a number of challenges in understanding and responding to these epidemics. MSM is an umbrella term coined to describe behaviours, while the term is sensitive to defining a common behaviour among men of diverse identity, it lacks specificity across the many subsets it contains such as *Hijra* who do not identify as 'men'[154, 155]. A

further complexity is that in some settings such as Thailand, India (particularly in cosmopolitan cities such as Delhi and Mumbai as documented by the Naz Foundation) and Peru, communities of gay-identified men have emerged. In a study of sexual behaviour among MSM in Latin America has shown that insertive and receptive penile anal sex acts, as well as frequency of bisexual activity, varies between different MSM groups, which can influence the potential for HIV spread given the differences in transmission risk according to the behaviour within acts [140].

This thesis highlights varying behavioural profiles of MSM in India, which are associated with different risks of HIV and inconsistent condom use. The shape of the HIV epidemic is greatly influenced by the degree of mixing between people with different prevalence of disease and risk behaviour. The most effective strategies for reducing spread of the disease are to prevent transmission among those with highest rates of partner change and to reduce unprotected and disassortative mixing between different risk groups [148]. The challenge of finding effective prevention and intervention strategies among MSM are made more difficult by the adverse and social settings in which MSM communities are often located [156]. Indeed the National AIDS Control Organisation is currently mounting a court challenge to India's Sodomy on the basis that the law is hindering India's HIV prevention efforts [157]. These hostile environments and the unique factors that drive STI epidemics among MSM mean that approaches to HIV control may need to be tailored in order to be effective. Thus there is a public health need for research in HIV risk behaviour among MSM. This thesis aims to highlight several areas of increasing importance in the control of HIV among MSM cruising for sex in public settings in South India.

7.2 Limitations of the work

A limitation of this study was its reliance on self-reported sexual behaviours, given the potential for self-report biases. Rates of HIV-transmission risk behaviours reported in this study should, therefore, be considered a lower bound and condom use should be considered an upper-bound estimate. Self-disclosure research suggests that people tend to disclose more honestly and in greater details to people with whom they feel emotionally comfortable [68]. The interview situation has many ambiguous facets, including the credibility of the interviewer and confidentiality of the responses.

In this survey MSM, none of whom had been formally trained and were therefore not fully appreciative of the nuances of confidentiality and anonymity, were used to interview the respondents. The limitations of using such non-social science graduates as interviewers were, particularly with the ICVI tool, that privacy and interview protocols may not have been as adhered to as strictly as they should have been. Indeed the ICVI did not result in greater reporting of stigmatised behaviour. A potential reason for this could have been inadequate implementation of the tool (such as the interview not being adequately screened from the respondent, the respondent not understanding the coding of 'yes' (circle)/ 'no' (square)). On the other hand the FTFI might have been more complete than the ICVI given that the interviewer filled the questionnaire and so it was possible to explore non-response or inconsistent answers. An advantage of using MSM interviewers was to reduce the respondent's potential inhibition to report illegal male-with-male sex to interviewers who did not engage in such behaviour and did therefore not understand slang or language used for various sex acts. In conclusion although it was not possible to assess which interview tool provided the most valid responses, the findings reflected the growing evidence that the use of ICVI is not feasible in all settings

The data for this thesis was collected in collaboration with the NGO implementing the intervention, Sangama, who target MSM of a lower socioeconomic stratum. The advantages of working with the NGO were that it is a long-established organisation that is well known among MSM cruising in certain cruising sites in Bangalore. The disadvantage of recruiting through such an organisation is that the focus is on specific groups of people rather than a cross-section of all MSM in Bangalore. Thus, these findings may have limited application, representing men who cruise for sex with men in public areas, who are perhaps economically disadvantaged. It would be interesting to pursue testing the FTFI and ICVI among more educated MSM who seek sex with men on the internet or in bars (which are expensive to enter in Bangalore).

7.3 Future work and policy implications

The results of the above chapters have implications for HIV programmes, policy and research in India. In light of the seriousness of the HIV epidemic, it is important to design and

implement programmes and policies that are appropriate for specific population subgroups. Future research as well as the present study should be utilised to this end.

Prior methodological studies in the area of human sexuality have focused largely on developed countries. Further research is needed that examines measurement error (response bias, memory distortions etc) with regard to sexual behaviour, risk of HIV and stigma in a developing country context. One key issue is the effect of stigma against MSM on risk behaviour. Although many studies show that stigma may contribute negatively to the reporting of risk behaviour, exactly to what extent is still not determined. Chapters 2 and 4 have shown innovative interview methods did not result in increased reporting of specific HIV risk behaviour compared with traditional face-to-face methods, but differences were evident. However, studies comparing the efficacy of such interview techniques in developing countries are few. Further research is needed to explore both the impact of new tools as well as interviewer bias by comparing behaviour reported using different interviewing methods where the interviewer is MSM or non-MSM social science graduate interviewers. This research is needed particularly among such a semi-literate and stigmatised population to ensure that there is a correct understanding of the risk behaviours taking place.

Despite the threat of inhibition due to stigma, this thesis has demonstrated that a clear proportion of men/*Hijra* cruising for sex with other men/*Hijra* in public places are engaging in both commercial and non-commercial sexual behaviour, and many do so without taking precautions against HIV infection. HIV education programmes that focus on improving knowledge and attitudes about condom use are essential to increase the ability of MSM to protect themselves and their current or future partners from HIV infection.

It has been shown in Chapter 5 that MSM with different sexual identities have a range of risk behaviours it was not clear however, whether these terms have been created by policy makers and NGOs working with MSM in India, or if the MSM community themselves really identify with such categories. It is not known whether sexual identity changes over time, for example if someone starts their sexual experience as a *Panthi* and evolves to self-identify as a *Hijra*. Furthermore, it is not clear whether identity may change according to partner type. For example if a male partner is looking for a feminine man with whom to have anal sex do some adapt to take on a *Kothi*/*Hijra* persona. On the other hand if a man (client or non-commercial) is seeking receptive anal intercourse with a masculine partner it is not understood if a usually

self-identifying *Kothi* would adapt to behave in a more masculine manner. It would be interesting therefore to explore further in a qualitative context where these identity labels came from, how rigid the MSM themselves believe the sexual roles are within these categories and if it is possible to move between identities.

There is growing evidence from HIV surveillance and behavioural data, particularly as a result of the Avahan programme, that HIV infection rates are high among MSM in India. However, more specific information on the impact that homosexual sex has on HIV transmission in the general population would help to raise or lower the level of priority given to HIV prevention among MSM. It is clear from Chapter 6 that homosexually active men do not form a separate sexual network. Instead, they link to both circuits of high-risk activity and the general female population. It is important therefore that HIV prevention programmes among MSM in India not only need to work on increasing correct and consistent condom use with male but also with female partners. Mobilising MSMW to use condoms within a marriage will be difficult, however, especially in the context of only 2% reporting condom use with their wives in this study. This is a complex issue as it relates to gender equations in sexuality in India, but nevertheless it is imperative for the evolution of comprehensive MSM-related HIV prevention programmes.

Non-stigmatising intervention efforts should not only men who openly acknowledge that they have sex with men but also men who consider themselves heterosexual to reduce HIV transmission. It is essential therefore to ensure MSMW are not excluded from the MSM community, which largely consists of more feminine and therefore visible (and subsequently highly ostracised) *Kothi*, *Hijra* and *Double-Decker*. In order to be more proactive about targeting behaviourally bisexual men, consideration should be given to training peer educators in seeking and contacting less visible (and more likely bisexual) MSM in cruising sites. However, because HIV is often not the primary concern in their stigmatised sexual lives, such an intervention should not be restricted to matters of sexual health but should have a broader remit of psychological and relational matters as well. Research is necessary to test whether such an approach would be effective and feasible. It would be interesting to explore further with qualitative work whether many MSMW marry women as a result of family pressure, whether they feel socially excluded from the MSM community as a result of being behaviourally bisexual, and if they are reluctant to access the intervention programme due to fear of being seen at the drop-in clinic. New strategies must be explored to help more hidden

MSM overcome the barriers in accessing such interventions and ensure that the prevention coverage is complete.

While male sexual behaviour is important and would appear to be driving the HIV epidemic in India, the female role in HIV transmission and prevention are important to understand as well. Currently, there is a large gap in the available literature regarding the sexual behaviour of the female partners of MSM. Future research might investigate whether the female partners of MSM report more risky sexual behaviour than their female counterparts married to behaviourally heterosexual men.

Finally, the results of this study have provided a detailed description of risk factors for HIV infection in MSM cruising for sex in public places in Bangalore. These findings have provided much information relevant to the planning of HIV-related interventions and research, as well as forming a background to which subsequent rounds of data collection and analysis can be compared. As such it has formed a crucial first step in the evaluation of the ongoing HIV interventions in the Avahan study. The recommendations that emerge suggest that an adaptation of these prevention efforts are needed to address the dynamic and varied sexual behaviour profiles of MSM.

References:

1. Beyrer, C., *Hidden yet happening: the epidemics of sexually transmitted infections and HIV among men who have sex with men in developing countries.* Sex Transm Infect, 2008. **84**(6): p. 410-412.
2. Vittinghoff, E., et al., *Per-contact risk of human immunodeficiency virus transmission between male sexual partners.* Am J Epidemiol, 1999. **150**(3): p. 306-11.
3. Steinbrook, R., *HIV in India--a complex epidemic.* N Engl J Med, 2007. **356**(11): p. 1089-93.
4. *World Bank Country Profile: India*. 2007 [cited 10th September 2008]; Available from: www.worldbank.org/india.
5. *CIA Factbook: India*. [cited 30th September 2008]; Available from: https://www.cia.gov/library/publications/the-world-factbook/geos/in.html
6. Bollinger, R.C., S.P. Tripathy, and T.C. Quinn, *The human immunodeficiency virus epidemic in India. Current magnitude and future projections.* Medicine (Baltimore), 1995. **74**(2): p. 97-106.
7. UNAIDS. *Report on the global AIDS epidemic*. 2008 [cited 2008 10th January]; Available from: http://data.unaids.org/pub/GlobalReport/2008/jc1510_2008_global_report_pp29_62_en.pdf.
8. UNAIDS. *India HIV Estimates*. 2006 [cited 23rd January 2008]; Available from: http://www.unaids.org.in/new/Publications_IndiaHIVEstimates-2006.pdf.
9. Steinbrook, R., *HIV in India--a downsized epidemic.* N Engl J Med, 2008. **358**(2): p. 107-9.
10. Chandrasekaran, P., et al., *Containing HIV/AIDS in India: the unfinished agenda.* Lancet Infect Dis, 2006. **6**(8): p. 508-21.
11. Dandona, L., et al., *A population-based study of human immunodeficiency virus in south India reveals major differences from sentinel surveillance-based estimates.* BMC Med, 2006. **4**: p. 31.
12. Kang, G., et al., *Community prevalence of antibodies to human immunodeficiency virus in rural and urban Vellore, Tamil Nadu.* Natl Med J India, 2005. **18**(1): p. 15-7.
13. Thomas, K., et al., *Community prevalence of sexually transmitted diseases and human immunodeficiency virus infection in Tamil Nadu, India: a probability proportional to size cluster survey.* Natl Med J India, 2002. **15**(3): p. 135-40.
14. UNAIDS/WHO. *Working Group on Global HIV/AIDS and STI Surveillance: Guidelines for Second Generation HIV/AIDS Surveillance. . World Health Organization and Joint United Nations Programs on HIV/AIDS.* [cited October 2008].
15. Risbud, A., et al., *Prevalence and incidence of hepatitis B virus infection in STD clinic attendees in Pune, India.* Sex Transm Infect, 2002. **78**(3): p. 169-73.
16. Pisani, E., et al., *HIV surveillance: a global perspective.* J Acquir Immune Defic Syndr, 2003. **32 Suppl 1**: p. S3-11.
17. NACO. *National AIDS Control Organsation, India. HIV sentinel surveillance 2006 country report*. [cited 1st April 2008]; Available from: http://www.nacoonline.org/upload/NACO%20PDF/HIV%20Sentinel%20Surveillance%202006_India%20Country%20Report.pdf.

18. *Office of the Registrar General and Census Commissioner, Government of India, State-wise total population in India (2001)* [cited October 2008]; Available from: http://www.indiastat.com/india/ShowData.asp?secid=11955&ptid=16661&level=4
19. *Department of Family Welfare, Ministry of Health and Family Welfare, Government of India, State-wise comparative picture of the indicators of NFHS-I and NFHS-II in India – part I* [cited October 2008]; Available from: http://www.indiastat.com/india/ShowDataSec.asp?secid=30552&ptid=13226.
20. Gregson, S., et al., *Study of bias in antenatal clinic HIV-1 surveillance data in a high contraceptive prevalence population in sub-Saharan Africa.* AIDS, 2002. **16**(4): p. 643-52.
21. NACO. *National AIDS Control Organisation (NACO). HIV estimates (2001). New Delhi: NACO, Ministry of Health & Family Welfare, Government of India*. [cited October 2008]; Available from: http://www.nacoonline.org/facts.htm
22. Jha, P., et al., *Public health. Reducing HIV transmission in developing countries.* Science, 2001. **292**(5515): p. 224-5.
23. Basu, I., et al., *HIV prevention among sex workers in India.* J Acquir Immune Defic Syndr, 2004. **36**(3): p. 845-52.
24. Nagelkerke, N.J., et al., *Modelling HIV/AIDS epidemics in Botswana and India: impact of interventions to prevent transmission.* Bull World Health Organ, 2002. **80**(2): p. 89-96.
25. Harcourt, C. and B. Donovan, *The many faces of sex work.* Sex Transm Infect, 2005. **81**(3): p. 201-6.
26. Narain, J.P., et al., *Risk factors for HIV transmission in India.* AIDS, 1994. **8 Suppl 2**: p. S77-82.
27. Blanchard, J.F., et al., *Understanding the social and cultural contexts of female sex workers in Karnataka, India: implications for prevention of HIV infection.* J Infect Dis, 2005. **191 Suppl 1**: p. S139-46.
28. NACO. *National AIDS Control Organization (NACO). HIV prevalence 2003-2005 MSM, IDU, FSW. New Delhi, India: NACO, Ministry of Health and Family Welfare, Government of India, 2006.* . [cited 18th September 2008]; Available from: http://www.nacoonline.org/facts.htm.
29. Eicher, A.D., et al., *A certain fate: spread of HIV among young injecting drug users in Manipur, north-east India.* AIDS Care, 2000. **12**(4): p. 497-504.
30. Lowndes, C.M., et al., *Role of core and bridging groups in the transmission dynamics of HIV and STIs in Cotonou, Benin, West Africa.* Sex Transm Infect, 2002. **78 Suppl 1**: p. i69-77.
31. Hor, L.B., et al., *The role of sex worker clients in transmission of HIV in Cambodia.* Int J STD AIDS, 2005. **16**(2): p. 170-4.
32. Subramanian, T., et al., *HIV, sexually transmitted infections and sexual behaviour of male clients of female sex workers in Andhra Pradesh, Tamil Nadu and Maharashtra, India: results of a cross-sectional survey.* AIDS, 2008. **22 Suppl 5**: p. S69-79.
33. *National Institute of Medical Statistics and National AIDS Control Organisation. Technical report, India HIV estimates 2006. National Institute of Medical Statistics, ICMR and National AIDS Control Organisation, MOHFW, New Delhi, 2007.* [cited September 2008]; Available from: data.unaids.org/pub/Report/2007/india_hiv_estimates_report_2006_en.pdf
34. Pandey, A., et al., *Risk behaviour, sexually transmitted infections and HIV among long-distance truck drivers: a cross-sectional survey along national highways in India.* AIDS, 2008. **22 Suppl 5**: p. S81-90.

35. *Panos Global AIDS programme. Antiretroviral drugs for all? Obstacles to access to HIV/AIDS treatment. Lessons from Ethiopia, Haiti, India, Nepal and Zambia.* . [cited 15th November 2008]; Available from: http://www.etharc.org/arvinfo/avrsforall.pdf.
36. WHO. *Towards Universal Access: Scaling up priority HIV/AIDS interventions in the health sector.* . 2008 [cited 13th January 2009]; Available from: www.who.int/hiv/mediacentre/univeral_access_progress_report_en.pd.
37. Ramchandani, S.R., et al., *Knowledge, attitudes, and practices of antiretroviral therapy among HIV-infected adults attending private and public clinics in India.* AIDS Patient Care STDS, 2007. **21**(2): p. 129-42.
38. NACO. *National AIDS Control Organisation, Ministry of Health and Family Welfare, Government of India, Number of patients currently on ART as of January 2006, NACO, Ministry of Health and Family Welfare, Government of India, New Delhi, India.* 2006 [cited; Available from: www.nacoonline.org.
39. Dandona, L., et al., *Sex behaviour of men who have sex with men and risk of HIV in Andhra Pradesh, India.* AIDS, 2005. **19**(6): p. 611-9.
40. Kakar, *Intimate relations*.
41. Asthana, S. and R. Oostvogels, *The social construction of male 'homosexuality' in India: implications for HIV transmission and prevention.* Soc Sci Med, 2001. **52**(5): p. 707-21.
42. Khan, S., *Under a blanket: bisexualities and AIDS in India*, in *Bisexualities and AIDS: international perspectives*, P.Aggleton, Editor. 1996, Taylor and Francis.
43. Seabrook, J., *Lover in a different climate: Men who have sex with men in India*. 1999, London: Verso.
44. Dube, E.M., *The role of sexual behaviour in the identification process of gay and bisexual males.* J Sex Res, 2000. **37**: p. 123-132.
45. Mukhia, H., *The Mughals of India*. 2004, United Kingdom: Blackwells.
46. Khan, S., *Culture, sexualities, and identities: men who have sex with men in India.* J Homosex, 2001. **40**(3-4): p. 99-115.
47. Morison, L., *The global epidemiology of HIV/AIDS.* Br Med Bull, 2001. **58**: p. 7-18.
48. Hernandez, A.L., et al., *Sexual behavior among men who have sex with women, men, and Hijras in Mumbai, India--multiple sexual risks.* AIDS Behav, 2006. **10**(4 Suppl): p. S5-16.
49. Setia, M.S., et al., *Men who have sex with men and transgenders in Mumbai, India: an emerging risk group for STIs and HIV.* Indian J Dermatol Venereol Leprol, 2006. **72**(6): p. 425-31.
50. Boyce, P., *'Conceiving kothis': men who have sex with men in India and the cultural subject of HIV prevention.* Med Anthropol, 2007. **26**(2): p. 175-203.
51. Chakrapani, V., P.A. Newman, and M. Shunmugam, *Secondary HIV prevention among kothi-identified MSM in Chennai, India.* Cult Health Sex, 2008. **10**(4): p. 313-27.
52. Safren, S.A., et al., *A survey of MSM HIV prevention outreach workers in Chennai, India.* AIDS Educ Prev, 2006. **18**(4): p. 323-32.
53. Beyrer, C., et al., *Same-sex behavior, sexually transmitted diseases and HIV risks among young northern Thai men.* AIDS, 1995. **9**(2): p. 171-6.
54. Caceres, C.F., *HIV among gay and other men who have sex with men in Latin America and the Caribbean: a hidden epidemic?* AIDS, 2002. **16 Suppl 3**: p. S23-33.
55. Chan, R., et al., *HIV and men who have sex with men: perspectives from selected Asian countries.* AIDS, 1998. **12 Suppl B**: p. S59-65, S67-8.
56. Verma, R.K. and M. Collumbien, *Homosexual activity among rural Indian men: implications for HIV interventions.* AIDS, 2004. **18**(13): p. 1845-7.

57. Brahmam, G.N., Kodavalla, V., Rajkumar, H., Rachakulla, H.K., Kallam, S,. Myakala, S.P., Paranjee, R.M., Gupte, M.D., Ramakrishnan, L., Kohli, A., Ramesh, B.M, *Sexual practices, HIV and sexually transmitted infections among self-identified men who have sex with men in four high prevalence states of India.* AIDS, 2008. **22**(Suppl 5): p. S45-S57.
58. Shinde, S., Setia, M.S, Row-Kavi, A., Anand, V., Jerajani, H, *Male sex workers: are we ignoring a risk group in Mumbai, India.* Indian J Dermatol Venereol Leprol, 2009. **75**: p. 41-46.
59 Newman, P., Chakrapani, V., Cook, C., Shunmugam, M., Kakinami, L, *Correlates of paid sex among men who have sex with men in Chennai, India*. Sex Transm Infect, 2008. **84**: p434-438
60. Kumar, B. and M.W. Ross, *Sexual behaviour and HIV infection risks in Indian homosexual men: a cross-cultural comparison.* Int J STD AIDS, 1991. **2**(6): p. 442-4.
61. Gupta, A., et al., *Same-sex behavior and high rates of HIV among men attending sexually transmitted infection clinics in Pune, India (1993-2002).* J Acquir Immune Defic Syndr, 2006. **43**(4): p. 483-90.
62. Singh, S., R. Prasad, and A. Mohanty, *High prevalence of sexually transmitted and blood-borne infections amongst the inmates of a district jail in Northern India.* Int J STD AIDS, 1999. **10**(7): p. 475-8.
63. Singh, Y.N. and A.N. Malaviya, *Long distance truck drivers in India: HIV infection and their possible role in disseminating HIV into rural areas.* Int J STD AIDS, 1994. **5**(2): p. 137-8.
64. Potdar, R. and M.A. Koenig, *Does Audio-CASI improve reports of risky behavior? Evidence from a randomized field trial among young urban men in India.* Stud Fam Plann, 2005. **36**(2): p. 107-16.
65. Go, V.F., et al., *High HIV prevalence and risk behaviors in men who have sex with men in Chennai, India.* J Acquir Immune Defic Syndr, 2004. **35**(3): p. 314-9.
66. Dandona, L., et al., *How much attention is needed towards men who sell sex to men for HIV prevention in India?* BMC Public Health, 2006. **6**: p. 31.
67. UNAIDS. *Report on the global AIDS epidemic*. 2008 [cited 10th January 2009]; Available from: http://data.unaids.org/pub/GlobalReport/2008/jc1510_2008_global_report_pp29_62_en.pdf.
68. Catania, J.A., et al., *Methodological problems in AIDS behavioral research: influences on measurement error and participation bias in studies of sexual behavior.* Psychol Bull, 1990. **108**(3): p. 339-62.
69. Gribble, J., *Interview mode and measurement of sexual behaviours: methodological issues*. J Sex Res, 1999. **36**: p. 16-24.
70. Aral, S.O. and T.A. Peterman, *Measuring outcomes of behavioural interventions for STD/HIV prevention.* Int J STD AIDS, 1996. **7 Suppl 2**: p. 30-8.
71. Weinhardt, L.S., et al., *Reliability and validity of self-report measures of HIV-related sexual behavior: progress since 1990 and recommendations for research and practice.* Arch Sex Behav, 1998. **27**(2): p. 155-80.
72. Fenton, K.A., et al., *Measuring sexual behaviour: methodological challenges in survey research.* Sex Transm Infect, 2001. **77**(2): p. 84-92.
73. Cleland, J., et al., *Monitoring sexual behaviour in general populations: a synthesis of lessons of the past decade.* Sex Transm Infect, 2004. **80 Suppl 2**: p. ii1-7.
74. Aquilino, W.S., *Privacy effects on self-reported drug use: interactions with survey mode and respondent characteristics.* NIDA Res Monogr, 1997. **167**: p. 383-415.

75. Des Jarlais, D.C., et al., *Audio-computer interviewing to measure risk behaviour for HIV among injecting drug users: a quasi-randomised trial.* Lancet, 1999. **353**(9165): p. 1657-61.
76. Ghanem, K.G., et al., *Audio computer assisted self interview and face to face interview modes in assessing response bias among STD clinic patients.* Sex Transm Infect, 2005. **81**(5): p. 421-5.
77. Kissinger, P., et al., *Application of computer-assisted interviews to sexual behavior research.* Am J Epidemiol, 1999. **149**(10): p. 950-4.
78. Tourangeau, R., *Survey research and societal change.* Annu Rev Psychol, 2004. **55**: p. 775-801.
79. Turner, C.F., et al., *Adolescent sexual behavior, drug use, and violence: increased reporting with computer survey technology.* Science, 1998. **280**(5365): p. 867-73.
80. NIMH Collaborative HIV/STD Prevention Trial Group. *The feasibility of audio computer-assisted self-interviewing in international settings.* AIDS, 2007. **21 Suppl 2**: p. S49-58.
81. Hewett, P.C., et al., *Using sexually transmitted infection biomarkers to validate reporting of sexual behavior within a randomized, experimental evaluation of interviewing methods.* Am J Epidemiol, 2008. **168**(2): p. 202-11.
82. Le, L.C., et al., *A pilot of audio computer-assisted self-interview for youth reproductive health research in Vietnam.* J Adolesc Health, 2006. **38**(6): p. 740-7.
83. Mensch, B., Hewett PC, Jones HE, Luppi CG, Lippman SA, Pinho AA, & Diaz J, *Consistency in the reporting of sensitive behavior within an interview mode experiment conducted among women in São Paulo, Brazil.* Int Fam Plan Persp, 2008. **forthcoming**.
84. Simoes, A.A., et al., *Acceptability of audio computer-assisted self-interview (ACASI) among substance abusers seeking treatment in Rio de Janeiro, Brazil.* Drug Alcohol Depend, 2006. **82 Suppl 1**: p. S103-7.
85. Simoes, A.A., et al., *A randomized trial of audio computer and in-person interview to assess HIV risk among drug and alcohol users in Rio De Janeiro, Brazil.* J Subst Abuse Treat, 2006. **30**(3): p. 237-43.
86. van de Wijgert, J., et al., *Is audio computer-assisted self-interviewing a feasible method of surveying in Zimbabwe?* Int J Epidemiol, 2000. **29**(5): p. 885-90.
87. van Griensven, F., et al., *Palmtop-assisted self-interviewing for the collection of sensitive behavioral data: randomized trial with drug use urine testing.* Am J Epidemiol, 2006. **163**(3): p. 271-8.
88. Edwards, E.M., et al., *Behavioral assessments in Russian addiction treatment inpatients: a comparison of audio computer-assisted self-interviewing and interviewer-administered questionnaires.* HIV Clin Trials, 2008. **9**(4): p. 247-53.
89. Guest, G., et al., *Fear, hope and social desirability bias among women at high risk for HIV in West Africa.* J Fam Plann Reprod Health Care, 2005. **31**(4): p. 285-7.
90. Hewett, P.C., Erulkar A.S & Mensch B.S, *The feasibility of computer-assisted survey interviewing in Africa - Experience from two rural districts in Kenya.* Soc Sci Comp Rev, 2004. **22**(3): p. 319-334.
91. Hewett, P.C., B.S. Mensch, and A.S. Erulkar, *Consistency in the reporting of sexual behaviour by adolescent girls in Kenya: a comparison of interviewing methods.* Sex Transm Infect, 2004. **80 Suppl 2**: p. ii43-8.
92. Jaya, M.J. Hindin, and S. Ahmed, *Differences in young people's reports of sexual behaviors according to interview methodology: a randomized trial in India.* Am J Public Health, 2008. **98**(1): p. 169-74.

93. Mensch, B.S., P.C. Hewett, and A.S. Erulkar, *The reporting of sensitive behavior by adolescents: a methodological experiment in Kenya.* Demography, 2003. **40**(2): p. 247-68.
94. Minnis, A.M., et al., *Audio computer-assisted self-interviewing in reproductive health research: reliability assessment among women in Harare, Zimbabwe.* Contraception, 2007. **75**(1): p. 59-65.
95. Rumakom P, G.P., Chinvarasopak W, Utmarat Q & Sontanakanit K, *Obtaining accurate responses to sensitive questions among Thai students: a comparison of two data collection techniques*, in *Sex without consent: young people in developing countries*. 2005, Zed books. p. 318-322.
95b. Van der Elst E., et al. I*s Audio Computer-Assisted Self-Interview (ACASI) useful in risk behaviour assessment of female and male sex workers in Mombasa, Kenya?* PLoS ONE, 2009: **4;** 5340
96. Bernabe-Ortiz, A., et al., *Handheld computers for self-administered sensitive data collection: a comparative study in Peru.* BMC Med Inform Decis Mak, 2008. **8**: p. 11.
97. Jaspan, H.B., et al., *Brief report: methods for collecting sexual behaviour information from South African adolescents--a comparison of paper versus personal digital assistant questionnaires.* J Adolesc, 2007. **30**(2): p. 353-9.
98. Xia, D.Y., et al., *[A questionnaire-based survey on attitude and behavior of sex among rural women in Hainan province]*. Zhonghua Liu Xing Bing Xue Za Zhi, 2004. **25**(7): p. 586-9.
99. Gregson, S., et al., *Informal confidential voting interview methods and temporal changes in reported sexual risk behaviour for HIV transmission in sub-Saharan Africa.* Sex Transm Infect, 2004. **80 Suppl 2**: p. ii36-42.
100. Gregson, S., et al., *Methods to reduce social desirability bias in sex surveys in low-development settings: experience in Zimbabwe.* Sex Transm Dis, 2002. **29**(10): p. 568-75.
101. Hanck, S.E., et al., *Assessment of self-reported sexual behavior and condom use among female sex workers in India using a polling box approach: a preliminary report.* Sex Transm Dis, 2008. **35**(5): p. 489-94.
102. Plummer, M.L., et al., *"A bit more truthful": the validity of adolescent sexual behaviour data collected in rural northern Tanzania using five methods.* Sex Transm Infect, 2004. **80 Suppl 2**: p. ii49-56.
103. Plummer, M.L., et al., *Asking semi-literate adolescents about sexual behaviour: the validity of assisted self-completion questionnaire (ASCQ) data in rural Tanzania.* Trop Med Int Health, 2004. **9**(6): p. 737-54.
104. Allen, C.F., et al., *Validity of coital diaries in a feasibility study for the Microbicides Development Programme trial among women at high risk of HIV/AIDS in Mwanza, Tanzania.* Sex Transm Infect, 2007. **83**(6): p. 490-6; discussion 496-7.
105. Ferguson, A.G., C.N. Morris, and C.W. Kariuki, *Using diaries to measure parameters of transactional sex: an example from the Trans-Africa highway in Kenya.* Cult Health Sex, 2006. **8**(2): p. 175-85.
106. Pickering, H., et al., *Sexual behaviour in a fishing community on Lake Victoria, Uganda.* Health Transit Rev, 1997. **7**(1): p. 13-20.
107. Pickering, H., et al., *Prostitutes and their clients: a Gambian survey.* Soc Sci Med, 1992. **34**(1): p. 75-88.
108. Ramjee, G., A.E. Weber, and N.S. Morar, *Recording sexual behavior: comparison of recall questionnaires with a coital diary.* Sex Transm Dis, 1999. **26**(7): p. 374-80.

109. Camburn, D., Cynamon, D, Harel, Y, *The use of audio tapes and written questionnaires to ask sensitive questions during household interviews*, in *National Field Technologies conference*. 1991: San Diego, CA.
110. Kirkwood, B.R., Sterne, J.A.C, *Medical statistics*. 2nd ed. 2003: Blackwell Science Ltd.
111. Thompson, S.G. and J.P. Higgins, *How should meta-regression analyses be undertaken and interpreted?* Stat Med, 2002. **21**(11): p. 1559-73.
112. Egger, M., Davey-Smith, G., Altman, D.G. , *Systematic reviews in health care: meta-analysis in context*. 2nd ed. 2001: BMJ Books.
113. Mensch, B.S., Hewett P.C, Gregory R & Helleringer S *Sexual behaviour and STI/HIV status among adolescents in rural Malawi: an evaluation of the effect of interview mode on reporting.* Stud Fam Plann, 2008. **39**(4): p. 321-334.
114. Wang, Y.C., et al., *Survey of substance use among high school students in Taipei: web-based questionnaire versus paper-and-pencil questionnaire.* J Adolesc Health, 2005. **37**(4): p. 289-95.
115. FHI/USAID/DFID. *Guidelines for repeated behaviour surveys in populations at risk of HIV*. 2000 [cited 15th October 2008]; Available from: http://www.who.int/hiv/strategies/en/bss_fhi2000.pdf.
116. WHO. *WHO surveillance of populations at high risk for HIV transmission*. 2007 [cited 15th October 2008]; Available from: http://www.searo.who.int/LinkFiles/Publications_Module-6.pdf.
117. Lachin, J.M., *Introduction to sample size determination and power analysis for clinical trials.* Control Clin Trials, 1981. **2**(2): p. 93-113.
118. Magnani, R., et al., *Review of sampling hard-to-reach and hidden populations for HIV surveillance.* AIDS, 2005. **19 Suppl 2**: p. S67-72.
119. Semaan, S., J. Lauby, and J. Liebman, *Street and network sampling in evaluation studies of HIV risk-reduction interventions.* AIDS Rev, 2002. **4**(4): p. 213-23.
120. Heckathorn, D., *Respondent-driven sampling: a new approach to the study of hidden populations.* Social Problems, 1997. **44**: p. 174-199.
121. MacKellar, D., et al., *The Young Men's Survey: methods for estimating HIV seroprevalence and risk factors among young men who have sex with men.* Public Health Rep, 1996. **111 Suppl 1**: p. 138-44.
122. Muhib, F.B., et al., *A venue-based method for sampling hard-to-reach populations.* Public Health Rep, 2001. **116 Suppl 1**: p. 216-22.
123. Donner, A. and N. Klar, *Methods for comparing event rates in intervention studies when the unit of allocation is a cluster.* Am J Epidemiol, 1994. **140**(3): p. 279-89; discussion 300-1.
124. Bruin, J. *New test: command to compute new test. UCLA: Academic Technology Services, Statistical Consulting Group*. 2006 [cited 14th October 2008]; Available from: http://www.ats.ucla.edu/stat/stata/ado/analysis.
125. Jenkins, S., *Analysis of income distributions.* Stata Technical Bulletin, 1999. **48**: p. 4-18.
126. Rao, J.N.K., and Scott, A.J, *On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data.* Annals of Statistics, 1984. **12**: p. 46-60.
127. Koch, G.G., Freeman, D.H, and Freeman, J.L *Strategies in the multivariate analysis of data from complex surveys.* International Statistical Review, 1975. **43**: p. 59-78.
128. Bleek, W., *Lying informants: a fieldwork experience from Ghana.* Popul Dev Rev, 1987. **13**: p. 314-322.
129. Ross, D.A.V., J.P, *Health interview surveys in developing countries: a methodological review.* Stud Fam Plann, 1986. **17**: p. 78-94.

130. Wight, D.W., P., *Poor recall, misunderstandings and embarrassment: interpreting discrepancies in young men's reported heterosexual behaviour.* Cult Health Sex, 1999. **1**: p. 55-78.
131. Holmes, K.K., Levine, R. & Weaver, M, *Effectiveness of condoms on preventing sexually transmitted infections.* Bull World Health Organ, 2004. **82**(6): p. 454-461.
132. Crosby, R.A., *Condom use as a dependent variable: measurement issues relevant to HIV prevention programs.* AIDS Educ Prev, 1998. **10**: p. 48-57.
133. Fishbein, M.P., W, *Evaluating AIDS prevention interventions using behavioral and biological outcome measures.* Sex Transm Dis, 2001. **27**: p. 101-110.
134. O'Leary, A.O., Diclemente, R.J & Aral, S.O, *Reflections on design and reporting of STD/HIV behavioral intervention research.* AIDS Educ Prev, 1997. **9**: p. S1-S14.
135. Fleiss, J.L., *Statistical methods for rates and proportions*, ed. n. Ed. 1994: New York: John Wiley and Seonds.
136. Rigby, A.S., *Statistical methods in epidemiology v. towards an understanding of the kappa coefficient.* Disability & Rehabilitation, 2000. **11**(8): p. 229-344.
137. Binson, D.C., J.A, *Respondents understanding of the words used in sexual behaviour questions.* Public Opin Q, 1998. **62**: p. 109-208.
138. Caceres, C.F. and A.M. Rosasco, *The correlates of safer behavior among homosexually active men in Lima.* AIDS, 1997. **11 Suppl 1**: p. S53-9.
139. *UCLA: Academic technology services. Introduction to survey analysis in Stata 9*. [cited 12th February 2008]; Available from: http://www.ats.ucla.edu/stat/stata/seminars/svy_data_intro.
140. Goodreau, S.M., L.P. Goicochea, and J. Sanchez, *Sexual role and transmission of HIV Type 1 among men who have sex with men, in Peru.* J Infect Dis, 2005. **191 Suppl 1**: p. S147-58.
141. Goodreau, S.M., et al., *Role versatility among men who have sex with men in urban Peru.* J Sex Res, 2007. **44**(3): p. 233-9.
142. Niang, C., Tapsoba, P, Weiss, E, Diagne, M, Niang, Y, Moreau, A.M, Gomis, D, Wade, A.S, Seck, K, and Castle, C., *Its raining stones: stigma, violence and HIV vulnerability among men who have sex with men in Dakar, Senegal.* Culture, Health and Sexuality, 2003. **5**(6): p. 499-512.
143. *Integrated Behavioural and Biological Assessment among MSM-T in Karnataka, prepared by Karnataka Health Promotion Trust, Bangalore, India (Forthcoming report).*
144. Rosario, M., Schrimshaw, E.W, Hunter, J., & Braun, L. (2006) Sexual identity development among gay, lesbian, and bisexual youths: Consistency and change ober time. J Sex Res 43 (1), 46-58
145. Hawkes, S. and K.G. Santhya, *Diverse realities: sexually transmitted infections and HIV in India.* Sex Transm Infect, 2002. **78 Suppl 1**: p. i31-9.
146. Hernandez, M., et al., *Sexual behavior and status for human immunodeficiency virus type 1 among homosexual and bisexual males in Mexico City.* Am J Epidemiol, 1992. **135**(8): p. 883-94.
147. Izazola-Licea, J.A., et al., *Sexual behavior patterns and HIV risks in bisexual men compared to exclusively heterosexual and homosexual men.* Salud Publica Mex, 2003. **45 Supp 5**: p. S662-71.
148. Munoz-Laboy, M. and B. Dodge, *Bisexual Latino men and HIV and sexually transmitted infections risk: an exploratory analysis.* Am J Public Health, 2007. **97**(6): p. 1102-6.
149. Tabet, S., et al., *HIV, syphilis and heterosexual bridging among Peruvian men who have sex with men.* AIDS, 2002. **16**(9): p. 1271-7.

150. Doll, L.S., Petersen, L.R, White, C.R, Johnson, E.S, Ward, J.W, and The Blood Donor Study Group, *Homosexually and non-homosexually identified men who have sex with men: a behavioural comparison.* J Sex Res, 1992. **29**: p. 1-14.
151. *Integrated Behavioural and Biological Assesment among MSM-T in Karnataka, prepared by Karnataka Health Promotion Trust, Bangalore (forthcoming report).*
152. Choi, K.H., et al., *High levels of unprotected sex with men and women among men who have sex with men: a potential bridge of HIV transmission in Beijing, China.* AIDS Educ Prev, 2004. **16**(1): p. 19-30.
153. Halperin, D.T., *Heterosexual anal intercourse: prevalence, cultural factors, and HIV infection and other health risks, Part I.* AIDS Patient Care STDS, 1999. **13**: p. 717-730.
154. Caceres, C.F., *Estimating the number of men who have sex with men in low and middle income countries* Sex Transm Infect, 2006. **82**(Suppl 3): p. S3-S9.
155. Chan, P.A. and O.A. Khan, *Risk factors for HIV infection in males who have sex with males (MSM) in Bangladesh.* BMC Public Health, 2007. **7**: p. 153.
156. Rajabali, A., Khan, S, Warraich H.J et al, *HIV and homosexuality in Pakistan.* Lancet Infect Dis, 2008. **8**: p. 511-515.
157. Stall, R.H., Hart, G. *The continuing evolution of research on sexually transmitted infections among men who have sex with men.* Sex Transm Infect, 2008. **84**(6): p. 407-409.
158. BBC, *India HIV group backs gay rethink. The Indian government's HIV/AIDS control body has backed calls fr homosexuality to be legalised*. 2008.

APPENDIX A1

STUDY INSTRUMENT FOR SBS-FTFI

CONFIDENTIAL:
FOR RESEARCH PURPOSES ONLY

Institute of Population Health and Clinical Research (IPHCR), St John's Medical College, Bangalore

Centre hospitalier *affilié* universitaire de Québec (CHA), University of Manitoba, Winnipeg, Canada

Special behavioural surveys of core and bridging groups for HIV infection in selected Indian districts

Face-to Face Interview Questionnaire for Sexual minorities and bisexual men

SECTION I: INTERVIEW INFORMATION

Study number ☐☐☐

PSU Name and code_____ ☐☐☐

City/Town/Village_____ ☐☐

District_____ ☐☐

Type of Locale (Public garden=1, Public toilet=2, Railway station=3,
Bus stand/stop=4, Other=5) ..... ☐

Date of interview: DAY ☐☐ MONTH ☐☐ YEAR ☐☐☐☐

Name and code of interviewer:_____ ☐☐

Participation in the IBBA study that took place in Bangalore (YES=1; NO=0)..... ☐

Participation in SBS Bangalore YES.....1 STOP
NO.....0 PROCEED WITH CONSENT → ☐

Consented for interview (YES=1, NO=0)..... ☐

_____

Result of interview: Interview completed = 1 ☐☐
Interview partially completed = 2
Respondent not eligible (under age) = 3
Respondent not eligible (never had anal intercourse) = 4
Respondent refused = 5
Respondent was a duplicate = 6

Language of the interview: _____

Time interview started: Time Interview ended:

Hr : Mnts ☐☐☐☐ Hr : Mnts ☐☐☐☐

AM / PM AM / PM

SECTION II: EDITING AND DATA ENTRY

Name and code of Supervisor: _____ ☐☐ ☐☐ ☐☐☐☐

Date of scrutinizing the questionnaire: DAY MONTH YEAR

Signature of Supervisor:_____

Name and code of data entry person: _____ ☐☐ ☐☐ ☐☐☐☐

Date of data entry: DAY MONTH YEAR

Signature of data entry person:_____

Name and code of data entry person (2): ___ ☐☐ ☐☐ ☐☐☐☐

Date of re-data entry: DAY MONTH YEAR

Signature of data entry person (2):_____

Data entry checked by: _____ ☐☐ ☐☐ ☐☐☐☐

Date of data entry checked: DAY MONTH YEAR

Signature of person who checked data entry:_____

SECTION III: DEMOGRAPHIC CHARACTERISTICS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	How old are you?	AGE IN COMPLETED YEARS: ☐☐ DON'T KNOW.....98	
2	What is your caste?	CASTE_____ DON'T KNOW.....98 NO ANSWER.....99	
3	What is your religion?	HINDU.....1 ISLAM.....2 CHRISTIAN.....3 OTHER (SPECIFY)_____97 NO ANSWER.....99	
4	Can you read **and** write?	YES.....1 NO.....0	**6**
		NO ANSWER.....99	
5	What is the highest grade you have completed?	GRADE..... ☐☐	
6	What do you mainly do to earn income? **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER.**	NONE.....0 STUDENT.....1 SELF EMPLOYED.....2 NON-AGRICULTURAL LABOUR.... 3 AGRICULTURAL LABOUR.....4 BUSINESS / TRADE.....5 GOVERNMENT EMPLOYEE.....6 CLERICAL / SALESMAN..... 7 SUPERVISORY LEVEL..... .8 TRANSPORT (SPECIFY)_____9 SEX WORK..... 10 OTHER(SPECIFY)_____97 NO ANSWER.....99	
7	What is your current marital status? **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER.**	CURRENTLY MARRIED .....1 SEPARATED.....2 DIVORCED .....3 WIDOWED.....4 NEVER MARRIED.....5 HIJRA UNMARRIED .....6 HIJRA MARRIED.....7 NO ANSWER.....99	**11**
8	Whose decision was it for you to get married?	FAMILY .....1 MYSELF.....2 OTHER (SPECIFY)_____97 NO ANSWER.....99	

SECTION III: DEMOGRAPHIC CHARACTERISTICS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
9	How old were you when you first got married?	AGE AT MARRIAGE: ☐☐ DON'T KNOW.....98	
9A	**CHECK Q.7 AND MARK:**	**MARRIED.....1** **SEPARATED/DIVORCED/WIDOWED....2**	**→ 11**
10	How long ago were you separated/divorced/widowed? **RECORD IN MONTHS IF LESS THAN ONE YEAR. OTHERWISE RECORD COMPLETED YEARS. RECORD '00' IN MONTHS IF LESS THAN A MONTH.**	MONTHS.....1 ☐☐ YEARS.....2 ☐☐ NO ANSWER.....99	
11	With whom do you currently live? **DO NOT READ RESPONSES.** **CIRCLE ONLY ONE ANSWER.**	LIVING WITH MALE PARTNER.....1 LIVING WITH WIFE (AND FAMILY)....2 LIVING WITH OTHER FEMALE PARTNER……3 LIVING WITH HIJRA.....4 LIVING ALONE.....5 LIVING WITH GURU.....6 LIVING WITH FAMILY (NO WIFE)……7 LIVING WITH FRIEND/COLLEAGUE….8 OTHER_____97 NO ANSWER.....99	**SIV**
12	How long have you been living with this partner (partner mentioned in Q.11)? RECORD IN MONTHS IF LESS THAN ONE YEAR. OTHERWISE RECORD COMPLETED YEARS. RECORD '00' IN MONTHS IF LESS THAN A MONTH.	MONTHS.....1 ☐☐ YEARS.....2 ☐☐ NO ANSWER.....99	

SECTION IV: SEXUAL EXPERIENCE

No.	QUESTIONS AND FILTERS	CODING CATEGORI	SKIP
1	How old were you **the first time** you had anal sex with a **male**?	AGE IN COMPLETED YEARS: ☐☐ NEVER HAD ANAL SEX WITH MAN…..96 DON'T KNOW.....98	**END**
2	Who was this man? **DO NOT READ RESPONSES.** **CIRCLE ONLY ONE ANSWER**.	RELATIVE.....1 PAYING CLIENT.....2 MALE SEX WORKER.....3 MALE PARTNER.....4 FRIEND/CLASSMATE.....5 COLLEAGUE.....6 STRANGER.....7 OTHER(SPECIFY)_____97 DON'T KNOW.....98 NO ANSWER.....99	
3	How old were you **the first time** you had sexual intercourse with a **female**?	AGE IN COMPLETED YEARS: NEVER HAD SEX WITH WOMAN…97 DON'T KNOW.....98	**5**
4	Who was this female? DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER**.**	WIFE.....1 RELATIVE.....2 FEMALE SEX WORKER.....3 FRIEND/CLASSMATE.....4 COLLEAGUE.....5 OTHER(SPECIFY)_____97 DON'T KNOW.....98 NO ANSWER.....99	
5	Have you ever used a condom for vaginal or anal sex in your lifetime?	YES ..... 1 NO .....0 NO ANSWER..... 99	**8**
6	How long ago was the **first** time you used a condom? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD "00" IN WEEKS IF LESS THAN A WEEK**.	WEEKS..... ☐☐ MONTHS..... ☐☐ YEARS..... ☐☐ DON'T KNOW..... .....98 NO ANSWER 99	
7	**Who first taught you to use condoms?** DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER**.**	SELF.....1 PARTNER.....2 RELATIVE.....3 FRIEND.....4 HEALTH WORKER (i.e NGO)…….....5 OTHER (SPECIFY)_____97 NO ANSWER.....99	

SECTION IV: SEXUAL EXPERIENCE

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
8	**Have you been circumcised?**	YES.....1 NO .....0 NO ANSWER .....99 HIJRA NIRVAAN.....96	**11** **10**
9	**How old were you when you were circumcised?**	AGE IN COMPLETED YEARS: ☐☐ DON'T KNOW.....98	**11**
10	**How old were you when you were castrated?**	AGE IN COMPLETED YEARS: ☐☐ DON'T KNOW.....98	
11	**How do you identify yourself?** DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER**.**	PREDOMINANTLY KOTHI.....1 PREDOMINANTLY PANTHI.....2 DOUBLE DECKER.....3 HIJRA.....4 BISEXUAL.....5 NO SPECIFIC IDENTITY.....97	
12	**Does your family know that you have sex with men?**	YES.....1 NO .....0 NO ANSWER.....99	
12A	CHECK SECTION III Q.11 AND MARK:	**LIVING WITH MALE PARTNER.....1** **LIVING WITH WIFE (AND FAMILY)….2** **LIVING WITH OTHER FEMALE.....3** **LIVING ALONE.....4** **LIVING WITH GURU.....5** **LIVING WITH FAMILY (NO WIFE)…..6** **LIVING WITH FRIEND/COLLEAGUE..7** **OTHER_____97** **NO ANSWER.....99** **LIVING WITH HIJRA PARTNER.....8**	**SV** **SVII** **SVI**

SECTION V: MALE COHABITING PARTNER

No	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	**Now I would like to ask you some details about your male co-habiting partner. I assure you of the confidentiality of the information provided. Please let me know if you do not want to answer any of these questions.** What is the age of your male cohabiting partner?	AGE IN COMPLETED YEARS..... ☐☐ DON'T KNOW 98	
2	What is the religion of your male cohabiting partner?	HINDU.....1 ISLAM .....2 CHRISTIAN.....3 OTHER (SPECIFY)_____97 DON'T KNOW.....98	
3	How many months did you stay together with your male cohabiting partner out of the last 12 months?	NUMBER MONTHS..... ☐☐ **RECORD '00' IF LESS THAN A MONTH & CHECK IF THIS PARTNER IS COHABITING**	
4	How do you think your male cohabiting partner identifies himself?	PREDOMINANTLY KOTHI.....1 PREDOMINANTLY PANTHI.....2 DOUBLE DECKER.....3 HIJRA.....4 BISEXUAL.....5 NO SPECIFIC IDENTITY.....97	
5	What does your male cohabiting partner mainly do to earn income? **DO NOT READ RESPONSES.** **CIRCLE ONLY ONE ANSWER.**	NONE.....0 STUDENT.....1 SELF EMPLOYED / PROFESSSIONAL.....2 NON-AGRICULTURAL LABOUR.....3 AGRICULTURAL LABOUR.....4 BUSINESS / TRADE.....5 GOVERNMENT EMPLOYEE.....6 CLERICAL / SALESMAN.....7 SUPERVISORY LEVEL.....8 TRANSPORT (SPECIFY)_____9 SEX WORK.....10 OTHER(SPECIFY)_____97 NO ANSWER.....99	

SECTION V: MALE COHABITING PARTNER

No	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
6	Does your male cohabiting partner know that you have sex with **other** men?	YES.....1 NO.....0 DON'T KNOW.....98 DOES NOT HAVE SEX WITH **OTHER** MEN.96	
7	Is your male cohabiting partner a sex worker?	YES.....1 NO.....0 DON'T KNOW.....98	
8	Does he buy sex from (other) male sex workers?	YES.....1 NO.....0 DON'T KNOW.....98	
9	How many times do you have anal sex with your male cohabiting partner in a "normal month"?	NUMBER..... ☐☐ **RECORD '00' IF NEVER** →	**SVII**
9A	**CHECK & MARK:**	**IF RESPONDENT IS HIJRA.....1** →	**11**
10	Do you have insertive or receptive anal sex with this person?	INSERTIVE.....1 RECEPTIVE.....2 BOTH.....3 NO ANSWER.....99	
11	How long ago did you have anal sex with your male cohabiting partner for the **first time**? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	DAYS..... 1 WEEKS.....2 MONTHS.....3 YEARS.....4 ☐☐	
12	How long ago did you have anal sex with your male cohabiting partner for the **last time** (most recent sex encounter)? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	DAYS..... 1 WEEKS.....2 MONTHS.....3 YEARS.....4 ☐☐	
13	How often is a condom used when you have anal sex with your male co-habiting partner?	NEVER (0%).....1 → SOMETIMES (< 50%).....2 FREQUENTLY (≥ 50%).....3 ALWAYS (100%).....4 NO ANSWER.....99	**SVII**
14	How long have you been using condoms **(always / frequently / sometimes)** when you have anal sex with him? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	WEEKS.....1 MONTHS.....2 YEARS.....3 ☐☐	
15	Out of the **last 10 times** that you had anal sex with him, how many times was a condom used?	NUMBER..... ☐☐	

15A	CHECK:	LIVES WITH MALE COHABITING PARTNER.1→	SVII

SECTION VI: HIJRA COHABITING PARTNER

No	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	**Now I would like to ask you some details about your hijra co-habiting partner. I assure you of the confidentiality of the information provided. Please let me know if you do not want to answer any of these questions.** What is the age of your hijra cohabiting partner?	AGE IN COMPLETED YEARS..... ☐☐ DON'T KNOW 98	
2	What is the religion of your hijra cohabiting partner?	HINDU.....1 ISLAM .....2 CHRISTIAN.....3 OTHER (SPECIFY)_____97 DON'T KNOW.....98	
3	How many months did you stay together with your hijra cohabiting partner out of the last 12 months?	NUMBER MONTHS..... ☐☐ **RECORD '00' IF LESS THAN A MONTH**	
4	What does your hijra cohabiting partner mainly do to earn income? **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER.**	NONE.....0 STUDENT.....1 SELF EMPLOYED / PROFESSSIONAL.....2 NON-AGRICULTURAL LABOUR.....3 AGRICULTURAL LABOUR.....4 BUSINESS / TRADE.....5 GOVERNMENT EMPLOYEE.....6 CLERICAL / SALESMAN.....7 SUPERVISORY LEVEL.....8 TRANSPORT (SPECIFY)_____9 SEX WORK.....10 OTHER(SPECIFY)_____97 NO ANSWER.....99	
5	Is she a sex worker?	YES.....1 NO.....0 NO ANSWER.....99	
6	Does your hijra cohabiting partner know that you have sex with **other** men/hijras?	YES.....1 NO.....0 NO ANSWER.....99 DOES NOT HAVE SEX WITH OTHER MEN/HIJRA.....96	

SECTION VI: HIJRA COHABITING PARTNER

No	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
7	What type(s) of sex do you have with this hijra partner in general? **DO NOT READ RESPONSES. MULTIPLE** **RESPONSES POSSIBLE.**	VAGINAL.....A ANAL.....B ORAL.....C THIGH.....D MASTURBATION.....E OTHER (SPECIFY)_____97 NO ANSWER.....99	
7A	**CHECK Q.7 AND MARK:**	**HAS ANAL SEX.....1** **DOES NOT HAVE ANAL SEX.....2** →	**SVII**
8	How many times do you have **anal** sex with your hijra partner in a "normal month"?	NUMBER..... ☐☐ **RECORD '00' IF NONE** →	**SVII**
9	How long ago did you have anal sex with your hijra partner for the **first time**? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	DAYS.....1 WEEKS.....2 MONTHS.....3 YEARS.....4 ☐☐	
10	How long ago did you have anal sex with your hijra partner for the **last time** (most recent sex encounter)? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	DAYS.....1 WEEKS.....2 MONTHS.....3 YEARS.....4 ☐☐	
11	How often is a condom used when you have anal sex with your hijra partner?	NEVER (0%).....1 → SOMETIMES (< 50%).....2 FREQUENTLY (≥ 50%).....3 ALWAYS (100%).....4 NO ANSWER.....99	**SVII**
12	How long have you been using condoms (**sometimes / frequently / always**) when you have anal sex with her? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	WEEKS.....1 MONTHS.....2 YEARS.....3 ☐☐	
13	Out of the **last 10 times** that you had anal sex with her, how many times was a condom used?	NUMBER..... ☐☐ *RECORD '00' IF NONE*	

SECTION-VII: SEX WORK AND CLIENTS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	**Now I would like to ask you a few questions regarding sex work and your paying clients.** Do you ever receive cash or gifts from other men in exchange for sex?	CASH ONLY.....1 CASH AND GIFTS.....2 GIFTS ONLY.....3 NO.....4 NO ANSWER.....99	**SVIII**
2	Out of the **last 10 times** you had sex, how many times were with men who gave you gifts or cash for this sex act?	NUMBER OF TIMES..... ☐☐ NO ANSWER.....99	
3	How old were you when you **first** started receiving cash/gifts from men for sex?	AGE IN COMPLETED YEARS..... ☐☐ DOES NOT DO SEX WORK.....96 → **SVIII** DON'T KNOW…….98 NO ANSWER……..99	
4	Where do you pick up **most** of your commercial male sex partners at **present?** **DO NOT READ RESPONSES. MULTIPLE RESPONSES POSSIBLE.**	HOME.....A RENTED ROOM.....B BAR/NIGHTCLUB.....C PUBLIC GARDEN.....D PUBLIC TOILET.....E RAILWAY STATION.....F BUS STAND.....G CINEMA HALL.....H OTHER PUBLIC PLACES (SPECIFY)_____ I VEHICLE.....J HAMMAM.....K PHONE CONTACTS.....L LODGE.....M OTHER(SPECIFY)_____97 NO ANSWER.....99	
5	Where do you have sex with **most** of your commercial sex partners at **present**? **DO NOT READ RESPONSES. CIRCLE ALL THE PLACES MENTIONED.**	HOME.....A RENTED ROOM.....B BAR/NIGHTCLUB.....C PUBLIC GARDEN.....D PUBLIC TOILET.....E RAILWAY STATION.....F BUS STAND.....G CINEMA HALL.....H OTHER PUBLIC PLACES (SPECIFY)_____ I VEHICLE.....J HAMMAM.....K PHONE CONTACTS.....L OTHER(SPECIFY)_____97 NO ANSWER.....99	
6	In the past one year, were you ever beaten or otherwise physically forced to have sexual intercourse with someone even though you didn't want to?	YES.....1 NO.....0 NO ANSWER.....99	

SECTION-VII: SEX WORK AND CLIENTS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
7	How many days in the last month did you do sex work?	NUMBER OF DAYS..... ☐☐ NO ANSWER.....99	
8	How many clients did you have on the **last day** you did sex work?	NUMBER OF CLIENTS ..... ☐☐ NO ANSWER.....99	
9	**Now I would like to ask you a few questions regarding your new or occasional clients i.e those that are not known to you.** Out of the last 10 clients you had sex with, how many were new/occasional clients?	NUMBER OF CLIENTS ..... ☐☐ **RECORD '00' IF NONE** →	**19**
10	What type(s) of sex do you have with new/occasional clients? **DO NOT READ RESPONSES. MULTIPLE RESPONSES POSSIBLE.**	ANAL.....A ORAL.....B MASTURBATION.....C THIGH.....D OTHER (SPECIFY)_____97 NO ANSWER.....99	
10A	**CHECK Q.10 AND MARK:**	**HAS ANAL SEX.....1** **DOES NOT HAVE ANAL SEX.....2** →	**15**
11	Out of the last 10 times that you had sex with new/occasional clients how many times did you have insertive anal sex?	NUMBER OF TIMES..... ☐☐ **RECORD '00' IF NONE** →	**13**
12	Out of these times (number in Q.11), how many times did you use a condom?	NUMBER OF TIMES..... ☐☐	
13	Out of the last 10 times that you had sex with new/occasional clients how many times did you have receptive anal sex?	NUMBER OF TIMES..... ☐☐ **RECORD '00' IF NONE** →	**15**
14	Out of these times (number in Q.13), how many times did you use a condom?	NUMBER OF TIMES..... ☐☐	
15	Out of the last 10 times that you had sex with new/occasional clients how many times did you have oral sex?	NUMBER OF TIMES..... ☐☐ **RECORD '00' IF NONE** →	**17**
16	Out of these times (number in Q.15), how many times did you use a condom?	NUMBER OF TIMES..... ☐☐	

SECTION-VII: SEX WORK AND CLIENTS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
17	In general, how often are condoms used when you have sex with new/occasional clients?	NEVER(0%) ..... 1 SOMETIMES (< 50%) ..... 2 FREQUENTLY (≥ 50%) ..... 3 ALWAYS (100%) ..... 4 NO ANSWER 99	→ **19**
18	How long ago did you start using condoms **(always / sometimes / frequently)** with new/occasional clients? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD '00' IN WEEKS IF LESS THAN A WEEK.**	WEEKS ..... 1 ☐☐ MONTHS ..... 2 ☐☐ YEARS ..... 3 ☐☐	
19	**Now I would like to ask you a few questions regarding your repeat clients.** Have you ever had any **repeat** clients?	YES ..... 1 NO ..... 0 DON'T KNOW ..... 98 NO ANSWER 99	**SVIII**
20	How many **different** repeat clients do you **currently** have?	NUMBER ..... ☐☐	
21	How long ago was the **last time** you had sex with a repeat client? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN A MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD '00' IF LESS THAN ONE MONTH.**	DAYS ..... 1 ☐☐ WEEKS ..... 2 ☐☐ MONTHS ..... 3 ☐☐ YEARS ..... 4 ☐☐	
22	**Now I would like you to provide me with some more detailed information about the repeat client that you had sex with most recently.** How old is he?	AGE IN COMPLETED YEARS: ☐☐	
23	Where is he from (native place)?	CITY/VILLAGE _____ DISTRICT _____ STATE _____ DON'T KNOW ..... 98 NO ANSWER 99	
24	What is his marital status? **DO NOT READ RESPONSES. CIRCLE ONE RESPONSE ONLY.**	CURRENTLY MARRIED ..... 1 SEPARATED ..... 2 DIVORCED ..... 3 WIDOWED ..... 4 NEVER MARRIED ..... 5 HIJRA UNMARRIED ..... 6 HIJRA MARRIED ..... 7 NO ANSWER 99	

SECTION-VII: SEX WORK AND CLIENTS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
25	What is his religion?	HINDU .....1 ISLAM.....2 CHRISTIAN.....3 OTHER (SPECIFY)_____97 DON'T KNOW 98	
26	Is he circumcised?	YES .....1 NO .....0 NO ANSWER 99	
27	What type(s) of sex do you have with this repeat client? **DO NOT READ RESPONSES. MULTIPLE RESPONSES POSSIBLE.**	ANAL.....A ORAL.....B MASTURBATION.....C THIGH.....D OTHER (SPECIFY)_____97 NO ANSWER.....99	
27A	**CHECK Q.27 AND MARK:**	**HAS ANAL SEX.....1** **DOES NOT HAVE ANAL SEX.....2** →	**33**
28	How long ago did you have anal sex with this repeat client for the **last time** (most recent sex encounter)? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN A MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR**	DAYS..... 1 ☐☐ WEEKS..... 2 ☐☐ MONTHS..... 3 ☐☐	
29	Out of the last 10 times that you had sex with this repeat client how many times did you have insertive anal sex?	NUMBER OF TIMES..... ☐☐ **RECORD '00' IF NONE** →	**31**
30	Out of these times (number in Q.29), how many times did you use a condom?	NUMBER OF TIMES..... ☐☐	
31	Out of the last 10 times that you had sex with this repeat client how many times did you have receptive anal sex?	NUMBER OF TIMES..... ☐☐ **RECORD '00' IF NONE** →	**33**
32	Out of these times (number in Q.31), how many times did you use a condom?	NUMBER OF TIMES..... ☐☐	
33	Out of the last 10 times that you had sex with this repeat client how many times did you have oral sex?	NUMBER OF TIMES..... ☐☐ **RECORD '00' IF NONE** →	**35**
34	Out of these times (number in Q.33), how many times did you use a condom?	NUMBER OF TIMES..... ☐☐	

SECTION-VII: SEX WORK AND CLIENTS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
35	In general, how often are condoms used when you have sex with this repeat client?	NEVER(0%)..... 1 →	**SVIII**
		SOMETIMES (< 50%)..... 2	
		FREQUENTLY (≥ 50%)..... 3	
		ALWAYS (100%)..... 4	
		NO ANSWER.....99	
36	How long ago did you start using condoms **(always / sometimes / frequently)** with this repeat client? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD '00' IN WEEKS IF LESS THAN A WEEK.**	WEEKS.....1 ☐☐ MONTHS.....2 ☐☐ YEARS.....3 ☐☐	

SECTION VIII: NON-COMMERCIAL MALE SEX PARTNERS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1A	**CHECK SIII Q11: IF LIVING WITH MALE PARTNER ADJUST SECTION ACCORDINGLY**		
1	**Now I would like to ask you about your <u>non-commercial</u> sexual partners.** **By non-commercial I mean people that you do not pay or do not pay you for sex.** **If have male cohabiting partner**: Apart from your male cohabiting partner have you ever had any (OTHER) **non-commercial male** sexual partners? **If no male cohabiting partner**: Have you ever had any **non-commercial male** sexual partners?	YES ..... 1 NO ..... 0 NO ANSWER 99	**SIX**
2	How many such (other) **non-commercial** sexual partners did you have so far in your **life**?	NUMBER ..... ☐☐☐☐	
3	With how many of these (other) **non-commercial male** partners did you have sex in the last **1 month**?	NUMBER ..... ☐☐ **RECORD '00' IF NONE** →	**5**
4	How many of these (number in Q.3) were **known** to you (you had had anal sex with previously)?	NUMBER ..... ☐☐	
5	Where do you pick up most of your non-commercial male sex partners at present? **DO NOT READ RESPONSES. CIRCLE ALL THE PLACES MENTIONED.**	HOME ..... A RENTED ROOM ..... B BAR/NIGHTCLUB ..... C PUBLIC GARDEN ..... D PUBLIC TOILET ..... E RAILWAY STATION ..... F BUS STAND ..... G CINEMA HALL ..... H OTHER PUBLIC PLACES (SPECIFY)_____ I VEHICLE ..... J HAMMAM ..... K PHONE CONTACTS ..... L LODGE ..... M OTHER(SPECIFY)_____ 97 NO ANSWER 99	
6	Where do you have sex with most of your non-commercial male sex partners at present? **DO NOT READ RESPONSES. CIRCLE ALL THE PLACES MENTIONED.**	HOME ..... A RENTED ROOM ..... B BAR/NIGHTCLUB ..... C PUBLIC GARDEN ..... D PUBLIC TOILET ..... E RAILWAY STATION ..... F BUS STAND ..... G CINEMA HALL ..... H OTHER PUBLIC PLACES (SPECIFY)_____ I VEHICLE ..... J HAMMAM ..... K PHONE CONTACTS L	

SECTION VIII: NON-COMMERCIAL MALE SEX PARTNERS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
6A	**CHECK Q.3 & Q.4 AND MARK:**	**IF Q.3 & Q.4 ARE THE <u>SAME</u> – RESPONDENT HAD SEX WITH KNOWN PERSONS ONLY.....1** **IF Q.3 & Q.4 ARE DIFFERENT – RESPONDENT HAD SEX WITH KNOWN AND UNKNOWN PERSONS.....2** → **21** **IF Q.4 IS ZERO – RESPONDENT HAD SEX WITH UNKNOWN PERSONS ONLY.....3** **IF Q.3 IS ZERO – ASK ABOUT MOST RECENT NON-COMMERCIAL PARTNERS.....4**	
7	**Now I would like to know some more details about these (other) <u>known</u> non-commercial male partners that you have anal sex with.** Let us start with the most recent **<u>known</u> non-commercial** sex partner. How old was he when you first had sex with him?	AGE IN COMPLETED YEARS ☐☐ DON'T KNOW.....98	
8	Where is he from (native place)?	CITY/VILLAGE_____ DISTRICT_____ STATE_____ COUNTRY_____ DON'T KNOW.....98 NO ANSWER.....99	
9	What is his marital status? **DO NOT READ RESPONSES. CIRCLE ONE RESPONSE ONLY.**	CURRENTLY MARRIED .....1 SEPARATED.....2 DIVORCED.....3 WIDOWED.....4 NEVER MARRIED.....5 HIJRA UNMARRIED .....6 HIJRA MARRIED.....7 NO ANSWER.....99	
10	What is his religion? **DO NOT READ RESPONSES. CIRCLE ONE RESPONSE ONLY.**	HINDU..... 1 ISLAM ..... 2 CHRISTIAN ..... 3 OTHER(SPECIFY)_____97 DON'T KNOW..... 98	
11	What type(s) of sex do you have with this partner? **DO NOT READ RESPONSES. MULTIPLE RESPONSES POSSIBLE.**	ANAL.....A ORAL.....B MASTURBATION.....C THIGH.....D OTHER (SPECIFY)_____97 NO ANSWER.....99	

SECTION VIII: NON-COMMERCIAL MALE SEX PARTNERS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
11A	**CHECK Q.11 AND MARK:**	**HAS ANAL SEX.....1** **DOES NOT HAVE ANAL SEX.....2**	→ **20**
12	Do you have insertive or receptive sex with this partner? **CIRCLE ONE RESPONSE ONLY.**	INSERTIVE.....1 RECEPTIVE.....2 BOTH RECEPTIVE & INSERTIVE.....3 NO ANSWER.....99	
13	How long ago did you have anal sex with this partner for the **first time**? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD '00' IN WEEKS IF LESS THAN A WEEK.**	WEEKS.....1 ☐☐ MONTHS.....2 ☐☐ YEARS .....3 ☐☐	
14	How long ago did you have anal sex with this partner for the **last time** (most recent sex encounter)? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	DAYS.....1 ☐☐ WEEKS .....2 ☐☐ MONTHS .....3 ☐☐ YEARS .....4 ☐☐	
14A	**CHECK Q.13 AND Q.14 AND MARK THE DURATION OF RELATIONSHIP WITH THE PERSON:**	**DURATION MORE THAN 1 MONTH..... 1** **DURATION LESS THAN 1 MONTH 2**	→ **16**
15	In a normal month, how many times do you have anal sex with this partner?	TIMES PER MONTH..... ☐☐	→ **17**
16	How many times did you have anal sex with this partner in the **last week**?	TIMES IN LAST WEEK..... ☐☐	
17	In general, how often is a condom used when you have anal sex with this partner?	NEVER (0%) .....1 SOMETIMES (< 50%) .....2 FREQUENTLY (≥ 50%) .....3 ALWAYS (100%)..... 4 NO ANSWER.....99	→ **20**
18	How long ago did you start using condoms **(always / sometimes / frequently)** when you have anal sex with this partner? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD '00' IN WEEKS IF LESS THAN A WEEK.**	WEEKS..... 1 ☐☐ MONTHS..... 2 ☐☐ YEARS ..... 3 ☐☐	
19	Out of the **last 10 times** that you had anal sex with him, how many times was a condom used?	NUMBER..... …… ☐☐	

SECTION VIII: NON-COMMERCIAL SEX PARTNERS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
20	Does this partner buy sex from men?	YES ..... 1 NO ..... 0 DON'T KNOW ..... 98 NO ANSWER.....99	
20A	**CHECK Q.3 & Q.4 AND MARK:**	**HAD SEX WITH KNOWN PERSONS ONLY...1** **HAD SEX UNKNOWN (AND KNOWN) PERSONS.....2**	**→ SIX**
21	**Now I would like to know some more details about these (other) <u>unknown</u> non-commercial male sex partners.** What type(s) of sex do you have with your unknown non-commercial male sex partners? **DO NOT READ RESPONSES. MULTIPLE RESPONSES POSSIBLE.**	ANAL.....A ORAL.....B MASTURBATION.....C THIGH.....D OTHER (SPECIFY)_____97 NO ANSWER.....99	
21A	**CHECK Q.21 AND MARK:**	**HAS ANAL SEX.....1** **DOES NOT HAVE ANAL SEX.....2** →	**SIX**
22	With how many of these **unknown** male sex partners (calculated from Q.3 & Q.4) did you have anal sex?	NUMBER ..... ☐☐ **RECORD '00' IF NONE** →	**SIX**
23	Did you have insertive or receptive sex with these partners? **CIRCLE ONE RESPONSE ONLY.**	INSERTIVE.....1 RECEPTIVE.....2 BOTH INSERTIVE & RECEPTIVE.....3 NO ANSWER.....99	
24	In general, how often is a condom used when you have anal sex with unknown non-commercial sex partners?	NEVER (0%) ..... 1 SOMETIMES (< 50%) .....2 FREQUENTLY (≥ 50%) .....3 ALWAYS (100%)..... 4 NO ANSWER.....99	→ **SIX**
25	How long ago did you start using condoms **(always / sometimes / frequently)** when you have (had) anal sex with unknown non-commercial sex partners? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD '00' IN WEEKS IF LESS THAN A WEEK.**	WEEKS..... 1 ☐☐ MONTHS..... 2 ☐☐ YEARS ..... 3 ☐☐	
26	Out of the **last 10 times** that you had anal sex with him, how many times was a condom used?	NUMBER..... ☐☐	

SECTION-IX: CLIENTS OF SEX WORKERS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	**Now I would like to ask you a few questions regarding sex and the sex workers you visit.** Have you ever **given** cash or gifts to other men to have sex?	CASH ONLY.....1 CASH AND GIFTS.....2 GIFTS ONLY.....3 NO.....4 NO ANSWER.....99	**15**
2	How many days in a typical month do you have anal sex with male sex workers?	NUMBER OF TIMES/MONTH ..... ☐☐ *RECORD '00' IF NO LONGER VISITS MALE SEX WORKERS*	**15**
3	Out of the last 10 times that you had sex with a man, how many men did you give gifts or cash to in exchange for sex?	NUMBER OF TIMES..... ☐☐ NO ANSWER.....99	
4	How old were you when you first started visiting male sex workers?	AGE IN COMPLETED YEARS..... ☐☐	
5	Where do you pick up male sex workers at present? **DO NOT READ RESPONSES. CIRCLE ALL THE PLACES MENTIONED.**	HOME.....A RENTED ROOM.....B BAR/NIGHTCLUB.....C PUBLIC GARDEN.....D PUBLIC TOILET.....E RAILWAY STATION.....F BUS STAND.....G CINEMA HALL.....H OTHER PUBLIC PLACES (SPECIFY)_____ I VEHICLE.....J HAMMAM.....K PHONE CONTACTS.....L LODGE.....M OTHER(SPECIFY)_____97 NO ANSWER.....99	
6	Where do you normally have sex with male sex workers at present? **DO NOT READ RESPONSES. CIRCLE ALL THE PLACES MENTIONED.**	HOME.....A RENTED ROOM.....B BAR/NIGHTCLUB.....C PUBLIC GARDEN.....D PUBLIC TOILET.....E RAILWAY STATION.....F BUS STAND.....G CINEMA HALL.....H OTHER PUBLIC PLACES (SPECIFY)_____ I VEHICLE.....J HAMMAM.....K PHONE CONTACTS.....L OTHER(SPECIFY)_____97 NO ANSWER.....99	

SECTION-IX: CLIENTS OF SEX WORKERS

No.	QUESTIONS AND FILTERS	*CODING CATEGORIES*	SKIP
7	In the past one year, were you ever beaten or otherwise physically forced to have sexual intercourse with someone even though you didn't want to?	YES.....1 NO.....0 NO ANSWER.....99	
7A	**CHECK Q2 & MARK:**	**PAID FOR SEX LESS THAN 10 DAYS THIS MONTH.....1** **PAID FOR SEX MORE THAN 10 DAYS THIS MONTH.....2**	**9**
8	How many times did you pay cash/gifts to have anal sex in the last month?	NUMBER OF TIMES/MONTH ..... ☐☐	**10**
9	How many times did you pay cash/gifts to have anal sex in the last week?	NUMBER OF TIMES/WEEK ..... ☐☐	
10	In general, how often are condoms used when you have anal sex with male sex workers?	NEVER(0%)..... 1 SOMETIMES (< 50%)..... 2 FREQUENTLY (≥ 50%)..... 3 ALWAYS (100%)..... 4 NO ANSWER.....99	**12A**
11	How long have you been using condoms **(sometimes / frequently / always)** when you have anal sex with male sex workers? **RECORD IN WEEKS IF LESS THAN A MONTH. RECORD IN MONTHS IF LESS THAN ONE YEAR. OTHERWISE RECORD COMPLETED YEARS. RECORD '00' IN WEEKS IF LESS THAN A WEEK.**	WEEKS ..... 1 ☐☐ MONTHS ..... 2 ☐☐ YEARS..... 3 ☐☐ NO ANSWER 99	
12	Out of the **last 10 times** that you had anal sex with him, how many times was a condom used?	NUMBER..... ☐☐	
12A	**CHECK Q2 & MARK:**	**IF PAID FOR SEX LESS THAN 10 DAYS THIS MONTH.....1** **IF PAID FOR SEX MORE THAN 10 DAYS THIS MONTH.....2**	MONTH WEEK
13	How many times did you pay cash/gifts to have oral sex in the last week/month?	NUMBER OF TIMES WEEK/MONTH. ☐☐ **[DELETE AS APPROPRIATE]**	
14	In general, how often are condoms used when you have oral sex with male sex workers?	NEVER(0%)..... 1 SOMETIMES (< 50%)..... 2 FREQUENTLY (≥ 50%)..... 3 ALWAYS (100%)..... 4 NO ANSWER.....99	
15	**Now I am going to ask you some questions about hijras with whom you have had anal intercourse.** Have you ever had anal intercourse with a hijra?	YES ..... 1 NO ..... 0 NO ANSWER.....99	**SX**

SECTION-IX: CLIENTS OF SEX WORKERS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
16	Have you paid to have anal intercourse with a hijra in the **past year**?	YES ..... 1 NO ..... 0 DON'T KNOW ..... 98 NO ANSWER 99	**SX**
17	How many times did you have anal intercourse with a hijra in **the past month**?	NUMBER OF TIMES ..... ☐☐ NO ANSWER ..... 99 *RECORD '00' IF NONE*	
18	In general, how often are condoms used when you have anal sex with hijra?	NEVER(0%) ..... 1 → **SX** SOMETIMES (< 50%) ..... 2 FREQUENTLY (≥ 50%) ..... 3 ALWAYS (100%) ..... 4 NO ANSWER 99	
19	How long have you been using condoms **(sometimes / frequently / always)** when you have anal sex with hijra? **RECORD IN WEEKS IF LESS THAN A MONTH. RECORD IN MONTHS IF LESS THAN ONE YEAR. OTHERWISE RECORD COMPLETED YEARS. RECORD '00' IN WEEKS IF LESS THAN A WEEK.**	WEEKS ..... 1 ☐☐ MONTHS ..... 2 ☐☐ YEARS ..... 3 ☐☐ NO ANSWER 99	
20	Out of the **last 10 times** that you had anal sex with her, how many times was a condom used?	NUMBER ..... ☐☐	

SECTION X: WIFE / FEMALE CO-HABITING PARTNER

No	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1A	**CHECK SECTION III Q.7 & 11 AND MARK:**	**IF LIVING WITH WIFE/FEMALE COHABITING PARTNER.....1** **IF NOT LIVING WITH WIFE/COHABITING FEMALE PARTNER.....2** → **SXI**	
1	**Now I would like to ask you some details about your wife/co-habiting partner. I assure you of the confidentiality of the information provided. Please let me know if you do not want to answer any of these questions.** What is the age of your wife/co-habiting partner?	AGE IN COMPLETED YEARS..... ☐☐ DON'T KNOW 98	
2	What is the religion of your wife/ co-habiting partner?	HINDU .....1 ISLAM.....2 CHRISTIAN.....3 OTHER (SPECIFY)_____97 DON'T KNOW.....98	
3	How many months did you stay together with your wife/cohabiting partner in the last 12 months?	NUMBER (MONTHS)..... ☐☐	
4	What does your female cohabiting partner mainly do to earn income? **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER.**	NONE.....0 STUDENT.....1 SELF EMPLOYED.....2 NON-AGRICULTURAL LABOUR.... 3 AGRICULTURAL LABOUR.....4 BUSINESS / TRADE.....5 GOVERNMENT EMPLOYEE.....6 CLERICAL / SALESMAN..... 7 SUPERVISORY LEVEL..... .8 TRANSPORT (SPECIFY)_____9 SEX WORK..... 10 OTHER(SPECIFY)_____97 NO ANSWER.....99	
5	Are you using any family planning methods **IF YES**: What are those? **DO NOT READ RESPONSES. CIRCLE ALL RESPONSES FOR METHODS MENTIONED.**	NOT USING.....A PILL.....B CONDOM/NIRODH.....C LOOP/COPPER T.....D FEMALE STERILIZATION.....E MALE STERILIZATION.....F RHYTHM/SAFE PERIOD.....G WITHDRAWAL.....H OTHER(SPECIFY)_____97 DON'T KNOW.....98	

SECTION X: WIFE / FEMALE CO-HABITING PARTNER

No	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
6	How many children do you have?	NUMBER..... ☐☐ *CODE '00' IF HAS NO CHILDREN*	
7	Does your wife/cohabiting partner know that you have sex with men?	YES .....1 NO .....0 DON'T KNOW..... 98 NO ANSWER.....99	
8	How many times do you have **vaginal** sex with your wife/co-habiting partner in a 'normal' month?	NUMBER..... ☐☐ **RECORD '00' IF NONE** →	**14**
9	How long ago did you have vaginal sex with your wife/cohabiting partner for the **first time**? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	DAYS.....1 ☐☐ WEEKS.....2 MONTHS.....3 YEARS.....4	
10	How long ago did you have vaginal sex with your wife/cohabiting partner for the **last time** (most recent sex encounter)? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	DAYS.....1 ☐☐ WEEKS.....2 MONTHS.....3 YEARS.....4	
11	How often is a condom used when you have vaginal sex with your wife/co-habiting partner?	NEVER (0%)..... 1 → SOMETIMES (< 50%)..... 2 FREQUENTLY (≥ 50%)..... 3 ALWAYS (100%)..... 4 NO ANSWER.....99	**14**
12	How long have you been using condoms (**sometimes / frequently / always**) when you have vaginal sex with her? **RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	WEEKS.....1 ☐☐ MONTHS.....2 YEARS.....3	
13	Out of the **last 10 times** that you had vaginal sex with her, how many times was a condom used?	NUMBER..... ☐☐	
14	How many times do you have anal sex with your wife/co-habiting partner in a 'normal' month?	NUMBER..... ☐☐ **RECORD '00' IF NONE** →	**SXI**
15	Out of the **last ten times** that you had anal sex with your wife/cohabiting partner, how many times was a condom used?	NUMBER..... ☐☐ **RECORD '00' IF NONE**	

SECTION XI: FEMALE SEX WORKERS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	**Now I would like to ask you a few questions regarding the sex workers that you visit. I assure you of the confidentiality of the information provided. Please let me know if you do not want to answer any of these questions.** Have you ever paid to have sex with a female sex worker?	YES ..... 1 NO ..... 0 NO ANSWER 99	**9**
2	How long ago was the last time that you paid for sex with a female sex worker? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN 1 MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS.**	DAYS ..... 1 ☐☐ WEEKS ..... 2 ☐☐ MONTHS ..... 3 ☐☐ YEARS ..... 4 ☐☐	
3	How many times have you paid for sex with a female sex worker in the last year?	NUMBER ..... ☐☐ RECORD '00' IF NO LONGER VISITS FEMALE SEX WORKERS	**SXII**
4	How many different female sex workers have you had sex with in the last year?	NUMBER ..... ☐☐	
5	What type(s) of sex did you have with this female sex worker(s) in general? **DO NOT READ RESPONSES. CIRCLE ALL RESPONSES MENTIONED.**	VAGINAL ..... A ANAL ..... B ORAL ..... C THIGH ..... D MASTURBATION ..... E OTHER (SPECIFY)_____ 97 NO ANSWER 99	**6A**
6	How often do you use condoms when having vaginal sex with female sex worker(s)?	NEVER (0%) ..... 1 SOMETIMES (< 50%) ..... 2 FREQUENTLY (≥ 50%) ..... 3 ALWAYS (100%) ..... 4 NO ANSWER 99	
6A	**CHECK Q.5 AND MARK:**	**HAS ANAL SEX ..... 1** **DOES NOT HAVE ANAL SEX 2**	**7A**
7	How often do you use condoms when having anal sex with female sex worker(s)?	NEVER (0%) ..... 1 SOMETIMES (< 50%) ..... 2 FREQUENTLY (≥ 50%) ..... 3 ALWAYS (100%) ..... 4 NO ANSWER 99	
7A	**CHECK BOTH Q.6 & Q7 AND MARK**	**NEVER (0%) ..... 1** **SOMETIMES/FREQUENTLY/ALWAYS 2**	**9**

SECTION XI: FEMALE SEX WORKERS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
8	How long have you been using condoms **(sometimes / frequently / always)** with female sex worker(s)?	WEEKS.....1 ☐☐ MONTHS.....2 ☐☐ YEARS .....3 ☐☐ DON'T KNOW.....98	
8A	**CHECK SECTION III Q.7 & Q11 AND ADJUST WORDING OF Q9-11 ACCORDINGLY**		
9	**Now I would like to ask you some questions about your (other) female sex partners previous to the ones that we have just discussed.** Have you ever had sex with any (other) woman in your life (besides your cohabiting female partner/wife (past/ current) and besides female sex workers)?	YES..... 1 NO..... 0 NO ANSWER.....99	**SXII**
10	How many (other) women have you had sex with in your lifetime?	NUMBER ..... ☐☐ **[EXCLUDES COHABITING FEMALE PARTNER/WIFE/FEMALE SEX WORKERS]**	
11	How many (other) are you currently having sex with?	NUMBER ..... ☐☐ **[EXCLUDES COHABITING FEMALE PARTNER/WIFE/FEMALE SEX WORKERS]**	

SECTION XII: CONDOM & LUBRICANT USE

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1A	CHECK SECTION IV Q5	**NEVER USED A CONDOM.....1** →	**SXIII**
1	Out of the last 10 times that you used a condom, how many times did you experience the condom breaking?	NUMBER ..... ☐☐	
2	Out of the last 10 times that you used a condom, how many times did you experience the condom slipping off?	NUMBER ..... ☐☐	
3	Have you ever used lubrication while having anal sex?	YES.....1 NO .....0 NO ANSWER.....99	**SXIII**
4	What type(s) of lubricant have you used in the last one year? DO NOT READ RESPONSES. RECORD ALL RESPONSES. MULTIPLE RESPONSES POSSIBLE.	BABY OIL.....A BUTTER.....B COOKING OIL.....C HAND LOTION.....D KY JELLY.....E VASELINE.....F SALIVA.....G OTHER (SPECIFY)_____97 NO ANSWER.....99	

SECTION XIII: MIGRATION

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	Which city/village / district / state do you belong to (native place)?	CITY/VILLAGE_____ DISTRICT_____ STATE _____ NO ANSWER..... 99	
2	Where do you live now?	CITY/VILLAGE_____ DISTRICT_____ STATE _____ NO ANSWER..... 99	
3	How long have you lived in this place (place mentioned in Q.2)? *RECORD '00' IF <1 YEAR*	NUMBER OF YEARS…..... ☐☐ SINCE BIRTH .....97 DON'T REMEMBER 98	
3A	**CHECK Q.1 & Q.2 AND MARK:**	**NATIVE PLACE SAME AS RESIDENCE...1** **NATIVE PLACE DIFFERENT RESIDENCE.2**	**→ 4A**
4	How often do you return home (native place)?	NUMBER TIMES / YEAR..... ☐☐ **RECORD '00' IF NEVER RETURNS HOME**	
4A	**CHECK Q.2 AND MARK:**	**LIVES IN BANGALORE .....1** **LIVES OUTSIDE BANGALORE.....2**	**→ 8**
5	How often do you come to Bangalore from your place of residence to have sex with men?	EVERY DAY ..... 1 ONCE A WEEK..... 2 MORE THAN ONCE A WEEK..... 3 FORTNIGHTLY ..... 4 ONCE A MONTH..... 5 OTHER (SPECIFY)_____97	
6	How long do you normally stay in Bangalore when you come to have sex with men? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN A MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD '00' IF LESS THAN ONE MONTH.**	DAYS ..... 1 ☐☐ WEEKS ..... 2 ☐☐ MONTHS ..... 3 ☐☐ YEARS ..... 4 ☐☐	
7	Where do you normally stay when you come to Bangalore to have sex with men? **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER.**	RENTED ROOM..... 1 LODGE..... 2 DABHA..... 3 HAMMAM..... 4 FRIENDS/RELATIVES HOUSE..... 5 OTHER (SPECIFY)_____ 97 NO ANSWER.....99	
8	For how long have you been having sex with men in Bangalore? **RECORD IN DAYS IF LESS THAN A WEEK. RECORD IN WEEKS IF LESS THAN A MONTH. RECORD IN MONTHS IF MORE THAN A MONTH BUT LESS THAN A YEAR. RECORD IN YEAR IF MORE THAN 12 MONTHS. RECORD '00' IF LESS THAN ONE MONTH.**	DAYS ..... 1 ☐☐ WEEKS ..... 2 ☐☐ MONTHS ..... 3 ☐☐ YEARS ..... 4 ☐☐	
9	Is the place you pick up men also used by female sex workers for soliciting clients?	YES.....1 NO 0	
10	Have you ever had **anal** sex with men in any city, village, town other than Bangalore?	YES.....1 NO..... 0 NO ANSWER.....99	**SXIV**

SECTION XIII: MIGRATION

	Please provide the details of the city/town/village where you had sex with men other than Bangalore			
No.	**QUESTIONS**	**PLACE 1**	**PLACE 2**	**PLACE 3**
11	CITY/TOWN/VILLAGE: DISTRICT: STATE:	_____ _____ _____	_____ _____ _____	_____ _____ _____
		REFER TO NAME OF PLACE WHEN ASKING Q.12-Q.19	**REFER TO NAME OF PLACE WHEN ASKING Q.12-Q.19**	**REFER TO NAME OF PLACE WHEN ASKING Q.12-Q.19**
12	How often do you visit this place (place mentioned in Q.11)?	EVERY DAY.....1 ONCE A WEEK.....2 MORE THAN ONCE A WEEK.....3 FORTNIGHTLY.....4 ONCE A MONTH.....5 OTHER, _____97 SPECIFY	EVERY DAY.....1 ONCE A WEEK.....2 MORE THAN ONCE A WEEK.....3 FORTNIGHTLY.....4 ONCE A MONTH.....5 OTHER, _____97 SPECIFY	EVERY DAY.....1 ONCE A WEEK.....2 MORE THAN ONCE A WEEK.....3 FORTNIGHTLY.....4 ONCE A MONTH.....5 OTHER, _____97 SPECIFY
13	How many men did you have sex with on the last (most recent) time you visited this place (place mentioned in Q.11)?	NUMBER OF MEN**...** ☐☐	NUMBER OF MEN**...** ☐☐	NUMBER OF MEN**...** ☐☐
14	How long ago was the **first** time you visited this place (place mentioned in Q.11) to have sex with men?	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐
15	How long ago was the **last** time you visited this place (place mentioned in Q.11) to have sex with men?	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐

SECTION XIII: MIGRATION

No.	QUESTIONS	PLACE 1	PLACE 2	PLACE 3
16	What are the main reasons for going to this place (place mentioned in Q.11) to have sex? **PROBE & RECORD ALL RESPONSES MENTIONED**	MAINTAIN SECRECY....A BEAUTIFUL PLACE.....B MORE MONEY.....C MORE MEN.....D LESS POLICE HARRASSMENT. .....E OTHER_____97	MAINTAIN SECRECY....A BEAUTIFUL PLACE.....B MORE MONEY.....C MORE MEN.....D LESS POLICE HARRASSMENT. .....E OTHER_____97	MAINTAIN SECRECY....A BEAUTIFUL PLACE.....B MORE MONEY.....C MORE MEN.....D LESS POLICE HARRASSMENT. .....E OTHER_____97
17	Where do you have sex in this place (place mentioned in Q.11)? **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER**.	HOME.....A RENTED ROOM .....B BAR/NIGHT CLUB...C PUBLIC GARDEN....D PUBLIC TOILET....E RAILWAY STATION..F BUS STAND.....G CINEMA HALL.....H OTHER PUBLIC PLACE _____I VEHICLE.....J HAMMAM.....K LODGE/GUEST HS...L OTHER _____97 (SPECIFY)	HOME .....A RENTED ROOM.....B BAR/NIGHT CLUB...C PUBLIC GARDEN....D PUBLIC TOILET....E RAILWAY STATION..F BUS STAND.....G CINEMA HALL.....H OTHER PUBLIC PLACE _____I VEHICLE.....J HAMMAM.....K LODGE/GUEST HS...L OTHER _____97 (SPECIFY)	HOME.....A RENTED ROOM .....B BAR/NIGHT CLUB...C PUBLIC GARDEN....D PUBLIC TOILET....E RAILWAY STATION..F BUS STAND.....G CINEMA HALL.....H OTHER PUBLIC PLACE _____I VEHICLE.....J HAMMAM.....K LODGE/GUEST HS...L OTHER _____97 (SPECIFY)
18	How often are condoms used when you have sex with men in this place (place mentioned in Q.11)?	NEVER (0%)……..1→ **SXIV** SOMETIMES (<50%)……...2 FREQUENTLY (>50%)……3 ALWAYS (100%).....4	NEVER (0%)……..1→ **SXIV** SOMETIMES (<50%)……...2 FREQUENTLY (>50%)……3 ALWAYS (100%).....4	NEVER (0%)…….1→ **SXIV** SOMETIMES (<50%)…....2 FREQUENTLY (>50%)…..3 ALWAYS (100%).....4
19	How long have you been using condoms **(sometimes/frequently/ always)** in this place?	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS....3 ☐☐ YEARS.....4 ☐☐

SECTION XIV: INFORMATION ON DRUG USE

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	Which partners do you normally drink alcohol with before having sex? **DO NOT READ RESPONSES. RECORD ALL RESPONSES, MULTIPLE RESPONSES POSSIBLE**	COHABITING MALE PARTNER…….....A COHABITING HIJRA PARTNER…….....B CLIENTS.....C NON-COMMERICAL SEX PARTNERS...D MALE SEX WORKERS.....E WIFE.....F FEMALE SEX WORKERS.....G OTHER (SPECIFY)_____97 NO ANSWER.....99	
2	**Some people like to inject drugs/narcotics (like heroin) for fun or to get high. Now I would like to ask you a few questions regarding injecting drugs. I assure you of the confidentiality of the information collected. Please let me know if you do not want to answer any of these questions.** Have you ever taken drugs for fun or to get high?	YES.....1 NO .....0 NO ANSWER.....99	**SXV**
3	If so, in what form did you take the drugs? **DO NOT READ RESPONSES. CIRCLE ALL RESPONSES MENTIONED.**	SMOKING.....1 INHALING.....2 INJECTING.....3 OTHER (SPECIFY)_____97 NO ANSWER.....99	
4	What is (are) the name (s) of these drugs?	_____ (VERBATIM)	
5	Have you ever injected illicit drugs?	YES.....1 NO .....0 NO ANSWER.....99	**SXV**
6	For how long have you been injecting drugs?	MONTHS.....1 ☐☐ YEARS.....2 ☐☐	
7	How long ago was the last time you injected drugs?	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS.....3 ☐☐ YEARS.....4 ☐☐ NO ANSWER.....99	
8	Do you ever share needles when injecting?	YES.....1 NO.....0 NO ANSWER.....99	
9	Out of the last 10 times that you injected drugs, how many times did you share needles/syringes?	NUMBER:..... ☐☐ NO ANSWER.....99	
10	With whom do you usually inject drugs?	SEX WORKER FRIENDS.....A CLIENTS.....B NON COMMERCIAL PARTNER.....C REPEAT CLIENT.....D STRANGERS.....E OTHERS (SPECIFY)_____97 NO ANSWER.....99	

SECTION XV: RISK PERCEPTION

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	**Now I would like to ask you a few questions related to HIV. I assure you of the confidentiality of the information collected. Please let me know if you do not want to answer any of these questions.** How long have you known about HIV/AIDS?	DAYS .....1 ☐☐ WEEKS .....2 ☐☐ MONTHS .....3 ☐☐ YEARS.....4 ☐☐	
2	Do you yourself feel you are at risk of being infected with HIV?	YES ..... 1 NO ..... 0 DON'T KNOW ..... 98 NO ANSWER 99	
3	Have you ever taken an HIV/ AIDS test?	YES ..... 1 NO ..... 0 NO ANSWER 99	**SXVI**
4	How many times have you undergone HIV testing?	ONLY ONCE ..... 1 MORE THAN ONCE..... 2 NO ANSWER 99	
5	Why did you have the most recent test?	BECAUSE I AM A SEX WORKER.....1 BECAUSE A SOCIAL WORKER/PEER EDUCATOR PERSUADED ME.....2 BECAUSE I WAS ILL.....3 OTHER (SPECIFY)_____97 NO ANSWER.....99	

SECTION XVI: PROGRAM EXPOSURE & COMMUNITY LED INTERVENTION

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	**Now I would like to ask you a few questions regarding the HIV prevention program in your district. I assure you of the confidentiality of the information provided. Please let me know if you do not want to answer any of these questions.** Are you aware of any NGO's or programmes working with prevention of HIV/AIDS among men who have sex with men in Bangalore? If yes, what is the name of this NGO?	YES (**SPECIFY THOSE MENTIONED**): 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ NO ..... 0 NO ANSWER.....99	→ **END**
2	Have you been contacted by the (peer educators/NGO staff) workers from SANGAMA to provide you with information regarding HIV/AIDS and condoms use?	YES ..... 1 NO ..... 0 NO ANSWER.....99	**9**
3	How long ago was the **first** time you were contacted by workers from SANGAMA?	DAYS.....1 ☐☐ WEEKS.....2 ☐☐ MONTHS.....3 ☐☐ YEARS.....4 ☐☐	
4	How many times in the past **one month** were you contacted in the field by a PE/NGO worker from SANGAMA to give you information?	NUMBER:..... ☐☐	
5	How often are you given condoms by a PE/NGO worker from SANGAMA?	NEVER.....1 EVERY DAY.....2 ONCE A WEEK.....3 MORE THAN ONCE A WEEK.....4 FORTNIGHTLY.....5 ONCE A MONTH.....6 OTHER (SPECIFY)_____97	
6	Have you ever received a condom demonstration by a PE/NGO worker from Sangama?	YES ..... 1 NO ..... 0 NO ANSWER.....99	
7	Have you ever visited the clinics run by SANGAMA?	YES.....1 NO.....0 NO ANSWER.....99	**9**
8	How many times have you visited this clinic **to see the doctor** in the last one year **OR** since you first knew about it **[IF LESS THAN ONE YEAR]**?	NUMBER:..... ☐☐	
9	Do you have a regular group of friends with whom you go to have sex with men in Bangalore?	YES ..... 1 NO ..... 0 DON'T KNOW ..... 98 NO ANSWER 99	
	The interview ends here. Thank you very much for your time, and for providing the information. I assure you again that none of the information you have given us will be shared with anyone else, and your responses will remain completely anonymous. **INTERVIEWER OBSERVATIONS**		

APPENDIX A2

Institute of Population Health and Clinical Research (IPHCR), St John's Medical College, Bangalore

Centre hospitalier *affliilié* universitaire de Québec (CHA), University of Manitoba, Winnipeg, Canada

Special behavioural surveys of core and bridging groups for HIV infection in selected Indian districts

Informal Confidential Voting Interview Questionnaire for Sexual Minorities

SECTION I: INTERVIEW INFORMATION

Study number ☐☐☐☐☐☐

PSU Name and code_____

City/Town/Village_____ ☐☐

District_____ ☐☐

Type of Locale (Public garden=1, Public toilet=2, Railway station=3,
Bus stand/stop=4, Other=5) ..... ☐

Date of interview: DAY ☐☐ MONTH ☐☐ YEAR ☐☐☐☐

Name and code of interviewer:_____ ☐☐

Participation in the IBBA study that took place in Bangalore (YES=1; NO=0)..... ☐

Participation in SBS Bangalore YES.....1 STOP ☐
NO.....0 PROCEED WITH CONSENT →

Consented for interview (YES=1, NO=0)..... ☐

Result of interview: Interview completed = 1 ☐☐
Interview partially completed = 2
Respondent not eligible (under age) = 3
Respondent not eligible (never had anal intercourse) = 4
Respondent refused = 5
Respondent was a duplicate = 6

Language of the interview: _____

Time interview started: Time Interview ended:

Hr : Mnts ☐☐☐☐ Hr : Mnts ☐☐☐☐

AM / PM AM / PM

SECTION II: EDITING AND DATA ENTRY

Name and code of Supervisor: _____ ☐☐ ☐☐ ☐☐☐☐

Date of scrutinizing the questionnaire: DAY MONTH YEAR

Signature of Supervisor:_____

Name and code of data entry person: _____ ☐☐ ☐☐ ☐☐☐☐

Date of data entry: DAY MONTH YEAR

Signature of data entry person:_____

Name and code of data entry person (2): _____ ☐☐ ☐☐ ☐☐☐☐

Date of re-data entry: DAY MONTH YEAR

Signature of data entry person (2):_____

Data entry checked by: _____ ☐☐ ☐☐ ☐☐☐☐

Date of data entry checked: DAY MONTH YEAR

Signature of person who checked data entry:_____

SECTION III: SOCIO- DEMOGRAPHIC CHARACTERISTICS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1	How old are you?	AGE IN COMPLETED YEARS ☐☐ DON'T KNOW.....98	
2	Can you read and write?	YES.....1 NO.....0 →	4
3	What is the highest grade you have completed?	GRADE..... ☐☐	
4	What do you mainly do to earn income? **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER.**	NONE.....0 STUDENT.....1 SELF EMPLOYED.....2 NON-AGRICULTURAL LABOUR...3 AGRICULTURAL LABOUR.....4 BUSINESS / TRADE.....5 GOVERNMENT EMPLOYEE.....6 CLERICAL / SALESMAN.....7 SUPERVISORY LEVEL.....8 TRANSPORT (SPECIFY)_____9 SEX WORK.....10 OTHER(SPECIFY)_____97 NO ANSWER.....99	
5	What is your current marital status?	CURRENTLY MARRIED……1 SEPARATED……2 DIVORCED……3 WIDOWED……4 NEVER MARRIED……..5 HIJRA UNMARRIED……6 HIJRA MARRIED.....7 NO ANSWER……99	
6	With whom do you currently live? **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER.**	LIVING WITH MALE PARTNER.....1 LIVING WITH WIFE.....2 LIVING WITH OTHER FEMALE.....3 LIVING WITH HIJRA PARTNER.....4 LIVING ALONE.....5 LIVING WITH GURU.....6 LIVING WITH FAMILY.....7 LIVING WITH FRIEND/COLEAGUE.8 OTHER_____97 NO ANSWER.....99	

SECTION III: SOCIO- DEMOGRAPHIC CHARACTERISTICS

No.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
7	How do you identify yourself? DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER**.**	PREDOMINANTLY KOTHI.....1 PREDOMINANTLY PANTHI.....2 DOUBLE DECKER.....3 HIJRA AKWA.....4 HIJRA NIRVAAN.....5 BISEXUAL.....6 NO SPECIFIC IDENTITY.....97	
8	How old were you **the first time** you had anal sex with a **male**?	AGE IN COMPLETED YEARS: ☐☐ NEVER HAD ANAL SEX WITH MAN….96 DON'T KNOW.....98	→ **END**
9	**Who was this man?** **DO NOT READ RESPONSES. CIRCLE ONLY ONE ANSWER**.	RELATIVE.....1 PAYING CLIENT.....2 MALE SEX WORKER.....3 MALE PARTNER.....4 FRIEND/CLASSMATE.....5 COLLEAGUE.....6 STRANGER.....7 OTHER(SPECIFY)_____97 DON'T KNOW.....98 NO ANSWER.....99	

Final list of ICVI Questions for Bangalore

1.	Have you ever used a condom for anal intercourse? → *Colour the SQUARE if YES or the CIRCLE if NO*
2.	Was a condom used when you last had anal intercourse? → *Colour the SQUARE if YES or the CIRCLE if NO*
3.	In the past six months was there a time when you wanted to use a condom during sexual intercourse but did not? → *Colour the SQUARE if YES or the CIRCLE if NO*
4.	In the past six months have you had the experience of a condom breaking while it was being used? → *Colour the SQUARE if YES or the CIRCLE if NO*
5.	Have you ever used a lubricant while having anal sex? I mean something that that will make your penis or your partner's penis more slippery and easier to insert into the anus? → *Colour the SQUARE if YES or the CIRCLE if NO*
6.	Have you ever injected drugs for non-medical purposes? → *Colour the SQUARE if YES or the CIRCLE if NO*
7.	Do you have a main (regular) male sexual partner? → *Colour the SQUARE if YES or the CIRCLE if NO*
8.	The last time you had anal intercourse with this partner was a condom used? → *Colour the SQUARE if YES or the CIRCLE if NO. Do not colour if you do not have a main (regular) male sexual partner.*
9.	Have you ever received cash or gifts in return for anal sex? → *Colour the SQUARE if YES or the CIRCLE if NO*
10.	In the past one week, how many different men did you have anal intercourse with? → *Colour as many circles as the number of men to whom you had anal sex with in the past one week. Colour all the circles if you had sex with 10 or more different men. Do not colour any circles if you did not have sex with any man in the past one week.*
11.	The last time you had anal intercourse with one of these partners was a condom used? → *Colour the SQUARE if YES or the CIRCLE if NO*
12.	The last time you had anal intercourse with a known (regular) male partner was a condom used? → *Colour the SQUARE if YES or the CIRCLE if NO*
13.	Was a condom used when you last had anal sex with a man that you don't know or recognise (new)? → *Colour the SQUARE if YES or the CIRCLE if NO*
14.	Have you had anal intercourse with a hijra? → *Colour the SQUARE if YES or the CIRCLE if NO*

15.	Have you paid to have sexual intercourse with a female in the last year? → *Colour the SQUARE if YES or the CIRCLE if NO*
16.	Do you have a main female sexual partner? → *Colour the SQUARE if YES or the CIRCLE if NO*
17.	How many times do you have **vaginal** sex with your main female sexual partner in a 'normal' month? → *Colour as many circles as the number of times you had vaginal sexual intercourse with her in the past one month. Colour all the circles if you had sex with her 10 or more times. Do not colour any circles if you do not have a female sexual partner.*
18.	The last time you had sexual intercourse with her was a condom used? → *Colour the SQUARE if YES or the CIRCLE if NO. Do not colour any circles if you do not have a female sexual partner.*
19.	How many times do you have anal sex with your main female sexual partner in a 'normal' month? → *Colour as many circles as the number of times you had anal sexual intercourse with her in the past one month. Colour all the circles if you had sex with her 10 or more times. Do not colour any circles if you do not have a female sexual partner.*
20.	In the past one year were you ever beaten or otherwise physically forced to have sexual intercourse with someone even though you did not want to? → *Colour the SQUARE if YES or the CIRCLE if NO*

APPENDIX B: Ethnographic mapping data of MSM cruising sites in Bangalore city

Public Places

Zone	Adress or lacation details	Estimated # Hijras	Estimated # Other SMs
1	Near Cubbon Park	0	49
1	Old Madras Road	12	208
1	HAL Road	0	47
1	Near Adarsh Theatre	0	60
1	Benzon Town	0	29
1	Near Banasavadi Tank	0	44
1	Near Lingaraj Puram fly over	0	64
1	HAL Road	0	76
1	Shivaji Nagar	0	11
1	MG Road	0	18
1	Bangalore Kolar Highway	0	5
1	Henoor Cross	0	39
1	Near Benzon Town	0	16
1	Near Fire engine office	0	38
1	Near Gurudwara	0	73
1	Ring Road	0	43
1	Cubbon Park	0	514
1	Ramamurthynagara	0	168
1	Shivaji Nagar	0	100
1	Outer ring road	0	82
1	Henoor Main Road	0	18
1	Near HAL	0	35
3	TV Station back side	0	81
3	Near Navaranga Park	0	46
3	Kempegowda Road	0	51
3	Near Alad Mara	0	18
3	Majestic	96	150
3	Rajaji Nagar	0	29
3	BMTC, Majestic	0	770
3	KSRTC, Majestic	0	549
3	Malleswaram	0	116
3	Near KSTDC, Corporation	0	123
4	Militry ground road, near bus stand	0	61
4	Whitefield	0	39
4	Near leela palace	0	44
4	Near ring road	0	93
4	Near factories	0	46
4	Domlur	0	132
6	Anekad Bar	128	709
6	Near Hosur Road	0	22
6	Koramangala	0	139
6	BTM Layout	0	63

6	Opp Banashankari Petrol Bunk	0	12
6	Near Lal Bagh	0	19
6	Nearby Wipro Bus Stand	0	58
6	Near Madiwala	0	61
6	Near KR Market	0	22
6	Near Basavana Guddi	0	14
6	Jayanagar 4th block	0	167

Hammams

Zone	Name of cruising site	Type of site	Estimated # Hijras
1	Ulsoor	Hamam	25
1	Tin Factory	Hamam	20
1	Hennor cross	Hamam	20
3	Magadi road 1	Hamam	25
3	Magadi road 2	Hamam	25
6	Banashankari hamam 1	Hamam	7
6	Banashankari hamam 2	Hamam	8
6	Sarakhi	Hamam	5
6	Bommanahalli	Hamam	10
6	Kudlu gate	Hamam	4
4	Kudndalahalli	Hamam	15
4	Gardacharpalya	Hamam	5

APPENDIX C

INFORMAL CONFIDENTIAL VOTING INTERVIEW (ICVI) GUIDE

Introduction: Informal Confidential Voting Interviews (ICVI):

ICVI is a new technique of data gathering. It allows for greater confidentiality and thus works to reduce social desirability bias. It is an anonymous survey where the interviewer is blinded to the responses of the participants. In the present study the objective SBS is to validate the IBBA findings selecting 20 questions from IBBA questionnaire to know whether the ICVI is a better technique to collect the behavioral data which is sensitive in nature.

Challenges in using ICVI techniques:

- ICVI may fail completely if the respondent did not comprehend the instruction correctly.
- The interviewers have no control over the mistakes or errors that the respondent might make.
- During the course of interview the interviewer may end up giving the clues while clarifying the doubts, which might be leading.
- Sometimes respondent may reply loudly after you reading the question.

How to overcome the above challenges?

- The interviewer has to spend enough time to ensure that the respondent understands the method of filling ICVI questionnaire and also it is important to build the confidence of the respondent in this process to participate and give correct information and not to bother about the confidentiality of the information.
- The interviewer should be very clear and confident about the instruction for each and very question and he/she should encourage the respondent to ask the interviewer to repeat the instruction s if they did not understand.
- The interviewer has to be thorough with the instruction and should be able to tell them clearly and should audible to the respondent. Always give simple examples, which are not relevant to the present context but help, the respondent to overcome the doubt.
- In this situation politely tell him/her to code the respective answer and before proceeding further tell him/her that he/she need not have to reply as you are not interested to know the answer. But they can always ask you to read the question and instructs if they have not understood them and they should code their response only after they understand the questions and instructions.

The materials required to conduct ICVI are:

Safe and comfortable place to conduct the interview
ICVI consent forms
ICVI cards
ICVI questionnaire
ICVI instruction guide
Pen to fill the questionnaire

Instructions to the interviewer:

- Do not read the question but ask it in a conversational language.
- Ask the question clearly.
- While asking the question emphasize on the words which are bold.
- Then give the instruction to fill in the questions.
- Hand over the card and let the respondent know that they should let you know once they have answered the question.
- Ask the respondent to put the card in the sealed ballot box placed in front of them.

Instructions to be given to each question in ICVI:

1. Have you ever used a condom for anal intercourse?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

2. The last time you had anal sex did you use a condom?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

3. In the past 6 months was there a time where you wanted to use a condom but did not?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

4. In the past 6 months have you had the experience of a condom breaking while it was being used?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

5. Have you ever used a lubricant?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

6. Have you ever injected drugs for non-medical purposes?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

7. Do you have a main (regular) male partner?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

8. Was a condom used the last time you had anal sex with this partner?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

If you do not have a regular male partner please do not mark and drop the card in the ballot box

9. Have you ever received cash or gifts in return for anal sex?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

10. In the last week how many different men did you have sex with?

- There are 10 circles on the card with numbers. Please recollect approximately how many different men you had sex with and then fill the appropriate circle.
- If none do not code or fill the card and then put it in the ballot box.

11. The last time you had sex with one of these partners was a condom used?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

12. The last time you had sex with a known (regular) male partner was a condom used?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

If you do not have sex with regular men do not mark and drop the card in the ballot box

13. Was a condom used the last time you had sex with a man that you didn't recognise or was unknown to you?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

If you do not have sex with unknown men do not mark and drop the card in the ballot box

14. Have you ever had sex with a Hijra?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

15. Have you paid to have sex with a female in the last year?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

16. Do you have a main (regular) female partner?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

17. How many times do you have vaginal sex with this female in a normal month?

- There are 10 circles on the card with numbers. Please recollect approximately how many different men you had sex with and then fill the appropriate circle.
- If none do not code or fill the card and then put it in the ballot box.

If you do not have a main female partner do not mark and drop the card in the ballot box

18. The last time you had sex with this partner was a condom used?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

If you do not have a main female partner do not mark and drop the card in the ballot box

19. How many times do you have anal sex with this female in a normal month?

- There are 10 circles on the card with numbers. Please recollect approximately how many different men you had sex with and then fill the appropriate circle.
- If none do not code or fill the card and then put it in the ballot box.

If you do not have a main female partner do not mark and drop the card in the ballot box

20. In the past one year, were you ever beaten or otherwise physically forced to have sexual intercourse with someone even though you didn't want to?

- If your answer is "yes" please fill in the **square** with the pen provided to you.
- If your answer is "no", please fill in the **circle** with the pen provided to you.
- After you are done please put the card in the ballot box in front of you.

APPENDIX D: CONSENT FORM

Once you confirmed that the respondent was not interviewed before for SBS:

- Explain, in detail, the content of the Consent Form (see Appendix B). Do not simply read the Consent Form. The Consent Form explains the purpose of the study, study procedures, risks and benefits, costs, payment for participation, confidentiality, voluntary participation/withdrawal from the study, medical care for injury related to the study etc. Do not leave out any section of the Consent Form. If the respondent is literate, you can give them the consent form to study. Otherwise, you will have to explain the content of the consent form.
- Answer all the questions of the respondent.
- For ethical reasons, it is required to obtain signed consent for the SBS from the respondent. However, in the Indian setting, many respondents may not prefer or be able to sign or put their name on the consent form even if they wish to participate in the study. Hence two options are given for completing the Consent Form: one for those who are willing to sign or put their name/ alias on the Consent Form and the other for those who do not want to or who cannot sign or put their name/alias on the Consent Form.
- If the respondent is willing to sign or enter a name or alias on the Consent Form, request them to mark √ in any of the two boxes provided for each of the following items and record the name/alias in the space provided.

I agree to participate in this research study and to answer the questions asked. Yes ☐ No ☐ Participant printed name or alias: _____

- If the respondent does not want to or cannot sign or enter a name or alias on the consent form, have a community member present during the consent process and let the witness certify the process:

I, the undersigned, have witnessed the consent process for the participant named above and believe that the participant has understood and has knowingly given their consent. To answer the questions asked: Yes ☐ No ☐ Signature of the witness: _____

- In both the cases, however, you have to further certify that you have explained to the respondent all the study procedures and you have obtained their informed consent.

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has knowingly given their consent. Printed Name: _____ Date _____ Signature: _____

APPENDIX E: List of internal consistency checks performed on FTFI

Section	Consistency check	Number of inconsistencies
3	Age (S3Q1) ≤ Age at marriage (S3Q9)	0
	Age (S3Q1) ≤ Age at first sex with a male (S4Q1)	0
	Age (S3Q1) ≤ Age at first sex with a female (S4Q3)	0
	Age (S3Q1) ≤ Age at circumcision (S4Q9)	0
	Age (S3Q1) ≤ Age at castration (S4Q10)	0
	Age (S3Q1) ≤ Age first started selling sex (S7Q3)	0
	Age (S3Q1) ≤ Age first started buying sex (S9Q4)	0
	S3Q6==10 should not answer S7Q1==0	6
4	Age first sex with a man (S4Q1) ≤ Age first started selling sex (S7Q3)	1
	Age first sex with a man (S4Q1) ≤ Age first started buying sex (S9Q4)	3
	Duration first used a condom (S4Q6) ≤ duration using condoms with male cohab. partner (s5Q14)	1
	Duration first used a condom (S4Q6) ≤ duration using condoms with *Hijra* cohab. partner (s6Q12)	0
	Duration first used a condom (S4Q6) ≤ duration using condoms with new clients (s7Q18)	1
	Duration first used a condom (S4Q6) ≤ duration using condoms with repeat clients (s7Q36)	7
	Duration first used a condom (S4Q6) ≤ duration using condoms with known NC men (s8Q18)	3
	Duration first used a condom (S4Q6) ≤ duration using condoms with unknown NC men (s8Q25)	5
	Duration first used a condom (S4Q6) ≤ duration using condoms with male sex workers (s9Q11)	3
	Duration first used a condom (S4Q6) ≤ duration using condoms with Hijra sex workers (s9Q19)	5
	Duration first used a condom (S4Q6) ≤ duration using condoms with wives (s10Q12)	1
	Duration first used a condom (S4Q6) ≤ duration using condoms with female sex workers (s11Q8)	3
	Duration first used a condom (S4Q6) ≤ duration using condoms in this location (s13Q19 i/ii/iii)	3/3/2
5	First time sex with male cohab. partner (S5Q11) ≤ lifetime duration been having sex (s3q1-s4q1)	0
	Last time sex (S5Q12) ≥ first time sex with male cohab partner (S5Q11)	
	Frequency of condom use (S5Q13) should correspond with out of last 10 times condom (S5Q15)	1
6	First time sex with *Hijra* cohab. partner (S6Q9) ≤ lifetime duration been having sex (s3q1-s4q1)	0
	Last time sex (S6Q10) ≥ first time sex with Hijra cohab partner (S6Q10)	0
7	Number of times (out of 10) had insertive sex with new clients (S7Q11) ≤ Number times used condoms (out of 10) for insertive sex with new clients (S7Q12)	0
	Number of times (out of 10) had receptive sex with new clients (S7Q13) ≤ Number times used condoms (out of 10) for receptive sex with new clients (S7Q14)	0
	Number of times (out of 10) had oral sex with new clients (S7Q15) ≤ Number times used condoms (out of 10) for oral sex with new clients	0

	(S7Q16) Number of times (out of 10) had insertive sex with repeat clients (S7Q29) ≤ Number times used condoms (out of 10) for insertive sex with repeat clients (S7Q30) Number of times (out of 10) had receptive sex with repeat clients (S7Q31) ≤ Number times used condoms (out of 10) for receptive sex with repeat clients (S7Q32) Number of times (out of 10) had oral sex with repeat clients (S7Q33) ≤ Number times used condoms (out of 10) for oral sex with repeat clients (S7Q34)	0 0 1
8	Number of lifetime NC partners (S8Q2) ≤ NC partners in the last month (S8Q3) Number of NC partners in the last month (S8Q3) ≤ known NC partners in last month (S8Q4) First time had anal sex with known NC (dursS8q13) ≥ duration having sex (S3q1-S4Q1) First time had anal sex with known NC (durs S8Q13) ≤ duration using condoms with this partner (durs S8Q18) Frequency of condom use (S8Q17) should correspond with out of last 10 times condom (S8Q19) Frequency of condom use (S8Q24) should correspond with out of last 10 times condom (S8Q26)	0 1 5 8 5 5
9	Frequency of condom use (S9Q10) should correspond with out of last 10 times condom (S9Q12)	8
10	Using condom family planning (S10Q5c = 1) should not condoms with wife (S10Q11=1) First time had sex with wife (durs S10Q9) ≥ duration having sex with women (S3q1-S4Q3) First time had sex with wife (durs S10Q9) ≥ duration using condoms with this partner (durs S10Q12) Frequency of condom use (S10Q11) should correspond with out of last 10 times condom (S10Q13)	1 3
11	Last time had sex with FSW (dursS11Q2) ≥ duration having sex with women (S3Q1-S4Q3) Number of times paid for sex in last year (S11Q3) ≤ Number of different FSW had sex with in last year Number of lifetime NC women had sex with (S11Q10) ≤ number currently having sex with (S11Q11)	1 0 1
12	Number condom breakages (s12q1) + number of condom slim off in last 10 sex acts (s12q2) > 10	4
13	Duration been having sex with men in Bangalore (durs S13Q8) < duration been having sex (S3Q1-S4Q1) Duration first has sex with men in this place (durs S13Q14 i/ii/iii) < duration been having sex (S3Q1-S4Q1) Duration last had sex with men in this place (durs S13Q15 i/ii/iii) < duration been having sex (S3Q1-S4Q1)	22 6 0
14	Duration injecting drugs (durs14Q6) < duration last time injected drugs (durs14Q7)	0