How you ask the question really matters: A randomized comparison of four questionnaire delivery modes to assess validity and reliability of self-reported socially censured data in rural Zimbabwean youth

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Lisa Fox Langhaug

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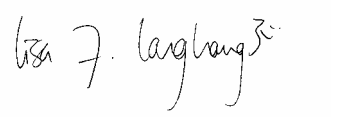
I, Lisa Fox Langhaug, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.



Abstract

Validity and reliability of self-reported sexual behaviour in epidemiological surveys are sub-optimal, particularly among young people. 1495 rural Zimbabwean youth were randomly allocated to one of the following: self-administered questionnaire (SAQ=373), SAQ accompanied by an audio soundtrack (Audio-SAQ=376); face-to-face interview using an informal confidential voting box (ICVI=365); and audio computer-assisted survey instrument (ACASI=381). Biomarkers for sexual activity included HIV, HSV-2 and pregnancy test in females. Key questions were selected *a priori* to compare item non-response and rates of reporting sensitive behaviours between questionnaire delivery modes. Additional qualitative and quantitative data were collected on method acceptability. Item non-response was significantly higher with SAQ and Audio-SAQ than with ICVI and ACASI ($p<0.001$). After adjusting for covariates, Audio-SAQ and ACASI users were twice as likely to report sexual activity when compared to SAQ users, with no reporting difference between ICVI and SAQ users. ACASI users reported a lower age at first sex ($p<0.045$). ACASI users reported increased ability to answer questions honestly ($p=0.004$) and believed their answers would be kept confidential. Participants claimed increased comprehension when hearing questions while reading them. ICVI users expressed difficulty answering sensitive questions, despite understanding that their answers would not be known by the interviewer. As a result, two methods, Audio-SAQ and ACASI were chosen to complete the final survey. In this larger sample we found evidence that the effect of mode differed by gender. There were fewer ACASI users with a positive biomarker for sexual activity that did not report sex ($p<0.001$). These results coupled with a systematic review of effect of questionnaire delivery mode on sexual behaviour reporting from developing countries provide strong evidence that ACASI significantly reduces bias, is feasible and acceptable in resource-poor settings with low computer literacy. Its increased use could improve sexual behaviour data quality.

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Acknowledgements

For my mother, who would have agreed with Martha Grimes when she wrote "We don't know who we are until we see what we can do."

There is a Shona proverb which claims that:

If you can walk,
you can dance.
If you can talk,
you can sing!

… and I would add that if you can write, someone might suggest you pursue a PhD!

They say that part of the process of writing a thesis is that upon its completion, the author should feel that the product belongs to them, that they 'own it'. I couldn't disagree more. At no point during this process did I ever think that I could have achieved this on my own. While I take full responsibility for the work presented here, I could not begin to feel that the effort was solely mine. Academic, moral, and financial support were ever-present in a number of individuals.

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Abbreviations and Definitions

ACASI	Audio computer-assisted survey instrument where questions and responses are heard through headphones and a respondent enters their response through the computer (desktop or laptop);
AIDS	Acquired immune deficiency syndrome or acquired immunodeficiency syndrome (AIDS) is a disease of the human immune system caused by the human immunodeficiency virus (HIV).
ARV	Antiretroviral drugs are medications used to control HIV disease within an individual.
ASCQ	Assisted self completed questionnaire, where questions are read out loud by a trained interviewer in a group setting (respondents spaced far apart);
Audio-SAQ	SAQ accompanied by an audio soundtrack
CAB	Community Advisory Board Member, community member who assisted with keeping his or her community in touch with the research. They provided advice on how to best involve communities within the study and to minimize concerns about the RDS project.
CAPI	Computer-assisted personal interview, interviewer administered & responses entered by interviewer into computer
CD	Coital Diary where respondents self-complete a record of their sexual activity over time;
CLC	Community Lay Counselors, community members trained by the RDS project to offer community based support for VCT. They were asked to promote VCT, encourage testing, and refer VCT attendees to support, treatment and care services at local and district level
FGD	Focus Group Discussion
FSW	Female Sex Worker
FTFI	Face-to-face interviewer administered questionnaire where trained interviewer asks questions and records respondent's answers;
FTFI/ACASI	Face to face interview for non-sensitive questions, followed by ACASI for sensitive questions; =trained interviewer spends considerable time (1 day to a few weeks) with respondent collecting data, questions are usually open-ended.
In-depth interview	A trained interviewer spends considerable time (1 day to a few weeks) with respondent collecting data, questions are usually open-ended.
HIV	Human Immunodeficiency Virus. There is currently no vaccine or cure for HIV. Eventually most HIV-infected individuals develop AIDS. These individuals mostly die from opportunistic infections or malignancies associated with the progressive failure of the immune system.
HSV-2	Herpes simplex virus type 2, one of two species of the herpes virus family, *Herpesviridae*. All viruses in the herpes family produce life-long infections.
IAQ	Interviewer administered questionnaire

ICVI	Iinterviewer controlled voting instrument where sensitive questions are recorded by respondent onto a sheet and placed in locked ballot box.
Interactive interview	FTFI with several audio-visual aids (5 segment audio drama; male and female dolls, confidential response sheet);
MOHCW	Ministry of Health and Child Welfare, Zimbabwe
MSM	Men having sex with men
PASI/Audio-PASI	Palm-assisted self interviewing which is a derivative of ACASI using a hand-held minicomputer or palmtop;
PDA/Audio-PDA	Personal digital assistant is a hand-held computer where questions and responses are read (and/or heard) and respondents enter responses directly into computer
Phone interview	Trained interviewers asks questions over a telephone
Phone-ACASI	Survey conducted over the phone using computerized data entry system (phone keypad used to enter responses
QDM trial	Questionnaire delivery mode trial ; the experimental evaluation presented within this thesis.
RDS	The Regai Dzive Shiri Project.
RRT	Random response technique: interviewer administered where respondent is randomly asked either a sensitive question or a non-sensitive question and the interviewer records the response but does not know which question is being answered
SAQ	Self-Completed Questionnaire using paper and pen
UK	United Kingdom
UNAIDS	The Joint United Nations Programme on HIV and AIDS, or UNAIDS, is the main advocate for accelerated, comprehensive and coordinated global action on the HIV epidemic.
US	United States of America
VCT	Voluntary Counseling and Testing for HIV.

Executive Summary

This thesis reports on the results of a randomised trial which compared the reliability and validity of sexual behaviour data collected from young Zimbabweans using four questionnaire delivery methods. This trial was nested within a larger cluster randomised trial designed to test the effectiveness of an adolescent HIV and reproductive health intervention to prevent HIV, HSV2, pregnancy and unsafe sexual behaviour that was conducted in rural Zimbabwe between 2003-2007.

In the first chapter, I describe the extent and correlates of the HIV epidemic, particularly as it relates to young people in Southern Africa, the region most severely affected by the global pandemic. Within this region, the majority of HIV is transmitted sexually, which puts young people, who often become sexually active during their adolescent years (either willingly or unwillingly), at the forefront of the epidemic. Sexual behaviours are heavily influenced by cultural norms, deviance from which can be heavily penalised.

With the onset of the HIV epidemic, the need to maximise the validity of sexual behaviour data has become increasingly recognised. Measuring sexual behaviours becomes problematic because strong pressure to conform to these societal norms results in self-reports being biased specifically in relation to social desirability bias. This is particularly problematic in young people, in part because society holds 'even stronger' views about what sexual behaviours (if any) are acceptable and unacceptable for young people than it does for adults.

The ensuing under-reporting of sexual behaviours renders it difficult to interpret trends in HIV prevalence/incidence in this age group, to design appropriate behavioural interventions and to interpret their effects. This requires greater attention be given to improving measurement techniques. The scope for change is vast and ranges from questionnaire wording, ensuring privacy and confidentiality, to improving questionnaire delivery modes. Traditionally, the field has relied on interviewer-administered questionnaires to collect self-reported sexual behaviour information. Increased concern for improved validity prompted researchers to begin improving and exploring alternative questionnaire delivery modes. This picture has been most radically transformed with the recent advent of computer programming in questionnaire design.

Unfortunately, while considerable research has occurred in industrialised countries much less comparative work has occurred in developing countries and in particular, among young people where the disease burden is greatest. At the time this experimental evaluation was designed,

published research in this area was relatively sparse. In the second chapter, I report on the results of a systematic review which I conducted to explore the relative advantages and disadvantages of different questionnaire delivery modes on reporting of sexual behaviour in developing country settings. While this review was initiated during this thesis' formative work, much of this data was not available at the time this thesis was initiated in 2004. Of the 28 publications reviewed, seven were published before 2004 and five in 2004. All 12 of these early studies focussed on improvements to interviewer-administered questionnaires or coital diaries; at the time the research for this thesis was begun, there were no published comparative studies on computer self-administered questionnaires outside North America and Western Europe. However, during the course of this research, conducted between 2005 and 2008, 16 studies were published, only three of which did *not* compare a computer-administered mode. This suggests the timely nature of this work.

In the third chapter, I provide an overview of the Regai Dzive Trial within which the work for this thesis, a randomized comparison of questionnaire delivery modes, was nested. In the formative work for this trial, I explored the nature of sexual behaviour reporting, quantifying its inconsistencies in two surveys (the feasibility study and the baseline survey). One important conclusion from the preparatory work for this trial was the considerable underreporting of sexual behaviour, particularly by young girls. Given the dearth of information on questionnaire delivery modes amongst youth outside North America and Western Europe available at the time, direct involvement in this initial research was instrumental in the development (including the choice of modes) of the random comparison.

The subsequent three chapters (chapters 4, 5, and 6) outline the methodology and quantitative and qualitative results of this experimental evaluation. Comparison of item response rates and rates of reporting risky sexual behaviours amongst the four questionnaire delivery modes was supplemented by biomarker evidence of sexual activity used to examine the validity of these self-reports. Internal comparison within the questionnaires and between two rounds of the same questionnaire strengthened mode assessment. Finally post-survey questionnaires and qualitative interviews provided additional information on each mode's acceptability and feasibility.

Taken in its entirety, all of this information, including the quantitative assessments between the four modes, coupled with the rates of responses between the two questionnaire rounds and against biomarkers, all supplemented by the analysis on mode acceptability, was applied holistically to determine the questionnaire delivery modes employed in the final evaluation survey of the parent trial. In chapter 7 I took advantage of the decision to use two modes to

conduct some additional comparative analysis on sexual behaviours. I used the opportunity to further explore issues of self-reported reliability; given a large sample size and a higher prevalence of biomarkers, I was able to report on differences by gender and compare self-reported response rates against biomarkers.

I conclude in chapter 8 with an analysis of these findings and how they relate to the broader context of sexual behavioural research in developing countries. This research strongly supports evidence that misreporting of sensitive questions in young people *is* situational and, as such, affected by questionnaire delivery mode. In particular I emphasize a need for a paradigm shift away from our traditional reliance on interview-administered questionnaires to self-administered ones, while retaining an oral component which remains essential to this setting where the terms for sexual behaviours are not well recognized and literacy can be less than optimal. I also encourage researchers to re-examine their reluctance to conduct comparative research within a trial setting. This shift is supported by the recent expansion in comparative research in resource poor settings where increased reporting of sexual behaviours repeatedly occurs in self-administered questionnaires, most often in computer-administered ones. Coupled with the evidence collected within this experimental evaluation, which supports the data from the review, and given the continued urgency for improved understanding of the behaviours driving the epidemic, this new information should goad us into reconsidering our old habits.

1 AN OVERVIEW OF THE HIV EPIDEMIC AND ITS CALL FOR IMPROVED OUTCOME MEASURES.

1.1 The Global HIV Pandemic

Almost 30 years after its discovery, the HIV pandemic remains the most serious of infectious disease challenges for public health. As of December 2007, there were 33.2 million people globally living with HIV, an estimated 2.5 million of which were new infections in that year (UNAIDS, 2008). This translates to 6800 people becoming newly infected every day across the globe (UNAIDS, 2008). Young people remain disproportionately affected with around 45% of new infections occurring among 15-24 year olds (UNAIDS, 2006). However youth hold tremendous potential for change. As sexual behaviours begin in adolescence, there are enormous possibilities to instil new healthier sexual lifestyles in future generations of adolescents (Harrison, 2005; Fortenberry, 2009; UNAIDS Interagency Task Team on Young People, 2006)

1.1.1 The HIV/AIDS epidemic in Sub-Saharan Africa

Sub-Saharan Africa is the worst affected region, with more than two-thirds (68%) of all HIV positive people living there. This includes over six million HIV positive young people, 76% of whom are female. In 2007, more than three-quarters (76%) of all the AIDS deaths globally occurred in sub-Saharan Africa, making AIDS the leading cause of death in this region (UNAIDS, 2008). Moreover, within sub-Saharan Africa, it is the 12 countries in southern Africa which continue to bear the brunt of the disease and are the epicentre of the epidemic (Stirling, Rees, Kasedde, & Hankins, 2008). Southern Africa accounted for 35% of all people living with HIV and more than one-third (35%) of all new infections in 2007. Nine of the twelve countries have the highest HIV prevalence rates in the world with HIV prevalence rates of over 12% among individuals aged 15-49 years (Stirling et al., 2008; UNAIDS, 2008). These countries are all experiencing generalized epidemics sustained within the general population (UNAIDS, 2008).

1.1.2 The HIV Epidemic in Zimbabwe

Zimbabwe, one of the countries in southern Africa, has one of the largest and most sustained HIV epidemics in the world, with the first case of infection diagnosed in 1985. Within five years, antenatal surveillance demonstrated that 10% of clinic attendees were infected. By 1998, prevalence rates in this population had reached 35% (Zimbabwe Ministry of Health, 2007). The first national estimate, produced in 2003, found 24.6% (95% CI 20-28%) of all

adults 15-49 years were HIV positive (Mahomva et al., 2006). While this peaked in 2001 at 33.7%, the most recent surveillance data indicate that 15.6% (95% CI 14.0-16.3) of Zimbabweans aged 15-49 are infected nationally (Zimbabwe Ministry of Health, 2007). This translates to more than one in seven Zimbabweans living with the disease. These very high HIV prevalence rates have been accompanied by severe impacts on morbidity and mortality, which strain the social fabric of the country (Foster, 2006; Foster, 2002). Over 2200 adults and 240 children (aged 0-14 years) die each week (Zimbabwe Ministry of Health, 2007). As a result of the epidemic, life expectancy has dropped from 62 years in 1990 to 33 years in 2006 (Makwiza et al., 2006). Data from the most recent Zimbabwe DHS conducted in 2005-2006 calculates that one quarter of children under the age of 18 are orphans, 77% of whom are orphaned as a result of one or both parents having died of AIDS (Central Statistical Office & Macro International Inc., 2007). Rates of orphaning have more than doubled in the past ten years; in 1994, 9% of children were orphaned (Central Statistical Office et al., 2007). In 2003, baseline survey data from a community randomized trial in rural Zimbabwean youth found that 35% of a school-going cohort were orphans who were at an increased risk for HIV (AOR=3.4; 95% CI 1.9-6.1, p<0.001) (Cowan et al., 2008).

1.1.2.1 Rates of HIV infection starting to fall in Zimbabwe

Despite the severity of the HIV epidemic in Zimbabwe, there is encouraging evidence that the prevalence of infection is starting to fall. Data collected through the national antenatal surveillance program found 32.1% of women aged 15-44 were infected in 2000 declining to 23.9% in 2004 (p<0.001) (Mahomva et al., 2006). Among 15-19 year olds, prevalence fell from 24.9% to 13.7% over that same period (Mahomva et al., 2006).

There is some evidence to suggest that the decline in HIV prevalence reported in Zimbabwe and elsewhere is in part due to behaviour change in young people (Mahomva et al., 2006) (Gregson et al., 2006). Earlier reports of declines from Uganda were treated with caution when two studies reported declines in HIV prevalence without attendant declines in HIV incidence (Wawer et al., 1997; Kamali et al., 2000). However, a large community-based study (the Manicaland study) which has followed a cohort of rural Zimbabweans since 1998 has demonstrated declining HIV prevalence and incidence coupled with evidence of recent behaviour change, notably delay in sexual debut and reduction in number of non-regular partnerships (Gregson et al., 2006). Prevalence of HIV in 17-24 year old men fell from 4.9% to 2.7% (age adjusted OR 0.55 p=0.002) and from 15.9% to 7.9% in 15-24 year old women (age adjusted OR 0.51 p<0.001) between 1998-2000 and 2001-2003 (Gregson et al., 2006).

This evidence was strengthened in a review from Mahomva *et al*. which compiled data from Zimbabwe antenatal clinic surveillance as well as several general population and smaller studies which confirmed a decline in HIV prevalence and reported sexual behaviours among young people (Mahomva et al., 2006). In particular there was a reduction in reported onset of sexual experience before age 15 in youth aged 15-19 years. As in Gregson's data there was also a reduction in the reporting of non-regular sexual partners in youth aged 15-29 years (Mahomva et al., 2006). The strength of these combined data provides increased confidence that behaviour change has occurred. Other evidence from the region supports youth as being most likely to be amenable to change (Pettifor et al., 2005a; Jackson et al., 1999; Whitworth et al., 2002; Fylkesnes et al., 2001). In addition, mathematical modelling also suggests that the observed decline in HIV prevalence cannot be solely attributed to natural disease progression (Hallett et al., 2006).

1.1.3 Reproductive health of adolescents in Africa

Within the life cycle, adolescence is a powerfully transformative stage characterised by physical and emotional changes (Hazen, Schlozman, & Beresin, 2008; Harrison, 2005; Mshana et al., 2006). As young people move through this time becoming more independent, experimentation, including sexual experimentation, plays a central role. Moreover, as the period between puberty and marriage lengthens this has also lead to more opportunities for multiple sexual partnerships. (Harrison, 2005; Haram, 2005; Blanc & Way, 1998)

1.1.4 Increased HIV risk for youth and young women in particular

While this recent decline in Zimbabwe is encouraging, rates of infection remain unacceptably high. In particular, young women remain at greatly increased risk of infection when compared to young men. Studies across southern Africa indicate that HIV prevalence peaks in young women at a lower age and at a higher level than in their male peers (Gregson & Garnett, 2000; Glynn et al., 2001; Laga, Schwartlander, Pisani, Salif Sow, & Carael, 2001; Gregson et al., 2002a; MacPhail, Williams, & Campbell, 2002;Gouws, Stanecki, Lyerla, & Ghys, 2008). Young women aged 15-24 are three to six times more likely to be at risk of HIV infection than their male counterparts (Pettifor et al., 2005b; Leclerc-Madlala, 2008; Auvert et al., 2001; Jewkes et al., 2008; Pascoe et al., 2007). Data from a nationally representative sample of youth conducted in Zimbabwe in 2001 found sexually experienced females and males aged 15-19 had HIV prevalence rates of 11.0% and 2.0% respectively (Ministry of Health & Child Welfare (Zimbabwe), Zimbabwe National Family Planning Council, National AIDS Council (Zimbabwe), & U.S.Centers for Disease Control and Prevention, 2004). HIV prevalence in females aged 20-24 rose to 26% peaking in females aged 25-29 at 35%; males had prevalence of 9% and 24% for

these two age groups respectively; note that at 25-29 years, male prevalence was similar to prevalence rates of females five years their junior (Ministry of Health & Child Welfare (Zimbabwe) et al., 2004). In a representative population-based survey carried out in 2006 among youth aged 18-21 years in three provinces in south-eastern Zimbabwe, risk of HIV was five times higher in 21 year old females than it was in 18 year olds (17% c.v. 3%) (Pascoe et al., 2007). While 18 year old males had a similar prevalence to females, the absolute increase over the subsequent 4 years was much smaller at 4.2%. (Pascoe et al., 2007).

These data from Zimbabwe corroborate other data within the region. In a study among youth aged 14-24 in a mining town (Carletonville) in South Africa in 1999, HIV prevalence was 9.4% for men and 34.4% for women (Auvert et al., 2001). Moreover, rates of infection in young women more than quadrupled between 15 and 24 years. Rates of infection were 6.1% for females aged 14-15 but reached 66.7% by the time they were 24 years of age. Similar disparities were also found by Pettifor *et al.* in a nationally representative study in South Africa in 2003 (Pettifor et al., 2005b). HIV prevalence among 15-19 year old females was 11.9% (95% CI 10.0-14.1), more than twice that of their male peers (4.6%; 95% CI 3.4-6.2). Rates among women aged 20-24 years rose to 30.7% (95% CI 27.2-34.4) (Pettifor et al., 2005a). This gender disparity in young people is reflected in other studies and countries in southern Africa (Haram, 2005; Stirling et al., 2008). Data from the Stepping Stones trial in South Africa indicated that young women had an annual HIV incidence exceeding six percent (Jewkes et al., 2008). HIV prevalence in Malawi and Swaziland among males aged 15-24 years is 2% and 4% respectively, whereas with females in the same age group their prevalence is 9% and 22% respectively (Stirling et al., 2008). In Tanzania, among 15-19 year olds, 4.8% of young women versus 1.5% of young men were HIV infected (Haram, 2005). This pattern is emulated in the next age group, where among 20-24 year olds, 17.9% of women versus 7.7% of men were found to be HIV positive.

1.1.5 How to account for this high rate among young women?

This gender disparity among young people has received wide attention. In 2005, the United Nation's Secretary General's Force on Women, Girls and HIV prioritized the importance of prevention among young women and girls in southern Africa (Stirling et al., 2008). Young women's increased risk was originally attributed to their earlier age of sexual debut, a greater number of partners and riskier sexual behaviours. However evidence from existing research disputes these early assumptions. Young women begin sexual activity at the same time as their male peers. Data from across the region suggest that a substantial proportion of young people aged 15-24 report being sexually active (Jewkes et al., 2008; Auvert et al., 2001;

Ministry of Health & Child Welfare (Zimbabwe) et al., 2004; Pettifor et al., 2005b). Half of the men (52.3%) and women (53.6%) aged 15-19 years reported being sexually active in a national survey in South Africa (Pettifor et al., 2005b). In another community-based sample in South Africa, over 90% of young people aged 15-23 reported having ever had sex (Jewkes et al., 2008). In Zimbabwe, just over 30% of 15-19 year old youth reported being sexual active, increasing to over 75% in youth aged 20-24 years (Ministry of Health & Child Welfare (Zimbabwe) et al., 2004). In this survey and the one in Carletonville, South Africa, the majority of youth had experienced their first sex before they were married (Auvert et al., 2001; Ministry of Health & Child Welfare (Zimbabwe) et al., 2004).

There is strong evidence that having multiple partners puts you at increased risk of HIV. Analysis by Pettifor *et al.* found that if a young person reported more than one lifetime partner they were two times more likely to be infected than those reporting one partner (AOR 1.98; 95% CI 1.55-2.53) (Pettifor et al., 2005b). For each additional partner, their risk of HIV increased by 1.04 (95% CI 1.01-1.34; p=0.003) (Pettifor et al., 2005b). In Uganda, youth aged 13-19 who reported two to four lifetime partners were three times as likely to be infected with HIV than those who reported one partner (AOR 3.0; 95% CI 1.3-6.7) (Carpenter et al., 2002).

However, despite the increased risk of HIV with greater numbers of partnerships, male youth across the region report more partnerships than their female peers but remain with lower rates of infection. In South Africa, mean lifetime partners in females aged 15-24 was 1.8 compared with males who reported a mean of four ($p<0.05$) (Pettifor et al., 2005a). In another study in South Africa, 9.4% (95% CI 7.9-11.0) of females compared with 46.4% (95% CI 43.7-49.1) of males aged 13-24 reported more than two partners in the past 12 months (Jewkes et al., 2008). In Zimbabwe, 5.0% of males compared with 1.1% of females aged 15-19 years reported four lifetime partners (Ministry of Health & Child Welfare (Zimbabwe) et al., 2004). Despite the possibility of young women underreporting their multiple partnerships, their risks of infection remain greater.

However, even with fewer reported sexual partnerships, young women remain at higher risk within those partnerships. In Carletonville youth, HIV prevalence was 56.0% among female youth who reported three or more partners, compared with 18.8% of male youth who reported 8 to 10 partners (Auvert et al., 2001). Increased research in this arena provides compelling evidence that young women's increased risk is more complex and is determined by both biological and socio-economic factors. These include biological vulnerability, STI co-infections, gender sexual violence, particularly at the onset of sexual debut, age disparity of sexual partnerships, and concurrent partnerships.

The biological immaturity of a young woman's genital tract and cervix, made more vulnerable by possible trauma during sexual activity, increases a young woman's chance of acquiring a sexually transmitted infection (Harrison, 2005; Leclerc-Madlala, 2008; Kristensen, Sinkala, & Vermund, 2002; Andersson, Cockcroft, & Shea, 2008). There is substantial evidence from incidence studies to support the findings that STIs, particularly Herpes Simplex Virus type 2 (HSV-2) make an individual more susceptible to HIV. In a recent meta-analysis of HSV-2 and HIV risk, HSV-2 was found to be a significant risk factor for HIV acquisition in generalized populations, providing a three-fold increased risk of infection (Freeman et al., 2006). In the Carletonville survey, 17.0% of males aged 14-24 were HSV-2 infected compared with 53.3% of females (Auvert et al., 2001). HSV-2 prevalence among females also increased steeply with age; from 18.6% (95% CI 11.4-25.8) in females aged 14-15 rising to 94% (95% CI 87.6-100) by aged 24 years (Auvert et al., 2001). In this survey, having HSV-2 was an independent risk factor for HIV (OR_{males}=5.3 (95% CI 2.7-10.3; $OR_{females}$=8.4; 95% CI 4.9 – 14.2) (Auvert et al., 2001). Pettifor *et al.* also found a similarly strong association among youth aged 15-24 (female youth who reported an unusual discharge AOR=1.75; 95% CI 1.26-2.44 and males who reported a genital ulcer in the past 12 months AOR=1.91; 95% CI 1.04-3.49) (Pettifor et al., 2005b). This association was also true for *N gonorrhoeae* (OR 1.96; 95% CI 2.51-6.15%).

Defined broadly to include sexual and non-sexual violence, emotional abuse, and child sexual abuse, Andersson and colleagues reviewed the sizable literature published in peer reviewed journals and found gender-based violence is widespread in southern Africa and linked to HIV infection (Andersson et al., 2008). Moreover, HIV-positive women report more interpersonal violence than their non-infected peers (Haram, 2005). Across eight countries in southern Africa, they found 18% of women reported intimate partner violence in the past year (Andersson et al., 2008). Sexual violence often occurs at the time of sexual debut which for many occurs during adolescence. In the Zimbabwe DHS in 2005-2006, more than one in five women reported that their first sexual experience had been forced (Central Statistical Office et al., 2007). In another survey in Zimbabwe, 23.8% of sexually active women aged 15-29 reported having been forced to have sex, 19.7% of whom were younger than 16 when it occurred (Ministry of Health & Child Welfare (Zimbabwe) et al., 2004). In Lesotho 25% of women aged 18-35 reported experiencing forced sex (Brown, Thurman, Bloem, & Kendall, 2006). Forty-four percent described their first sexual experience a result of being tricked (32.7%), forced (9.7%), or raped (1.4%). In the Carletonville study in South Africa, almost half of the females (48%) aged 14-24 reported forced sex (Auvert et al., 2001). In their review, Andersson *et al.* found that gender based violence both directly and indirectly contributed to HIV infection (Andersson et al., 2008). While the trauma of the sexual violence directly

impacts on the biological ability of the virus to penetrate the body, more sobering is the reality that for many survivors the increased feelings of low self-worth remain with them for a long time, decreasing their ability to negotiate safer sex and increasing their exposure to sexual risk behaviours (Andersson et al., 2008). In Kenya, a population-based survey of young people aged 10-24 reported that 21% of females and 11% of males had experienced sexual coercion where the majority of perpetrators had been intimate partners (Erulkar, 2004). Females who had ever been married were two times more likely (OR 2.6) to have experienced coercion, suggesting a high prevalence of coercion within marriage. Males who had been coerced into sex were significantly more likely (82.9%) to have had a first partner who was older by at least five years than those who had not (Erulkar, 2004).

Increased quantitative and qualitative research conducted more recently have identified age-mixing as another important source of increased HIV prevalence among young women (Leclerc-Madlala, 2008; Hallett et al., 2006; Luke, 2003; Luke, 2005; MacPhail et al., 2002). While young women have limited numbers of partnerships, they are more likely to have partners who are older than them. Age-disparity (where a partner is five or more years older) and intergenerational relationships (when a partner is 10 or more years) are more common among younger women than men. A review by Luke of more than 45 qualitative and quantitative studies throughout sub-Saharan Africa indicated that sexual partnerships between older men and younger women were common and were associated with unsafe sexual behaviours and an increased risk of HIV infection (Luke, 2003). Data collected from a nationally representative sample of 15-29 year old young people in Zimbabwe indicate that 32.9% of women reported their first partner was 5-9 years older than them and 11.8% reported a first partner who was ten or more years older (Ministry of Health & Child Welfare (Zimbabwe) et al., 2004). The majority of young men (73%) reported partners who were younger than themselves. Recent work continues to highlight the strength of association between age-mixing and HIV prevalence in young women. In South Africa 15-24 year old females were more than one and half times more likely to be HIV infected if they reported their partner was five or more years older when compared against those whose partners were the same age or younger (Pettifor et al., 2005b) In Zimbabwe in 2005-2006, HIV infection among females 15-24 years was 23.4% for those who reported having a partner 10 or more years older than them compared to 16.0% for those whose partners were less than 10 years older (Central Statistical Office et al., 2007). (Note that there were no young men in this age group who reported their first sexual partner as being ten or more years older than themselves.) In a study in Manicaland, Zimbabwe, Gregson *et al.* report that older age of sexual partners was associated with increased risk of HIV infection (males OR 1.13; 95% CI

1.02-1.25; females OR 1.04; 95% CI 1.01-1.07) and that young women tend to form partnerships with men who are five to ten years older than themselves (Gregson et al., 2002a). In Botswana, Langeni found a 28% increase in the odds of having unprotected sex for every year of age difference between partners (Langeni, 2007).

The cultural construction and social organization of gender has disempowered women and girls in many settings, making them vulnerable to HIV. Throughout much of sub-Saharan Africa conservative social mores dominate the cultural landscape (Ansell, 2001; Haram, 2005; Maticka-Tyndale et al., 2005). Christian churches (predominantly evangelical) promote sexual abstinence before marriage, do not condone condom use, and in some cases encourage virginity testing among adolescent girls. Within Shona culture in Zimbabwe there are strong taboos against women having extra-marital relationships (Duffy, 2005; Nyanzi, Nyanzi, Wolff, & Whitworth, 2005; Haram, 2005; Ansell, 2001). Social norms for pre-marital sexual relationships are gender specific. While young men are encouraged to be sexually experienced before marriage, young women are expected to enter marriage as virgins. This gender disparity is strongly evidenced with regards to unintended pregnancy in adolescence. Schools often expel girls discovered to be pregnant but generally allow the male student responsible to continue his education.

Research in Tanzania also highlights the mixed messages given to youth around their emerging sexuality. Despite acknowledging that sexual activity is inevitable, the cultural framework does not sanction sexual relationships amongst youth rendering them invisible (Wight et al., 2006; Haram, 2005). However even within this conservative cultural milieu, normally restrictive attitudes are relaxed during festivals and village congregations (e.g. funerals) (Wight et al., 2006). This scenario mimics qualitative data collected in rural Zimbabwe where youth were found drinking openly at village gatherings which is a behaviour that is not traditionally sanctioned (unpublished data from Regai Dzive Shiri parent trial).

Mathematical models, which simulate HIV epidemics, indicate that age and sexual mixing, as well as concurrency are likely to be more important determinants of HIV spread than absolute number of partners (Hallett et al., 2006; Halperin & Epstein, 2007). Recently epidemiological evidence has brought to the fore concurrent sexual partnerships as a primary contributor that can explain the continued rapid spread of HIV infection in southern African countries compared to the rest of the globe where prevalence has stabilized (Halperin & Epstein, 2004; Potts et al., 2008). In a WHO study 53%, 18% and 22% of men from Lesotho, Tanzania, and Zambia (Lusaka) respectively, reported two or more regular ongoing partnerships (lasting over one year) in the previous 12 months (Halperin et al., 2004). However only 3% and 2% of men

in Thailand and Sri Lanka reported similar types of partnerships. This pattern is similar in women with 39%, 9% and 11% in Lesotho, Tanzania, and Zambia (Lusaka) reporting two or more regular ongoing partnerships in the past 12 months while their counterparts in Thailand and Sri Lanka report 0.2% and 1.0% respectively. This occurrence is mirrored in young people; in the Nelson Mandela survey conducted in South Africa in 2005, 40% of males and 25% of females aged 15-24 reported more than one concurrent partner (Halperin et al., 2007). When compared against serial monogamy, mathematical modelling found HIV transmission created an epidemic which was ten times greater with long-term concurrency (Morris & Kretzschmar, 1997). This is primarily a result of the high infectiousness which is so much greater during the initial weeks and months after infection. In a serial monogamous relationship this high rate of infectivity remains within the unique partnership but moves rapidly within sexual networks defined by concurrent partnerships. This rapid spread is compounded by the greater difficulty men and women have negotiating condom use within these lasting relationships which are predicated on trust (Haram, 2005; Nyanzi et al., 2005; Gregson et al., 2002a). So while the number of lifetime partners remains similar in Southern Africa compared to the rest of the globe, the fact that they occur in parallel renders them much more risky (Halperin et al., 2007).

So while women are at increased biological risk of HIV, this is not the only explanatory factor that puts them at higher risk. Women are more likely to report socioeconomic factors including not being in school, increased sexual activity (not necessarily with different partners and which may not be consensual), less condom use, and having older partners (Pettifor et al., 2005a). This is supported by others who report that women are at increased risk because of more frequent sexual activity and inconsistent condom use with older male partners (Gregson et al., 2002a; MacPhail et al., 2002). Older males are more likely to be HIV infected so these women are at an increased and consistent risk of HIV infection with these older men having unprotected sex with them more often than their male peers are having sex.

Behavioural reports and extensive qualitative research reveal that our early assumptions of women as victims in these partnerships is too simplistic (Leclerc-Madlala, 2008; Gammeltoft, 2002). The complexity of young women's reasons for engaging in concurrent partnerships involving age-disparate and intergenerational relationships entails material and financial gain (ranging from school fees and snacks for poor young women to cell phones and social standing for more affluent young women), increased social power, access to jobs, a desire for love and affection, attracting a future husband (either the older partner or a younger boyfriend), increasing their self-esteem and having fun (Leclerc-Madlala, 2008; Ansell, 2001; Gregson et al., 2002a). These relationships are better understood within the cultural context of eastern and southern African societies which include a patrilineal system that promotes

bride-wealth exchange and polygamy (Duffy, 2005) (Leclerc-Madlala, 2008; Ansell, 2001) (for an overview of the colonial input on redefining bride wealth see (Ranchod-Nilsson, 2001)).

1.1.6 Continued need for HIV prevention programmes

Despite 25 years of research there is still no HIV cure nor a vaccine that can protect us against it (Jewkes et al., 2008; Padian, Buve, Balkus, Serwadda, & Cates, 2008). And while enormous progress has been made in the development of antiretroviral drugs (ARVs) which can stem the onset of AIDS, populations in the most affected areas of the globe are still the least likely to have access to them. For example, in Zimbabwe, an estimated 340,000 (70,000 of whom are children) were considered to be in need of antiretroviral treatment in 2006 (this figure peaked in 2004 at 510,000) (Makwiza et al., 2006). In 2004, the Ministry of Health and Child Welfare launched its national rollout and by 2007, an estimated 15.7% of those in need of ART were receiving it (n=102,566) (Zimbabwe Ministry of Health, 2007).

Globally, in 2007, this lack of access to treatments translates to six people becoming newly infected for everyone started on treatment (UNAIDS, 2007). This has led to a renewed commitment to the importance of HIV prevention coupled with a reminder that there is no single global epidemic, but a host of diverse ones (Padian et al., 2008; Wilson & Halperin, 2008; Asamoah-Odei, Garcia-Calleja, & Ties Boerma, 2004). In southern Africa as elsewhere in sub-Saharan Africa, HIV continues to be predominantly transmitted through unprotected penetrative heterosexual intercourse, although there continues to be a dearth of data regarding the specific mode (vaginal, oral, or anal) of this sexual transmission (UNAIDS Interagency Task Team on Young People, 2006). While the number of available biological interventions has increased recently (male condoms, STI treatment, male circumcision, ARV treatment) they will only achieve success if fully integrated into programmes that include behavioural and structural components (Padian et al., 2008). Therefore, the bulk of our efforts to halt the epidemic remain with behavioural interventions that encourage and support an individual's ability to decrease risky sexual behaviours while increasing protective ones. The development of effective interventions to protect the next generation from infection remains a major public health priority.

Specifically, prevention work with adolescents offers a window of opportunity to increase reproductive health knowledge, decrease the risk associated with sexual activity and promote healthy sexual behaviours. Young people are often more open and flexible in their attitudes than adults, and more willing to give critical consideration to health promotion messages. This is particularly true of sexually naïve adolescents who are more likely to benefit from health promotion messages than adults with established patterns of sexual behaviour (Kirby et al.,

1994). Our knowledge of the impact of HIV prevention programmes in developing country settings remains very limited with almost no information of its impact on HIV (Pettifor et al., 2005a; UNAIDS Interagency Task Team on Young People, 2006).

As is evident from the preceding discussion, being able to explore and describe sexual behaviour accurately is key to being able to understand the HIV epidemic, develop appropriate prevention interventions and measure their effectiveness (Turner, Danella, & Rogers, 1995). The next section explores the role of sexual behavioural measurement within the context of the HIV epidemic.

1.2 Sexual behaviour measurement

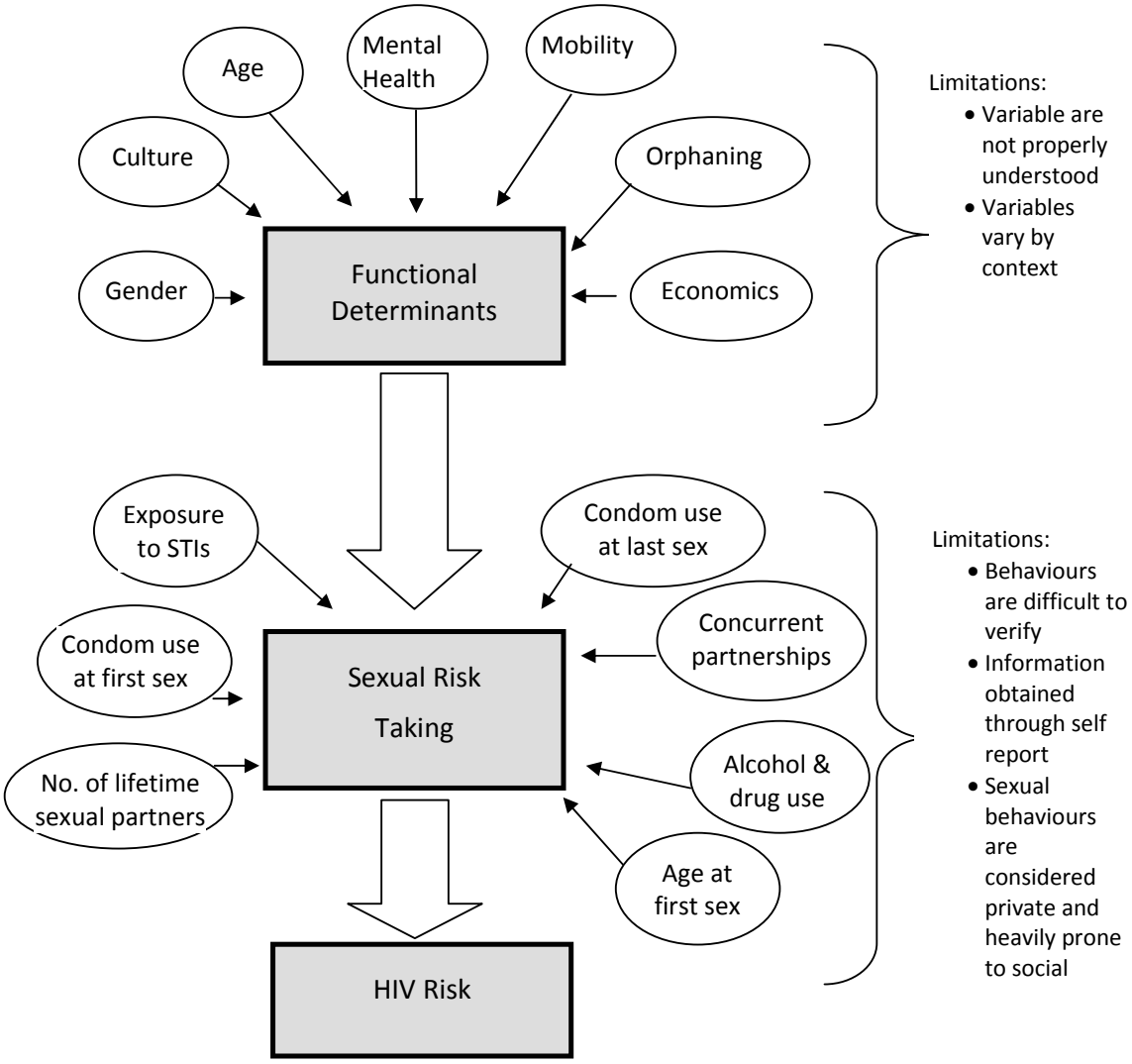
As highlighted above, sexual behaviour is complex and influenced by many factors including socioeconomic, cultural, biological, and psychological conditions. These determinants affect a host of risky sexual behaviours (e.g. age-mixing or having multiple partners coupled with low or inconsistent condom use) which in turn lead to increased risks of HIV infection. The relationship between these determinants although recognised is not well understood (Cohen & Dent, 1992; Carael & Holmes, 2001). Equally frustrating is that the determinants and risky sexual behaviours cannot be easily externally validated or objectively measured (Kreuter, Presser, & Tourangeau, 2008; Brener, Billy, & Grady, 2003; Tourangeau & Yan, 2007).

Implicit in the above description of the epidemic is the centrality of gathering information at a population level to gain a more in-depth understanding of the relationships between the determinants of risky sexual behaviours and HIV acquisition through qualitative and quantitative research (Turner et al., 1995). Without representative data, taken repeatedly, it is not possible to monitor and understand trends or track the progress of appropriate interventions (Carballo, Cleland, Carael, & Albrecht, 1989; Padian et al., 2008). The lack of accurate population level data on sexual behaviour resulted in the early projections of the HIV epidemic often being wildly inaccurate as a result of inaccurate 'guestimates' (Wellings et al., 2001; Turner et al., 1995). A more recent example of the value of population-based information comes from UNAIDS whose global predictions in 2006 for 2007 were reduced by 16% when actual figures were obtained (UNAIDS, 2008). One primary reason for this large discrepancy (these are global figures so small differences in percentages reflect large differences in actual numbers) was the result of an intensive exercise to asses India's epidemic, a country with a population of 1,097 million (World Health Organization, 2009). Likewise, analysis from repeated surveys in Zambia spanning 10 years suggested that prevalence declines in the population had occurred early on but had stagnated more recently (Bloom et

al., 2000). This nuance would not have been detected if surveys had only been conducted a decade apart.

The earliest research into sexual behaviours began with Kinsey's report in the 1940s which was conducted predominantly in the US, with volunteers from middle class White populations (Kinsey, Pomeroy, & Martin, 1948; Kinsey, Pomeroy, & Martin, 1953). Both its limited focus on pregnancy, vaginal sex, and masturbation and its reliance on volunteers meant that results could not be extrapolated to the general population (Turner et al., 1995). While volunteer samples were useful for describing the range of sexual lifestyles they were unable to describe the relative prevalence of these behaviours.

Figure 1-1: Schematic diagram indicating the multiple determinants influencing sexual risk taking and their measurement limitations



In the 50 years since Kinsey's seminal work, researchers have continued to conduct sexual behavioural surveys and improve the non-response and reporting errors around these sensitive questions. In the 1970s, survey research began to focus more on cognitive processes of the individual respondent (Sudman, Bradburn, & Schwartz, 1996b). However this work was often conducted in experimental settings within universities and remained unrepresentative (Turner et al., 1995). With the onset of the HIV epidemic researchers realized how little was known about sexual behaviours more generally (Martin & Vance, 1984). Two types of information were vital: i) prevalence and incidence rates to track the epidemic's expansion at regional, national, and sub-population level; ii) behavioural surveys to help us appreciate the complexities surrounding the risk behaviours driving the epidemic (again at different regional and population levels). The early 1990s saw the beginnings of larger scale studies that tracked prevalence and examined behavioural risk factors. These early researchers were also confronted by others as to the feasibility of conducting sexual behaviour research at a population level (e.g. Would people volunteer and be truthful about intimate sexual behaviours? Could these answers be considered scientific measurements?) (Turner et al., 1995). The first of these that surveyed nationally representative samples took place in the UK and France (with two smaller population-specific studies in the US and Europe) (Rogers & Turner, 1991; Johnson, Wadsworth, Wellings, Bradshaw, & Field, 1992; ACSF investigators, 1992; Sundet, Magnus, Kvalem, Groennesby, & Bakketeig, 1989). These were followed by the first prevalence surveys in developing countries where it became quickly apparent the extent of the epidemic lie (Schopper, Doussantousee, & Orav, 1993; Koenig, Jejeebhoy, Singh, & Sridhar, 1998). Initial prevalence data were collected from pregnant women attending antenatal clinics. However it was soon evident that this was not the best proxy of population prevalence (Gregson et al., 2006). Firstly it was quickly understood that HIV positive women were not as fertile as their negative peers. Secondly, the prevalence rates of older women who had completed childbearing but were still sexually active could not be established through these pregnancy clinics. Thirdly, they were not representative of all young sexually active women, just those that became pregnant. Slowly, developing countries began conducting population-based surveys. As seen earlier, the results of Zimbabwe's first nationally representative behavioural survey were published in 2003. This was followed by a national prevalence survey in 2004. In the late 1990s, Demographic Health Surveys, conducted every decade in the majority of countries around the world, began introducing sexual risk behaviour questions (Carballo et al., 1989) (Macro International Inc., 2009). As seen in the previous section, initial information emerging from these larger, more representative surveys provided an increased recognition that sexual behaviours are not conducted in isolation but take place within a broader framework of cultural values, economic issues, and gender (in)equity.

However, these early surveys also made us increasingly aware that we were still in our infancy when it came to an in-depth understanding of sexual behaviours (Martin et al., 1984; Catania, Gibson, Chitwood, & Coates, 1990; Wellings et al., 2001; Turner et al., 1995). What had been the sole domain of a small select group of social scientists was suddenly in huge demand as key areas of inquiry into the understanding of sexual behaviours were expanded. Sexual behavioural research acknowledged the need for a broader research agenda including an increase in geographic breadth (minority populations within the US and an increase in global research), an interest in high risk sub-populations (e.g. drug injecting populations, migrant populations, and commercial sex workers), and an expansion of sexual behaviours (e.g. anal and oral sex) to be examined (Catania et al., 1990; Carballo et al., 1989).

An added measurement challenge surrounds the private aspect of sexual behaviours. As they cannot ethically be observed directly, it becomes necessary for individuals to self-report their sexual experiences. Moreover, while cultural norms may differ around the world, most sexual behaviours are socially censured, making their reporting difficult for the individual. The strong pressure to conform to societal norms causes these self-reports to be fraught with bias particularly around recall and social desirability (Tourangeau et al., 2007; Brener et al., 2003).

In the early 1990s, Catania and his colleagues published a thoughtful review focussing renewed attention on the myriad of methodological challenges faced by sexual behavioural researchers (Catania et al., 1990). Improving measurement was seen as essential in order to fully understand these sensitive and often culturally censured behaviours. They concluded with a call for more rigorous research into the assessments of sexual behaviours and emphasized that the foundation lay in improving the reliability and validity of its measurement.

Clearly understanding and describing sexual behaviour is particularly important for sub-Saharan Africa where the majority of HIV transmission is sexually transmitted. Inherent within this is our understanding of what makes young people particularly vulnerable to HIV.

1.2.1 Measurement error

Accurate measurement is central to our ability to assess the extent of the epidemic and our appreciation of the risk behaviours and how they drive the epidemic in different sub-populations. There are two important considerations when attempting to measure a variable accurately, its validity and its reliability. Over the past two decades a wide range of studies have explored the relationship between risky behaviours and their impact on HIV. And in these diverse studies directed at condom usage, condom negotiations by gender and type of relationship, couples in discordant relationships (where one person is infected and the other is

not), researchers have noted a gap between the validity and reliability of the self-reported measure and other outcomes (Gallo et al., 2006; Gallo et al., 2007; Zenilman et al., 1995; Peterman et al., 2000; Cowan et al., 2002; Cowan et al., 2008; Plummer et al., 2004a; Plummer et al., 2004b; Hewett et al., 2008; Auvert et al., 2001).

1.2.2 Validity

Validity reflects how accurately a measure records the actual event. Clearly maximizing the validity of data relating to sexual behaviour and other sensitive information is important. While improving validity has been of longstanding concern, its gravity was heightened with the onset of the HIV epidemic.

One way to identify lack of validity in self-reported sexual behaviours is to compare self-reported sexual behaviour with biological markers of sexual activity. While a number of biological markers exist that can be objectively measured and are themselves associated with unprotected sexual activity (e.g. presence of sperm using PSA antigen, presence of sexually transmitted infections using antibodies, and pregnancy tests) some offer limited timeframes or fail to track past sexual activity (Cowan & Plummer, 2003; Gallo et al., 2006; Gallo et al., 2007). (Note this dilemma is not limited to sexual behaviours; Murphy *et al.* report on the inaccuracy of urine testing for marijuana when respondents are asked about recent drug use. (Murphy, Durako, Muenz, & Wilson, 2000)). In addition, the relationship between these markers and behaviour is not absolute (not every act of intercourse results in pregnancy or an STD for example) (Peterman et al., 2000; Schachter, 2000). Yet, their presence or absence can be used to strengthen the assessment of self-reported behavioural risks (MacLachlan et al., 2001). In particular, their strength is unidirectional offering the ability to compare self-reports of sexual behaviour against the presence of biomarkers for sex. However while they might give evidence of risk, they are not substitutes for measuring behavioural frequencies, partnership characteristics, and co-occurrence of behaviours. As shown in the first section of this chapter, these are critical aspects in our understanding of sexual behaviours and their impact on the epidemic.

Furthermore, even if validity could be established through biomarkers, accuracy of self-reported data is insufficient as researchers need to know not only the magnitude of the inaccuracy but its likely sources which relies on self-reported information. As measuring validity is hindered by the lack of external measures for sexual behaviours, researchers exploring measurement of social issues are forced to assume that higher prevalence estimates of sensitive issues are more 'valid' than lower estimates (Brener et al., 2003; Kreuter et al., 2008).

1.2.3 Reliability

The reliability of a measurement focuses on response consistency: does a respondent whose actual behaviour has not changed answer a question in the same way over time. And while reliability is a pre-requisite for validity, its presence cannot *ensure* validity. For example, participants can repeatedly report that they are not sexually active achieving high reliability, when in fact, the presence of a sexually transmitted infection questions the validity of their responses.

Reliability can be evaluated using two approaches. The first is to ask a respondent to answer the same set of questions twice (test-retest) in two different surveys and compare their answers. Assuming that the time frame between the two questions is not long enough to have produced a change in the respondent's behaviour, a replicable answer in the test-retest implies reliability. However, because it is possible for sexual behaviour to change over time, much debate surrounds what constitutes a 'reasonable' gap in time. Researchers try to achieve a balance between a time frame that is long enough to ensure the respondent has not re-answered based on a recollection of their previous answer, but short enough to make it unlikely that a change in behaviour will have taken place. And because sexual behaviours vary across sub-populations, so too does the 'appropriateness' of the time frame (e.g. the sexual behaviour of a 12 year old is less likely to change in a week than for an older adolescent or a commercial sex worker). Traditionally, researchers have tried to keep the time frame between three days and two weeks (des Jarlais et al., 1999b; Catania et al., 1990; Carey, Carey, Maisto, Gordon, & Weinhardt, 2001; Fenton, Johnson, McManus, & Erens, 2001; Vanable et al., 2009).

A second technique to check reliability looks at internal consistency within a questionnaire. Here, the same set of questions are incorporated within two sections of one questionnaire and their responses are compared. While this negates the concern about behaviour changing over time, it offers less control over an individual remembering their previous response.

Cohen's Kappa is used to measure the agreement between two classificatory variables adjusting for any agreement that could happen by chance (Murphy et al., 2000). A Kappa of 1 is considered perfect agreement and 0 is agreement that occurs solely by chance. As discussed above, Kappa requires a narrow time-frame.

1.2.4 Sources of measurement error external to the respondent

In all research, sampling error is reduced by ensuring that populations at risk have been accurately represented. Sample sizes also need to be sufficiently large to detect the level of difference (e.g. change in prevalence) required by the study. Once an appropriate sampling

frame has been devised, it remains to ensure that the majority of those invited to participate do so. Given high levels of discomfort surrounding sexual behaviours, obtaining high response rates is a constant threat to the representativeness of this type of research.

Apart from errors resulting from poor research design, measurement error can be introduced into self-reported sexual behaviour in a number of ways including refusal to report (social desirability), deliberate under reporting or concealment (social desirability), inaccurate answers (recall), misunderstanding (question wording), and faulty time references (Carballo et al., 1989; Fenton et al., 2001). This section briefly outlines various types of measurement error.

1.2.4.1 Questionnaire construction

Sexual behaviours are often not discussed in a public setting. As a result our terminology is inadequate and often inappropriate (Wellings et al., 2001; Mitchell et al., 2007; Mavhu, Langhaug, Manyonga, Power, & Cowan, 2008). With the expansion of survey research into sexual behaviours, it has become increasingly apparent that the terms used to define these behaviours need to be well understood and similarly understood by *all* participants. Debate continues around whether to use informal or colloquial terms to describe sexual behaviours or to use more formal biological terminology (Ford & Norris, 1991; Wellings et al., 2001). Studies have found that while it is possible to use colloquial terms with specific populations (Halkitis, Parsons, & Wilton, 2003; Halkitis, Wilton, & Wolitski, 2005) that when working with the general population, it is generally more appropriate to use more formal terms (Mitchell et al., 2007). Even within specific populations, informal terms are sometimes considered inappropriate. In an article examining the behaviours of gay men, while the term 'barebacking' is used in the article to describe unprotected anal intercourse, the questionnaire used more formal phrasing such as 'anal sex without a condom' (Elford, Bolding, Davis, Sherr, & Hart, 2007). Even when clinical language is more appropriate, language around specific sensitive behaviours such as anal and oral sex, can remain sensitive (Ford et al., 1991). More important is the understanding that even standard terms can be differently understood (Catania, Binson, Canchola, Pollack, & Hauck, 1996). For example, formative research for the first NATSAL study in the UK, found that married men thought the term 'sexual partner' was too casual to be used as a reference for their wives, while single participants thought the term implied a steady relationship rather than a casual one (Fenton et al., 2001); Spencer et al., 1988). A significant minority also failed to understand basic clinical terms such as heterosexual, penetration, and vaginal (Wellings et al., 2001). Time periods can also be understood differently. In the Regai Dzive Shiri trial in Zimbabwe, cognitive interviewing with participants, conducted in preparation for the final survey, highlighted the multiple ways in

which 'in the last year' was understood (unpublished data). For some it meant starting at the beginning of the calendar year while for others it meant the 12 months prior to the current month (e.g. April to April). Qualitative research using cognitive interviews conducted prior to questionnaire administration can highlight these differences in understanding and ensure all terms and concepts are properly described and so commonly understood (Mavhu et al., 2008) (Mitchell et al., 2007; Wellings et al., 2001; Elam & Fenton, 2003).

1.2.5 Measurement error emanating from respondents

While some measurement error is due to poor research design numerous reporting errors are a result of sexual behaviour being by nature a private activity that is not readily disclosed. Two main types of reporting bias emanate directly from respondents and contribute to measurement error. The first is recall bias where, through no fault of the participant, they fail to recall the information requested. A number of factors can hinder recall in sexual behaviour research including the frequency of the behaviour and the length of time frame over which recall is required. Equally critical is social desirability bias where, due to the sensitive or socially censured nature of the behaviour being researched, participants feel nervous about revealing their engagement in them.

1.2.5.1 Recall bias

Sexual behavioural research commonly asks participants to recall sexual behaviour over a long period of time (e.g. number of lifetime sexual partnerships). A number of factors influence a participant's ability to accurately recall these sensitive behaviours. Incidence (e.g. 'have you ever had sex?') has been found to be easier to recall than the frequency of a sexual behaviour (e.g. 'how often have you had sex in the past month?') (Catania et al., 1990; Wellings et al., 2001; Fenton et al., 2001). Recalling frequency is improved if questions are focused on people (e.g. sexual partners) rather than events. Thus participants are generally more accurate in recalling the numbers of different partners they report than in their number of sexual acts (Catania et al., 1990). Shorter time frames are also easier to recall than longer time frames (Lagarde, Enel, & Pison, 1995). However, longer time frames are less problematic if the questions relate to the occurrence of rare events (e.g. anal versus vaginal sex) which are more unique and therefore easier to recall. Age at first sex is felt to be recalled relatively accurately due to the uniqueness of the event. In the first NATSAL, less than 2% of participants couldn't recall their age at first sex (Wellings et al., 2001). An exception to this would occur in those populations less aware of their exact age, a situation that is more common in Africa but less so in younger populations such as adolescents.

Unfortunately, despite the known difficulties of recalling events over longer time frames, this information is required for sexual behavioural measurement. Seasonal patterns of migration and limited contacts with higher risk groups (e.g. injecting drug users, commercial sex workers) might constrain sex to happen in chunks of time. Limiting questions to more recent timeframes which are easier to recall would fail to pick up on these important sexual patterns (Carballo et al., 1989).

A number of techniques have been developed to assist participants in recalling their sexual behaviour, including the use of sexual or coital diaries where data are recorded prospectively and regularly (Hensel, Fortenberry, Harezlak, Anderson, & Orr, 2004), the time-follow back method which uses a specific point in time to assist participants in recalling events (Carey et al., 2001; Crosby, Stall, Paul, & Barrett, 1996) and the use of a monthly calendar where participants can record their behaviours (Goldman, Moreno, & Westoff, 1989; Becker & Sosa, 1992).

1.2.5.2 Social desirability bias

Social desirability bias is when a respondent answers a question in order to provide others with a favourable impression of themselves. One of the first challenges in minimizing social desirability bias is to ensure that participants answer the questions that are asked of them. Item non-response rates examine the number of questions or the prevalence of a particular question not being answered by participants. Having low item non-response rates improves the chance that survey results remain representative of the sampled population. While some researchers point out that item non-response rates are not significantly different in sexual behavioural surveys compared to surveys asking other sensitive questions, the fact remains that it is important in all instances to aim for a low item-response rate for all questions (Wellings et al., 2001).

Social desirability bias impacts on self-reports in two ways: over-reporting of socially desirable behaviours and underreporting of socially *un*desirable behaviours (Tourangeau et al., 2007; Kreuter et al., 2008). For example, cocaine use is not socially sanctioned within any sub-population so one would expect under-reporting of this behaviour. Likewise, voting in the US is considered a citizen's obligation, therefore researchers would expect this behaviour to be over-reported (which they traditionally do). Unfortunately, measuring the direction of social desirability bias is less straightforward for sexual behaviours. As it is generally considered a private behaviour which is rarely spoken of in public, researchers generally assume they will find sexual behaviours to be under-reported. As noted earlier, girls and young women fall into this category. And while this can be generally assumed to be true, there are some sub-

populations where over-reporting is possible. For example, in many cultures, young males are expected to be sexually experienced, so they may exaggerate their activity in order to conform to this expectation (Brener et al., 2003; Mensch, Hewett, & Erulkar, 2003). Likewise, this would be true of married couples trying to match their reported sexual activity to a societal expectation. Given that social desirability bias causes over-reporting of desirable behaviours and underreporting of undesirable behaviours, the question for researchers exploring sexual behaviours is to understand what behaviour is considered desirable *within* that sub-population under consideration. Without sound knowledge of these population specific norms it is difficult to interpret the results, particularly in comparative studies.

When sexual behaviour is used to assess the impact of behavioural intervention programmes in affecting behaviour change an additional challenge is that social desirability bias is likely to be differential between intervention recipients (who should know the 'right' answer) and non-recipients. This distorts the apparent effects of the intervention indicating behaviour change has occurred when it has not.

The literature is replete with evidence documenting systematic and intentional misrepresentation in surveys, showing people are more willing to report socially embarrassing behaviours when they are assured anonymity, feel emotionally comfortable, or when they believe the researchers have access to information revealing truth of their thoughts or actions (Holbrook, Green, & Krosnick, 2003; Tourangeau et al., 2007; Catania et al., 1996; Roese & Jamieson, 1993; Buve et al., 2001).

A number of mechanisms can help to decrease social desirability bias including improving the privacy of the space in which a questionnaire is answered, reassuring the participant that their confidentiality will be respected, and ensuring high quality interviewers who can gain the participant's trust. Choosing how the questionnaire is delivered to the participant is also influential and further research is needed into the role that questionnaire delivery modes play in countering social desirability bias (Catania et al., 1990; Weinhardt, Forsyth, Carey, Jaworski, & Durant, 1998; Wellings et al., 2001; Tourangeau et al., 2007). At the end of the 1990s, a systematic review examined the comparative evidence relating to questionnaire delivery mode (Weinhardt et al., 1998). Despite novel developments in the field (described in more detail below) Weinhardt and colleagues believed that comparative research of questionnaire delivery modes remained limited (Weinhardt et al., 1998).

1.3 Types of questionnaire delivery modes used to collect self-reports of sexual behaviour

Questionnaire delivery modes designed to capture self-reported sexual behaviour fall into two broad categories, those administered by an interviewer (interviewer-administered) and those completed by the respondent (self-administered). Researchers have traditionally tried to balance gains made around probing and ensuring clarity when using an interviewer against the respondent's increased sense of privacy when using a self-administered questionnaire delivery method. It is generally hypothesized that the quality of sexual behaviour data are improved as the level of privacy and standardization is increased (Tourangeau, Rips, & Rasinski, 2000; Tourangeau et al., 2007; Kreuter et al., 2008).

The list below, while not exhaustive, provides an illustrative overview of the most common questionnaire delivery modes.

1.3.1 Interviewer-administered questionnaires:

An interviewer-administered questionnaire in its most elementary form employs a trained researcher to administer the questionnaire to the respondent. Data can be captured using pen and paper or the interviewer can enter a respondent's response directly into a computer database. This latter technique is referred to as computer-assisted personal interviewing (CAPI) and can considerably reduce data entry time and error (Caceres et al., 2007; Bernabe-Ortiz et al., 2008). However, CAPI does not alter the basic interviewer-respondent interaction (Gribble, Miller, Rogers, & Turner, 1999).

Broadly speaking interviewer-administered questionnaires have the advantage that the interviewer can clarify questions with the respondent, or probe to ensure that all relevant information is gathered. Skilled interviewers can ensure all questions are asked and answered, improve the consistency of reporting by checking answers with respondents (e.g. "did you mean you last had sex with your wife because earlier you said that you were not married?"), and provide reassurance to the respondent. As someone is recording responses, it also offers the possibility of asking open-ended questions which can impart important detail or context to a closed-ended, categorical answer.

However, the quality of the interviewer-administered questionnaire is contingent on the interviewer's inherent personal skills supplemented by the quality of their instruction (Elam et al., 2003). Training must ensure interviewers are equipped to read sensitive questions in a non-judgemental and reassuring manner and are able to build rapport with a respondent so as to establish confidence in the interview process. A key component of sexual behaviour

questionnaires is their ability to accurately document multiple and concurrent partnerships as well as to record risk behaviours (e.g. condom use at first and last sex with partner, sexual coercion, sexual partner's age) for each of the respondent's sexual partners (Carballo et al., 1989; UNAIDS, 1998). This requires interviewers to be skilled in managing sometimes complicated skip patterns.

Nevertheless all of these strengths may be outweighed by the respondent being unwilling to reveal certain information or behaviours to an interviewer. Some research suggests an interviewer's gender can be an influential factor, with evidence suggesting that irrespective of the respondent's gender, sensitive behaviours are more often reported to female interviewers (Konings, Bantebya, Carael, Bagenda, & Mertens, 1995; Wellings et al., 2001; Becker, Feyisetan, & Makinwa-Adebusoye, 1995). Female respondents are also more likely to be affected by the gender of the interviewer than their male peers. Yet, other evidence suggests that a non-judgemental manner outweighs the gender of the interviewer (Wellings et al., 2001). Evidence from Ghana suggests that interviewer characteristics (e.g. marital status and age) were associated with different responses but not with more accurate answers (Blanc & Croft, 1992). Research also examined the impact of offering the respondent the choice of interviewer's gender, believing that the ability to choose would increase a respondent's sense of control in an otherwise potentially threatening environment. However, this hypothesis did not hold up; instead, as in other studies cited here, findings argued the importance of matching the gender of interviewers and respondents (Catania et al., 1996).

One particular use of interviews is around its application in cognitive interviewing. This is traditionally performed during the formative stage of questionnaire design to isolate response errors from poor question wording that inhibits the respondent from accurately recalling and reporting their experiences (Sudman, Bradburn, & Schwartz, 1996a). The cognitive approach to questionnaire development has generated a substantial body of knowledge (for a comprehensive review of taxonomy and procedures see (Forsyth & Lessler, 1991)). Interviewers applying cognitive interviewing try to gain entry into the respondent's thought processes in order to tease out where errors can occur. A general mode for cognitive theory assumes the following key processes: i) what does the respondent understand by the question; ii) how does the respondent retrieve necessary information to answer the question; iii) how much influence do normative concerns play; iv) can the respondent match their own answer to the possible response options provided in the survey question (Tourangeau, 1984). Cognitive interviewing uses specific questions and extensive probing to untangle these four underlying thought process and resembles an in-depth interview. However, the one additional distinction

in this process compared to standard interview-administered questionnaires is the training provided to the respondent to assist them in opening up their thought processes.

Several adaptations have been made to the standard interviewer-administered questionnaire which are described below.

1.3.1.1 Telephone surveys:

Telephone surveys offer the respondent greater anonymity while maintaining the opportunity for the interviewer to clarify and probe. However, one review of comparative research using telephone surveys and face-to-face interviewing found those surveyed over the phone were less cooperative, less engaged during the interview, more likely to express dissatisfaction with the survey length (despite it taking a shorter length of time) and being more suspicious of the process (Holbrook et al., 2003). Telephone surveys tend to have to be shorter and cannot take advantage of visual aids. These have gained wider popularity in the US but have not been used as extensively elsewhere, in part because in many countries coverage of the telephone network is not universal, making it more difficult to survey a representative sample (Fenton et al., 2001). Telephone surveys are not viable in most developing countries where the majority of the population do not have access to phones.

1.3.1.2 Use of visual aids

During development of the first national survey in the UK (NATSAL), Johnson and colleagues recognized early on the inherent limitations of answering a sensitive sexual behavioural question to a person, even when well trained. For a number of sensitive questions, they provided the respondent with a show card listing the answers and the respondent only had to report the number or letter linked to their specific response (Johnson et al., 1992; Wellings et al., 2001).

1.3.1.3 Informal confidential voting interviews (ICVI)

Gregson and colleagues adapted the interviewer-administered questionnaire by providing a mechanism for some questions to be answered by the respondent in private (Gregson, Zhuwau, Ndlovu, & Nyamukapa, 2002b). As with innovative techniques developed in the NATSAL survey, they strived to maintain the advantages of using an interviewer while improving the privacy of responses around sensitive questions. Respondents self-completed answers to sensitive questions onto strips of paper labelled with their study ID. Upon completion of all the sensitive questions, the respondent posted the strip into a locked box which the interviewer was unable to access (Gregson et al., 2002b). These sensitive questions were only introduced part way through the interview after the interviewer had built rapport

with the respondent. Hanck and her colleagues adapted this method further by including voting picture cards for their illiterate respondents in India (Hanck, Blankenship, Irwin, West, & Kershaw, 2008).

1.3.1.4 Random Response Technique (RRT)

While the random response technique (RRT) is an indirect survey method, it is often used to capture prevalence estimates of sensitive behaviours (for a review of a meta-analysis of RRT conducted, see Tourangeau et al., 2007). RRT requires the presence of an interviewer and is limited to reporting of a dichotomous variable. Respondents are randomly assigned to answer one of two questions, one of which is sensitive (e.g. 'have you ever had an abortion?') and the other which is non-sensitive and has a known probability of occurrence within the population being studied (e.g. 'were you born in April?'). The answers to both questions must be of a similar format (e.g. yes/no) so that the answer does not give away which question is being answered. The respondent is asked to randomly pick a question and answer it without revealing the content of the question to the interviewer. The interviewer is not aware which question is being answered and only records the answer given by the respondent. Using assumptions about the probability of picking one question over the other and the probability of the non-sensitive question occurring within the population, it is possible to generate an estimate of the prevalence of the sensitive behaviour within the population surveyed (Lara, Strickler, Olavarrieta Diaz, & Ellerston, 2004). When compared with other self-reports this method can generate higher prevalence of sensitive behaviours (Lara et al., 2004). However the method is limited in that it can only ask the one question, and the data from that question cannot be analysed in conjunction with other questionnaire data (Tourangeau et al., 2007). For example, while prevalence on abortion can be estimated, it is not possible to ask additional questions surrounding the abortion because the interviewer can ascertain if it is the abortion question which has been answered.

1.3.2 Self-administered questionnaire delivery modes

The most basic format for self administered questionnaires (SAQ) asks the respondent to write the answers to the questions themselves directly onto the questionnaire. Its biggest advantage over interviewer-administered questionnaires is its increased sense of privacy (Turner et al., 1995). As such, SAQ has been used in conjunction with interviewer-administered questionnaires when highly sensitive sexual behavioural questions are asked (Johnson et al., 1992). However self-administered questionnaires have a number of disadvantages. As it requires a minimal level of literacy it is less useful in poorly literate populations (Turner et al., 1995). Lack of an interviewer means there are no checks which

makes it more difficult to ensure that all questions are answered (item response rate) and answered consistently (reliability). Self-administered questionnaires using paper forms are also less able to handle questions that require complex skip patterns, an important aspect of sexual behaviour reporting (see section 1.3.1 above).

As with interviewer-administered modes, there have been a number of adaptations to this mode.

1.3.2.1 Audio-assisted interviewing.

Qualitative data from countries which are primarily oral suggest that respondents rarely see sexual behavioural terms in print potentially increasing their difficulty to comprehend them (Elam et al., 2003). Offering an oral element can increase their sense of understanding (Langhaug et al., 2009). Adding an audio component to self-administered questionnaires can take two forms. In one, the respondent listens to the questions and responses being read aloud through a tape recorder, CD player or MP3 player while reading and responding to the questions on a paper version of the questionnaire (Liu & Detels, 1999; Le, Blum, Magnani, Hewett, & Do, 2006). The second format uses a trained researcher who reads the questions and responses aloud in a group setting while respondents record their responses individually (assisted self-completed questionnaire) (Plummer et al., 2004a; Plummer et al., 2004b; Cowan et al., 2002; Cowan et al., 2008).

Both of these forms improve SAQ's applicability within less literate populations. When the audio element is pre-recorded it provides the additional advantage of standardizing the voice that reads the questions out loud for all respondents eliminating potential bias that could be introduced using the interviewer-administered format. Additionally, it also allows the respondents to answer their questionnaires in private, less observed by their peers in the same room. Little comparative research has occurred between SAQ and Audio-SAQ. In one study among STD clinic attendees in the US, respondents using Audio-SAQ had less missing responses and increased reporting of unprotected vaginal sex and sex with someone they suspected had HIV (Boekeloo et al., 1994).

1.3.2.2 Computer-assisted survey instrument (CASI)

Tremendous progress has been made over the past 20 years in the development of computer assisted questionnaire technologies. At a minimum, as described above (see section 1.3.1) interviewers can use computers to enter a respondent's data directly into a data base. However respondents can also use computers to answer questions on their own.

The use of computer programmes emerged as a direct response for questionnaire delivery modes that might reduce social desirability bias in self-reports. While traditional paper and pen self-completion questionnaires partially reduced this bias, their use was limited to literate populations. In addition, self-administered questionnaires, had the disadvantage of lower item response-rates and poor performance in complex skips (Kreuter et al., 2008; Al-Tayyib, Rogers, Gribble, Villarroel, & Turner, 2002).

While there was some initial work conducted in the 1980s (Millstein & Irwin, Jr., 1983), audio computer-assisted survey instruments (ACASI) were first comparatively tested in the US in the early 1990s (Kurth, Spielberg, Rossini, & UW ACASI Working Group, 2001; Johnston & Walton, 1995; Turner et al., 1998; Fu, Darroch, Henshaw, & Kolb, 1998). The technique offers respondents the opportunity to listen to questions and responses through headphones while reading them on a computer screen. Respondents use a mouse or an external keypad to click on the response choices. There are a number of minor variations to this method. For example, in some instances, researchers forgo the computer screen and have respondents just listen to the questions and responses before entering their answers using a small keypad (Mensch et al., 2003). In this instance, the respondent listens (but cannot see) questions and response choices. This method is more suited for questions with limited response choices that are easy to remember. Some researchers have selected a limited number of keys on the keyboard, colour coding them for the respondent to use (e.g. green key represents 'yes', red key represents 'no'). As technology has improved some surveys replaced keyboards and mice with touch screens (Gribble et al., 1999). And, as computers themselves have improved, researchers have begun to use personal digital assistants to replace more bulky desk tops and laptops (Jaspan et al., 2007; Seebregts et al., 2008; Lane, Heddle, Arnold, & Walker, 2006). In some instances, picture codes and video were added (Gerich, 2008; Gerich & Lehner, 2006) to assist less literate populations (Kissinger et al., 1999) or the deaf (Bisol, Sperb, & Brewer, 2008) or children (Gerich & Bergmair, 2008).

Beyond its potential to decrease social desirability bias, computer programming offers a number of additional advantages. Where a number of languages are commonly-used among a population, a different questionnaire with the appropriate language can be switched to quickly (Turner, Rogers, Hendershot, Miller, & Thornberry, 1996). Complex skip patterns can be executed more smoothly as they are pre-programmed so there is no reliance on the respondent (or interviewer) to move from one question to the other. Computer programming also allows for immediate checks into data inconsistencies across related questions (e.g. comparing the respondent's age against their reported age of first sexual activity). While this is possible using interviewers, it is more cumbersome and can get forgotten when there are

time restrictions. As with all variations of computer generated data, data files are automatically generated, significantly reducing data time and entry errors.

Early work with ACASI began in the US with promising results from three nationals surveys: the 1995 National Survey of Family Growth and the 1995 National Survey of Adolescent Males (ACASI vs personal interview followed by self-administered questionnaire) and the National Longitudinal Study of Adolescent Health (Turner et al., 1998; Fu et al., 1998; Fu et al., 1998; Modi, 2000). With adolescent males, estimates of the prevalence of male-male sex, injection drug use, and sexual contact with intravenous drug users were higher by factors of three or more when collected using ACASI compared to standard self-administered questionnaires (Turner et al., 1998). ACASI was then used successfully in specialized populations including gay men, injecting drug users and women at increased risk of HIV (des Jarlais et al., 1999a; Metzger et al., 2000b). When HIV positive and HIV negative respondents were compared greater differences in reporting HIV risk behaviours were also noted (Macalino, Celentano, Latkin, Stathdee, & Vlahov, 2002). In the early stages, ACASI was compared against face-to-face interviewing and against different versions of itself (Newman et al., 2002; Tourangeau & Smith, 1996). For example, Tourrageau and Smith compared three related computer-assisted methods: i) computer-assisted person interviewing (CAPI), using a trained interviewer, against ii) computer-assisted *self*-administered interviewing, where the respondent answers the questions themselves (CASI), against iii) *audio* computer-assisted self-administered interviewing (Tourangeau et al., 1996). They found that while response rates did not differ between these three modes, there was a reduced disparity between the males and females in terms of number of partners reported using the two self-administered modes (CASI and ACASI). There was also an increased reporting of illicit drug use with ACASI.

However as computers were used more frequently by respondents themselves, reports on its ability to consistently report increased reporting of sensitive behaviours became more varied. In a methodological comparison in a generalized population sample in the UK, Johnson *et al.* found no consistent evidence of an increase in reporting of risk behaviours when comparing CASI against pen and paper although there was an improvement in item response and in data consistency with CASI (Johnson et al., 2001). More recent comparative research in industrialized countries have found it more difficult to match the large differences found by Turner and others when it was first used (Testa, Livingston, & VanZile-Tamsen, 2005; Ellen et al., 2002; Kissinger et al., 1999; Morrison-Beedy, Carey, & Tu, 2006).

As computer technology has improved and programming become more sophisticated there has been a proliferation of spin-offs to computer administered questionnaires. One such

derivative is to incorporate the use of computers within telephone surveys, often referred to as phone-ACASI (Lau, Thomas, & Liu, 2000; Lau, Tsui, & Wang, 2003). This method involves interactive voice recording (IVR) where the interviewer is replaced with a recorded voice and the respondent uses the phone keypad to enter their responses. With the growth of personal digital assistants, researchers have explored their feasibility as smaller versions of laptops (van Griensven et al., 2006; Lane et al., 2006; Seebregts et al., 2008; Jaspan et al., 2007). One immediate advantage is their long battery power allowing them to remain in the field for considerable time. In addition, they cost less and are smaller and lighter than laptops. Finally, as the internet has expanded across North America and Western Europe, surveyors have exploited its potential and created web-based surveys (Knapp & Kirk, 2003; Elford et al., 2007; Kreuter et al., 2008). With the arrival of video feed as a common phenomenon within the web page, web surveys have also begun to explore how to use them to personalize the survey experience (Tourangeau, Couper, & Steiger, 2003).

1.3.2.3 Coital diaries

Sexual or coital diaries are used to collect data prospectively and have been shown to increase reporting of some behaviours (Ramjee, Weber, & Morar, 1999; Ferguson, Morris, & Kariuki, 2006; Allen et al., 2007; Hensel et al., 2004) (see (Bolger, Davis, & Rafaeli, 2003) for a good review of diary methodology). Even though they can include visual aids, they also rely on a minimal level of literacy. Unlike the other modes described above, coital diaries are completed by the respondent prospectively as the behaviours occur and are not administered in a one-off survey. This makes them a useful mode for recording activities that occur with relative frequency where recall would be hindered (Fortenberry, Harezlak, Katz, & Orr, 2001) or when trying to break down a specific behaviour such as condom use (de Visser & Smith, 2000). As they also require a regular commitment from the respondent (as opposed to a one-off commitment with a survey) they can be prone to participation bias. There is some concern that because data are collected continuously, it raises sexual behaviour to the front of the respondent's consciousness, allowing the possibility for the research method to influence the respondent's sexual behaviour. Coital diaries have been less used in developing country settings where there is a less reliable postal service and increased logistical complications in recovering the diaries for analysis (Ramjee et al., 1999; Ferguson et al., 2006; Allen et al., 2007).

1.3.3 Methodological Research in Developing Countries

Considerable methodological literature derived from developed country populations comparing questionnaire delivery modes exist, generally indicating that self-completion

computer-assisted modes improve completeness and data consistency and may increase disclosure of socially censured behaviours (Tourangeau et al., 1996; Turner et al., 1998; des Jarlais et al., 1999b; Fu et al., 1998; Johnson et al., 2001). However, at the time the preparatory work for this thesis began in 2004, few studies had rigorously compared questionnaire delivery modes in developing countries (van de Wijgert, Padian, Shiboski, & Turner, 2000; Lau et al., 2000; Lau et al., 2003; Gregson et al., 2002b) particularly among young people (Mensch et al., 2003; Plummer et al., 2004a; Plummer et al., 2004b; Rumakom, Guest, Chinvarasopak, Utarmat, & Sontanakanit, 2005; Hewett, Mensch, & Erulkar, 2004) or among semi-literate populations (Lara et al., 2004; Potdar & Koenig, 2005). While the need for improved measurement validity and reliability was well recognized (Eggleston, Leitch, & Jackson, 2000; Nnko, Boerma, Urassa, Mwaluko, & Zaba, 2004; Zaba, Pisani, Slaymaker, & Boerma, 2004; Gregson et al., 2004; Curtis & Sutherland, 2004), the relative paucity of comparative research remained.

1.4 Overview of this thesis

This thesis sets out to explore the most effective methodology for measurement of sensitive behaviours among rural Zimbabwean youth in a developing country setting. The opportunity for this research presented itself during the course of a community randomized trial where I was working as the evaluation manager. The Regai Dzive Shiri Project (RDS) was a community randomized trial of a multi-component adolescent reproductive health intervention conducted in rural Zimbabwe between 2003 and 2007. In 2006, the interim survey for this trial provided the ideal opportunity to conduct a robust evaluation of several questionnaire delivery modes, triangulated against biological markers of sexual behaviour. Rates of non-response to questions could be compared between delivery modes (item response) as could the reporting of socially censured behaviours. Quantitative and qualitative data were included to compare the feasibility and acceptability of the different methods. These comprehensive data informed data collection procedure for the final survey.

The primary aims of the work reported in this thesis are:

- To conduct an experimental comparison of four questionnaire delivery methods to determine the most valid means of collecting socially censured information from young people in rural Zimbabwe. The most valid method would then be used in the final outcomes survey for the parent trial.

- To use quantitative and qualitative research methods to refine and assess the feasibility and acceptability of the questionnaire delivery modes among rural Zimbabwean youth.

The specific objectives of the work reported in this thesis are:

- To use cognitive interviewing to develop and refine an existing self-completion questionnaire.
- To compare self-reports of socially censured data including sexual behaviours, poverty, orphaning, and psychological morbidity, between four questionnaire delivery modes.
- To determine the reliability of sexual behavioural data collection through the triangulation of self-reported sexual behavioural data collected by four questionnaire delivery modes against biological markers of sexual activity such as HIV and HSV-2 antibody status and current pregnancy in females.
- To determine the reliability of sexual behavioural data through the comparison of responses by the same individual between two short time intervals using two different questionnaire delivery modes.
- To use quantitative and qualitative data to assess young people's acceptability towards the four questionnaire delivery modes.
- To compare item non-response rate and response rates of sexual behaviours between the two modes used in the final survey.

In summary:

- HIV is an important public health concern that dominates the health agenda in sub-Saharan Africa where is it primarily transmitted through unprotected heterosexual intercourse.
- Young people are at the centre of this epidemic and urgently require interventions to help them change their norms and behaviours before and after they become sexually active.
- Being able to measure sexual behaviour accurately is key to
    - understanding the sexual lifestyles that put people at risk of HIV;

    - developing appropriate sexual behaviour interventions, and;
    - having robust tools to measure impact of sexual behaviour interventions.
- Due to its private nature, measurement of sexual behaviour relies on self-report.
- As a result of its private nature and cultural social censuring, self-reported sexual behaviour is fraught with bias; methods to reduce recall and social desirability bias, particularly in young people, are required.
- A variety of questionnaire delivery modes exist to capture self-reported behaviours. Appropriate choice of questionnaire delivery mode may reduce these biases although little is known about their relative advantages and disadvantages in developing country settings.
- In this thesis I report on a trial of questionnaire delivery methods that was nested within a larger community randomized trial designed to evaluate the effectiveness of an innovative community-based adolescent reproductive health intervention.

In the following chapter, I assess the evidence from a systematic review of mode comparison around sexual behaviour reporting in developing countries. At the time this experimental evaluation was being designed, there were few comparative studies in non-industrialized countries and amongst young people in particular. However, during the time this research was carried out, interest in this field emerged and by the time this research was concluded there were a sufficient number of studies on which to make a more informed choice about questionnaire method selection.

2 A SYSTEMATIC REVIEW OF QUESTIONNAIRE DELIVERY MODES IN DEVELOPING COUNTRIES FOCUSED ON SEXUAL BEHAVIOUR

2.1 Introduction

Two decades into the HIV pandemic we are now aware that there is no single global epidemic, but rather a host of diverse ones (Wilson et al., 2008; UNAIDS, 2008). For countries in sub-Saharan Africa, who are host to generalized epidemics sustained within the population as a whole, the disease is primarily spread sexually. However our understanding of the sexual behaviours that drive this spread are limited by our ability to measure them. Measuring sexual behaviours is heavily reliant on self-reports which, due to the social taboos and sensitivity that surrounds them, are prone to social desirability bias. One important mechanism for improving our measurement of self-reported sexual behaviours is through the improvement of the questionnaire delivery mode used. Until recently, comparative research in this field has been dominated by studies conducted in North America or Western Europe. Interviewer-administered modes continue to govern the field in sub-Saharan Africa. This chapter presents the results of a systematic review of comparative studies from developing countries that assess the advantages and disadvantages of various questionnaire delivery modes for the measurement of sexual behaviours. At the time the experimental evaluation reported in this thesis was designed (2004), there were very few method comparisons from developing countries. This review assesses the evidence around questionnaire delivery modes, the results of which can be compared against this thesis' research results. An initial review was conducted during the formative development of the study which was subsequently updated to a more formal systematic review to reflect the current status in the field of methodological research.

2.2 Methods for the systematic review

Inclusion criteria: Studies were selected for review if they met the following criteria. Articles published or cited in peer-reviewed journals that compared two or more questionnaire delivery modes, had been conducted in a developing country, included data that reported on sexual behaviour (vaginal, anal, or oral sex, condom use, risky sexual behaviours, contraceptive use), and had been published between 1 January 1980 and 31 December 2008. While there is no established convention for the designation of a 'developed' or 'developing' country, the term is loosely defined to include those countries with lower standards of democratic governments, industrialization, social programmes, and human rights guarantees(Wikepedia, 2009; World Bank, 2009). In this review the countries listed as having 'emerging' or

'developing economies' by the International Monetary Fund World Economic Outlook report were considered a 'developing' country (International Monetary Fund, 2009). Studies were included if they were evaluated in an experimental (RCT), quasi-experimental (i.e. had non-randomised comparison group) or test-retest design. Studies were excluded if they were conducted in an industrialized country, compared one questionnaire delivery mode against a biological marker, or compared the impact of interviewer gender on questionnaire responses. Articles were also not included if studies compared data reported by married couples rather than between questionnaire methods.

Search strategy: Three databases were searched: Medline, EMbase, and PsychINFO. The search began using Medline Key MeSH terms and text words (see Table 2-1). These references, including their abstracts and key words, were imported into Reference Manager 10.0. Two additional searches in Embase and PsychINFO were conducted using key MeSH terms and text words relevant to each database (See Appendix A). These references were merged into the existing database that included the Medline references. Duplicates were manually discarded and the initial reference was kept[1]. This resulted in a total of 6822 references to be examined (Medline=3261; Embase=1761; PsycINFO=1800). Initial literature searches were downloaded between 7 and 12 September 2008. Each literature search was saved and any new articles that fit these search definitions were sent weekly to the author's email address. These additional searches were examined for any additional relevant articles until 31 December 2008 when the search was closed. In addition, the abstracts for the conference proceedings from the International Congress of Sexually Transmitted Infections (ISSTDR) were examined from 2001 onwards (2001, 2003, 2005 and 2007). Unpublished studies emanating from references of published articles and studies published in non-English language journals were considered for inclusion.

Analysis: Titles and abstracts were used to screen for relevance to the literature review. If questionnaire delivery method was not mentioned in the abstract, it was assumed only one method was used in the study. Likewise, if there was no abstract and the title did not mention a method, it was assumed there was no method comparison. For those articles where the title or abstract were not sufficient to make a determination, the article was downloaded and read. Reference lists for all included articles were also examined for additional relevant publications. Three percent of articles were re-examined blind by a co-investigator (Frances Cowan) to check that inclusion criterion were being met (there were no discrepancies during this check).

[1] Duplicates were checked against the authors, and article and journal title, but not against publication data as Ovid sometimes merged publication data with the journal title. As such, the more conservative approach was used and publication dates were checked manually in the generated duplicate list.

Table 2-1: Medline search strategy

1. data collection/mt or health surveys/ or interviews as topic/ or narration/ or questionnaires/
2. Sentinel Surveillance/
3. "reproducibility of results"/
4. validity.m_titl.
5. reliability.m_titl.
6. ("methodological study" or "methodological studies").mp.
7. evaluation studies as topic/ or "reproducibility of results"/ or validation studies as topic/
8. ("face to face" or FTFI).mp.
9. SAQ.mp.
10. self report$.mp.
11. ("randomized response" or "randomised response").mp.
12. coital diar$.mp.
13. (ACASI or CAPI or CASI).mp.
14. (respondent or "non respondent").mp.
15. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14
16. exp Reproductive Behavior/
17. exp Sexual Behavior/
18. HIV Infections/pc
19. Sexually Transmitted Diseases/pc
20. ("sexual behavior" or "sexual behaviour").mp.
21. ("sex behavior" or "sex behaviour").mp.
22. ("sexual behavioral" or "sexual behavioural").mp.
23. ("oral sex" or "anal sex").mp.
24. (sexual adj9 activit$).mp.
25. ("sexual orientation" or "sex orientation").mp.
26. ("unprotected sex" or "protected sex").mp.
27. ("unsafe sex" or "safe sex").mp.
28. high risk sex.mp.
29. ("extra marital" or extramarital).mp.
30. ("sexual intercourse" or "first intercourse").mp.
31. coital frequenc$.mp.
32. ("sexual partner$" or "multiple partner$").mp.
33. ("condom use" or "condom usage").mp.
34. "use of condoms".mp.
35. ("reproductive behavior" or "reproductive behaviour").mp.
36. exp Contraception Behavior/
37. contracepti$.mp.
38. "family planning".mp.
39. 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38
40. developing countries/ or exp africa/ or exp caribbean region/ or exp central america/ or exp latin america/ or exp south america/ or asia/ or exp asia, central/ or asia, southeastern/ or borneo/ or brunei/ or cambodia/ or east timor/ or indonesia/ or laos/ or malaysia/ or mekong valley/ or myanmar/ or philippines/ or thailand/ or vietnam/ or asia, western/ or bangladesh/ or bhutan/ or exp india/ or afghanistan/ or iran/ or iraq/ or lebanon/ or turkey/ or nepal/ or pakistan/ or sri lanka/ or far east/ or china/ or mongolia/ or exp europe, eastern/ or exp luxembourg/ or mediterranean region/ or exp transcaucasia/ or exp indian ocean islands/ or pacific islands/ or exp pacific islands/
41. 15 and 39 and 40
42. 41
43. limit 42 to (humans and yr="1980 - 2008")

Any articles where I was unclear about inclusion were discussed with Dr Cowan. All articles included in the review were jointly discussed by both investigators.

2.3 Results of the systematic review

Of the 6824 references, 28 articles reporting on 26 studies met the inclusion criteria for this review (see Figure 2-1). While the bulk (14/26) of studies reviewed here were conducted between 2000 and 2004, almost two-thirds of them (18/26) were published between 2005 and 2008 (Figure 2-2). Some articles reported results from more than one study which were analysed separately here. Other studies were reported in more than one article; these were combined for analysis. Studies ranged geographically (from China, to Hanoi, to rural Malawi) and in their selection of respondents (from female sex workers to South African students). SAQ was used as the comparison in five studies (see Table 2-2) whereas interviewer-administered questionnaires were the comparison in 16 studies (see Table 2-3). There were seven studies that included SAQ, an interviewer-administered mode, and at least one other mode for comparison (see Table 2-4.)

Before reporting on the results of this comparative review it should be noted that I have made the general assumption that an increase in reporting of a socially censured behaviour indicates more accurate reporting (reducing social desirability bias and increasing validity) (Durant & Carey, 2000; Weinhardt et al., 1998; Kreuter et al., 2008; Brener et al., 2003).

2.3.1 Comparison with SAQ

There were five studies that compared another method against SAQ and they all used ACASI or a derivative thereof (e.g. PDA or phone-ACASI) (see Table 2-2). Two of the studies were conducted in Asia (China and Thailand) with one study from Peru and two from South Africa. Of the five studies, two were conducted as randomized controlled trials (Rumakom et al., 2005; Seebregts et al., 2008), one was quasi-experimental (Fielding, Lam, & Hedley, 2006), and two focused on test-retest (Jaspan et al., 2007; Bernabe-Ortiz et al., 2008). Three of the studies included youth (Jaspan et al., 2007; Seebregts et al., 2008; Rumakom et al., 2005), all of whom were selected from a school going population (as young as 11 years and as old as second year of college).

2.3.1.1 Comparison of response rates

In the two studies where non-response rates were reported, SAQ performed poorly against ACASI and its derivatives in terms of item non-response rates. In the study by Jaspan *et al.* from South Africa, SAQ respondents were seven times more likely to have missing items than

Figure 2-1: Diagram of System Review

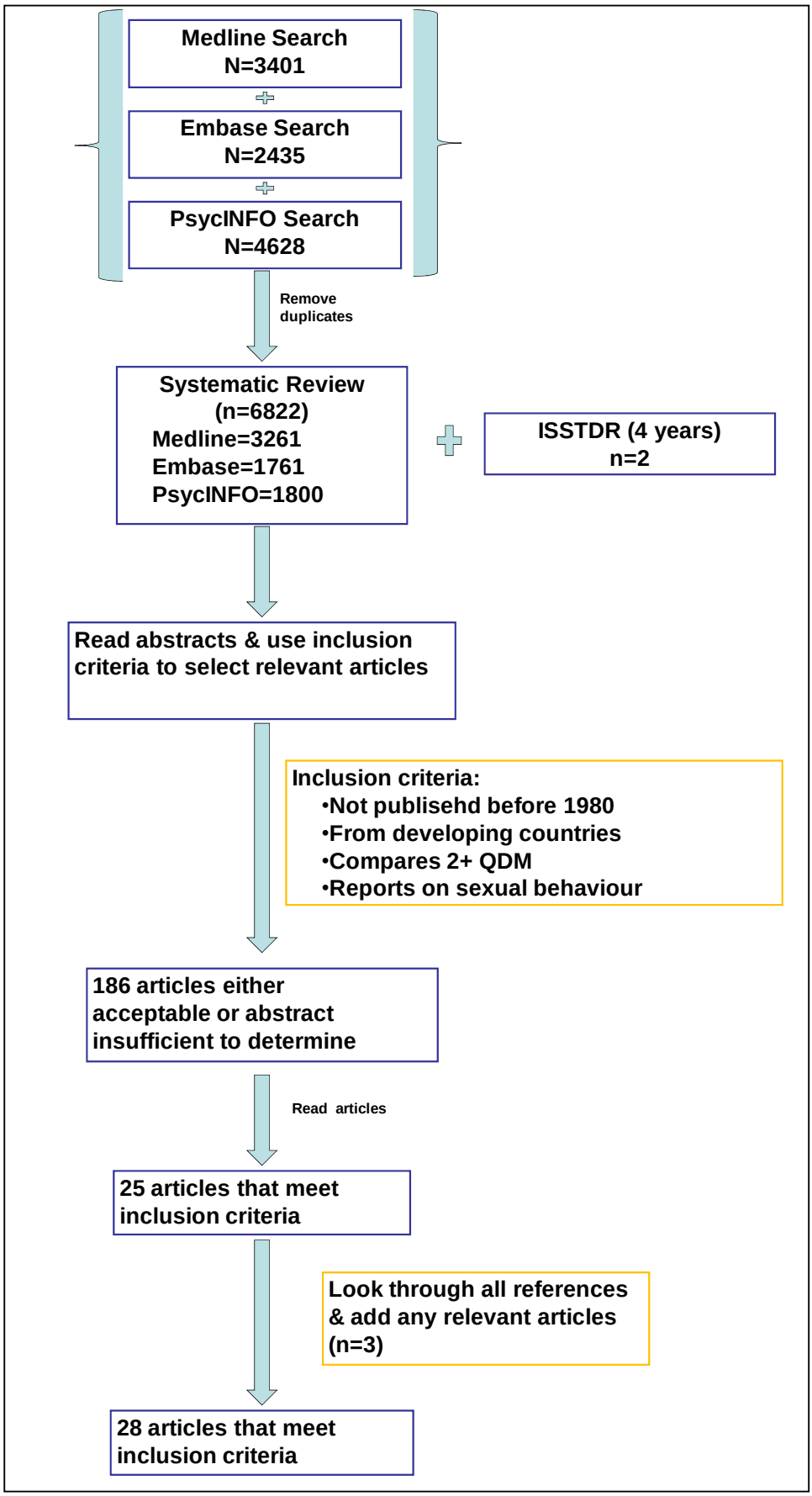
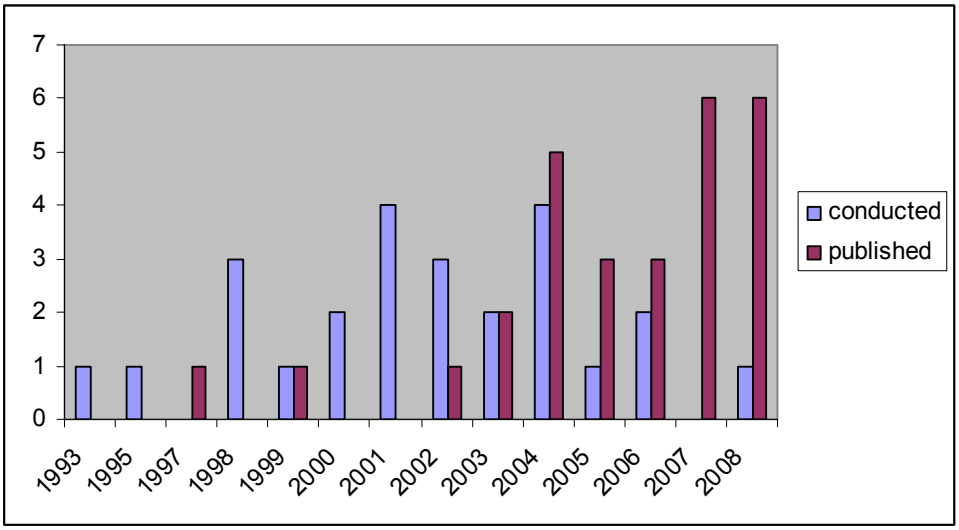


Figure 2-2: Comparison of timeframe when research was conducted against publications



respondents using PDA (Jaspan et al., 2007). In China, non-item response rates ranged from 8-14% with SAQ compared to 0.4-3.0% with phone-ACASI (Fielding et al., 2006).

2.3.1.2 Comparisons of reporting of sexual behaviours

Three of the five studies compared rates of reporting sexual behaviours with ACASI. Of these three, two showed an increase in reporting of sensitive behaviours using ACASI although these increases were not always statistically significant. In the Thai study, females were twice as likely to report masturbation using ACASI than SAQ (Rumakom et al., 2005). Despite small numbers of males reporting sexual activity (n=59) Thai college males were more likely to report more sexual partners in the last month and last three months with ACASI than with SAQ. In China, SAQ respondents reported lower levels of risk exposure compared to ACASI users when reporting homosexual sex (0.7% c.v 1.5%); bisexual sex (0.6% c.v. 2.6%, $p<0.001$); sex in the past year (50.3% c.v. 56.5%; $p=0.006$); and belief that their partner had sex with others (4.3% c.v. 7.0%; $p=0.005$) (Fielding et al., 2006). In the study conducted among South African youth, there were no differences in reporting of behaviours between SAQ and PDA except for 'ever sex' where reporting was higher in SAQ (SAQ=36% c.v. PDA=26%; $p=0.003$) (Jaspan et al., 2007).

2.3.1.3 Reliability between modes

Two studies had respondents use both modes; in Peru respondents were asked to first take the questionnaire using SAQ and then retake it immediately afterwards using PDA (Bernabe-Ortiz et al., 2008). In South Africa, there was a two week gap between the surveys (Jaspan et al., 2007). In both studies, responses did not vary by mode or mode order. Response

Table 2-2: Comparisons with self-administered questionnaires (SAQ)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Key Outcomes Measured*	Modes Compared[a]	Internal comparison & *Bio-marker presence*	Results
Rumakom *et al.*, 2005 1999 Thailand	Representative sample of Thai college students males=293; females=372 6 FGDs on acceptability (31 ppts)	randomized control trial *mode acceptability* *response rate for sexual behaviours*	SAQ ACASI/no photos ACASI/photos	no *no*	• Increased reporting and appreciation of ACASI o Females 2x as likely to report masturbation in both ACASI modes than SAQ (ACASI-no photos=18.2% c.v. ACASI photos=16.4% c.v. SAQ=6.8%*). o Males mean number of sexual partners in last 3 mo. (ACASI photos=1.40** c.v. ACASI no photos=1.31 c.v. SAQ=0.78); o Males mean number of partners in last month (ACASI no photos=0.70 c.v. ACASI photos=0.88*c.v. SAQ= 0.57). • Minimal inconsistency in reporting with SAQ
Seebregts *et al.*, (in press) 2003 Cape Town, South Africa	200 8th grade students in one public school, mean= 14.yrs.	randomized control trial *level of agreement compared using test-retest* *mode acceptability*	SAQ PDA 3 wks later, retook Q using same mode	yes *no*	• Test-retest reliability on sexual risk behaviours was similar in both modes (differences were not statistically significant) • Acceptability: most students thought PDA would be more confidential when answering sex Qs.
Fielding *et al.*, 2006 January-March 2001 China	15,092 adult volunteer blood donors	quasi-experimental *item non-response rate* *response rate for sexual risk behaviours*	SAQ phone-ACASI	no *no*	• Increased reporting with phone-ACASI o homosexual (1.5% c.v 0.7%) o bisexual (2.6% c.v. 0.6%***) o sex in past yr (56.5% c.v. 50.3%; p=0.006) o thinks partner has sex with another (7.0% c.v. 4.3%; p=0.005) • For risk behaviour Qs, non-item response rate was higher in SAQ than phone (SAQ=8.0-14.2% c.v. phone-ACASI=0.4-3.1%).

Table 2-2 (cont'd)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Key Outcomes Measured*	Modes Compared[a]	Internal comparison & *Bio-marker presence*	Results
Bernabe-Ortiz *et al.*, 2008 August 2005 Lima, Peru	200 household surveys 18-29 yrs, mean=22.9 yrs	test-retest *response agreement by educational level*	SAQ PDA	yes, immediately after *no*	• High levels of agreement (<85%) in test-retest: o Spearman rho between 0.76-0.95 o Agreement improved with increased education
Jaspan *et al.*, 2007 August 2004-March 2005 Cape Peninsula, South Africa	212 adolescents 11-19 yrs mean=14.5 yrs, 68% female	test-retest *feasibility & acceptability* *non-item response rate* *response rate for sexual behaviours*	SAQ PDA	yes, 2 weeks later *no*	• No differences based on questionnaire mode order. • Approx. 7x more missing items in SAQ than PDA. • High levels of agreement (85%) in test-retest: o Kappa=0.5 or greater; o correlation coefficient 0.65-0.91 No differences in reporting of sexual behaviours, except 'ever had sex' (SAQ=36% c.v. PDA=26%, p=0.003).

[a] Modes: **ACASI**=audio computer-assisted survey instrument, where questions and responses are heard through headphones and respondent enters their response through the computer (desktop or laptop); **PDA**=personal digital assistant is a hand-held computer where questions and responses are read (and/or heard) and respondents enter responses directly into computer, **phone-ACASI**=survey conducted over the phone using computerized data entry system (phone keypad used to enter responses).**SAQ**=self administered questionnaire using paper and pen;
* p<0.05; **p<0.01; ***p<0.001

agreement between the two modes was high at 85% and a Kappa of 0.5 or greater. In a second South African study, school-going youth were asked to retake the questionnaire three weeks later but used the same mode as before (Seebregts et al., 2008). For both modes, test-retest reliability was similar.

2.3.1.4 Acceptability of modes

When asked about the acceptability of the two questionnaire delivery modes (SAQ and ACASI), respondents were more likely to report that ACASI and its derivatives were more confidential when answering sexual behavioural questions. In the Thai study, 7.8% of college females who used SAQ reported feeling embarrassed answering the sexual behaviour questions compared with less than 1.5% of female ACASI respondents (Rumakom et al., 2005). In South Africa, students reported little difficulty using the PDA; however, while 70% reported enjoying it, an equally large proportion (57%) also found SAQ highly acceptable (Jaspan et al., 2007).

2.3.2 Comparisons with Face-to-Face Interviewing (FTFI)

A total of 16 studies compared face-to-face interviewing against another mode; eight of which were against ACASI (see Table 2-3). Four studies explored an adaptation of face-to-face interviewing which allowed respondents to self-report sensitive questions on a ballot card (Hanck et al., 2008; Gregson et al., 2002b; Gregson et al., 2004; Phillips et al., 2007). One study from India compared an additional mode which they termed 'interactive interviewing' (Jaya, Hindin, & Ahmed, 2008). This mode included a five segment tape-recorded drama intended to desensitise respondents around sensitive issues. Interviewers also used dolls to ask questions about same-sex behaviours. As in the three studies above, respondents also used a confidential ballot sheet to record their answers to sensitive questions. Four other studies compared face-to-face interviewing against in-depth interviewing (n=1) (Konings et al., 1995), coital diaries (n=2) (Allen et al., 2007; Ramjee et al., 1999) or used a derivative of SAQ where the questions were read aloud in a group setting (n=1) (Plummer et al., 2004a; Plummer et al., 2004b). A wide geographical scope was covered with four studies from Central and South America (Peru=2; Brazil=2), nine studies from East and Southern Africa (Tanzania=2; Zimbabwe=4; Uganda, Malawi, and South Africa), and six studies from Asia (India=4, China, and Indonesia).

As shown in Table2-3, eight studies were conducted as randomized controlled trials (Phillips et al., 2007; Caceres et al., 2007; Minnis et al., 2007; Simoes, Bastos, Moreira, Lynch, & Metzger, 2006; Jaya et al., 2008; Mensch, Hewett, Gregory, & Helleringer, 2008; Hewett et al., 2008; Allen et al., 2007), five as quasi-experimental studies (Konings et al., 1995; Gregson et al.,

2002b; Gregson et al., 2004; Bernabe-Ortiz et al., 2008; Hanck et al., 2008) , and three focused solely on test-retest (Sedyaningsih-Mamahit & Gortmaker, 2003; Plummer et al., 2004a; Plummer et al., 2004b; Ramjee et al., 1999). Four studies focussed exclusively on youth (Plummer et al., 2004a; Plummer et al., 2004b; Mensch et al., 2008; Jaya et al., 2008). Some of the adult studies included young people (starting at either 15, 16, or 18 years), but results were not disaggregated by age.

2.3.2.1 Comparison of response rates

Only three of the 15 studies reported item non-response rates. Researchers may have omitted reporting this because the inherent advantage of interviewer-administered questionnaires is that by default interviewer presence renders it more difficult for respondents to ignore a question. In Gregson's initial study in Zimbabwe, while there was a lower item non-response rate in face-to-face interviewing when compared with ICVI , it remained below 5% (Gregson et al., 2002b). In India, low item non-response rates were also reported (Jaya et al., 2008). In Peru, where data entry was handled manually (FTFI) or directly into a PDA, the number of inconsistencies and missing responses was significantly higher in the FTFI ($p<0.001$) (Bernabe-Ortiz et al., 2008).

2.3.2.2 Comparisons of reporting of sexual behaviours

Overall, respondents using face-to-face interviewing reported lower rates of sensitive behaviours when compared against respondents using other questionnaire delivery modes. Of the seven studies that compared face-to-face with ACASI, all but one of which were conducted as RCTs, six of them showed increased reporting of various sexual behaviours in ACASI compared to face-to-face. In Brazil, among urban women, STI risk behaviours were consistently higher in ACASI; however this difference was only statistically significant for three behaviours (anal sex in the last six months: 33% versus 24%; $p<0.01$; no condom use with vaginal sex in the last month: 59% versus 51%;$p<0.01$; number of sex acts in last month with no condom: 7% versus 6%; $p<0.05$) (Hewett et al., 2008). In a second study from Brazil, respondents seeking drug treatment were randomly allocated to complete their questionnaire using either ACASI or FTFI (Simoes et al., 2006). In general, the adjusted odds ratio for sexual risk behaviours were higher among those using ACASI, with the exception of reports of sexual activity in the past six months and having multiple partners, where no differences were reported. In three instances the differences were statistically significant at the 0.05 level (MSM behaviour AOR=2.52 (95% CI 1.38-4.61); sex for drugs AOR=1.88 (95% CI 1.20-2.94); money for sex AOR=1.37 (95% CI 0.95-1.98)). Although not statistically significant, ACASI users

Table 2-3: Comparisons with Face-to-Face administered questionnaires (FTFI)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Biomarker presence*	Results
Jaya *et al.*, 2008 August-November 2004 India	1058 (males=583; females=475) 15-19 yrs (mean males=17, mean females=16). 1/3 in school.	randomized control trial *item non-response rate* *response rates for 10 items*	FTFI ACASI interactive interview	yes, same day: FTFI vs. ACASI (both ways) FTFI vs. interactive Interview (both ways) *no*	• Overall low item non-response rate (0.2-1.0%) • Increased reporting in ACASI vs. FTFI: o Males ever sex (27% c.v. 21%; p=0.03); o Males forcibly touched (26.2% c.v. 21.4%; p=0.09) • Increased reporting in FTFI vs. ACASI: o Been emotionally attached to someone (males 28.3% c.v. 17.6%; females 17.2% c.v. 6.0%; p<0.001) o Touched someone sexually (males 21.7% c.v. 10.7%; females 6.0% c.v. 1.3%; p<0.001). o Females receive forced sex (38.4% c.v. 14.2***). • Increased reporting in interactive interviewing vs. FTFI: o Males 'ever had sex' (28% c.v. 20%; p=0.002) o Males forcibly touched (27% c.v. 22%; p=0.04) o Females 'ever had sex' (7% c.v. 2%; p=0.002)
Hewett *et al.*, 2008 April-November 2004 Brazil	818 females 18-40 yrs	randomized control trial response rates for STI risk behaviours	FTFI ACASI	no *yes:* *Chlamydia* *Gonorrhea* *Trichonomoniasis*	• Increased reporting in ACASI: o anal sex in last 6 mo.: ACASI=33% c.v. FTFI=24%**; o never condom use with vaginal sex in last mo.: ACASI=59% c.v. FTFI=51%*; o mean no. sex acts w/out condom in last mo.: ACASI=7.0% c.v. FTFI=5.8%* • Increased reporting in FTFI: o vaginal sex in last 6 mo.: ACASI=83% c.v. FTFI=90%** • ACASI revealed stronger associations between risk behaviour and presence of STIs. 16 of 21 measures were positively associated (7 were statistically significant). • In FTFI, STI positive respondents were more likely to underreport risk behaviour than STI negative respondents.

Table 2-3: Comparisons with Face-to-Face administered questionnaires (FTFI)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Biomarker presence*	Results
Mensch *et al.*, 2008 June-July 2004 Balaka District Malawi	501 unmarried female adolescents aged 15-21.	randomized control trial randomized to method and to interviewer *test-retest using nurse interview response rate of sexual behaviours results compared to similar population of unmarried females in Kenya, see Hewett et al., 2004)*	FTFI FTFI/ACASI nurse interview at time of biomarker collection	no *yes* *HIV* *gonorrhea,* *Chlamydia* *trichomoniasis*	• Increased reporting in FTFI compared to ACASI in initial question on 'ever sex' • Increased reporting in ACASI compared to FTFI for all other sexual behaviour questions: o When composite measure ('ever had sex' and 'ever had sex with any partner') used: ACASI=57.8% c.v. FTFI=48.3%* o Partners who are not boyfriend: ACASI=42% c.v. FTFI=25% (see Hewett *el al.*, 2004 for similar results in Kenya). • More inconsistencies with ACASI users, first indicating no sex, then indicating a type of sexual partner.
Caceres *et al.*, 2007 December 2000-May 2001 Fuzhou, China Chennai, India Lima, Peru St. Petersburg, Russia Manhenga & Nkayi, Zimbabwe	both genders surveyed China: 199 18-40 yrs; markets India: 63 18-40 yrs; slums Peru: 69 18-30 yrs; slums Russia: 60 18-30 yrs; college dorms Zimbabwe: 54 16-30 yrs; rural villages	randomized control trial *Levels of Agreement* *Questionnaire duration* *response rates for 11 risky behaviour Qs*	CAPI ACASI	yes 2-3 days later *no*	• Reporting of sexual behaviours was similar in both modes, except in China where increased reporting using CAPI over ACASI ($p<0.01$) • ACASI took longer to complete than CAPI, especially in India & Zimbabwe.

Table 2-3: Comparisons with Face-to-Face administered questionnaires (FTFI)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Biomarker presence*	Results
Allen *et al.*, 2007 March-April 2004 Tanzania	150 women who are participants in microbicide feasibility trial 23% < 25 yrs 35% > 35 yrs	randomized control trial *mode acceptability response rates for sexual behaviours*	FTFI CD 3 types of support: a) min (n=49) weekly collection, FTFI at end (1 mo) b) med (n=46) weekly collection, FTFI in last 7 days c) intense (n=46) like (b) + unscheduled visit to help with CD comprehension	no *no*	• Increased reporting with CD than FTFI • As level of support increased, majority of sexual behaviours reported also increased. o Difference between medium and intensive levels of support is smaller and not sufficient to outweigh extra cost incurred for intensive support.
Phillips et al., 2007 unknown date Bangalore, India	595 men (MSM and transgendered) mean age=29 years	randomized control trial (2/3 Face vs 1/3 ICVI) *response rates for sexual behaviours*	FFTI ICVI	no *no*	• Increased reporting with ICVI • Paid for sex with FSW in the last year: 28% vs. 8%*** • No statistically significant differences for other sexual behaviours

Table 2-3: Comparisons with Face-to-Face administered questionnaires (FTFI)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Biomarker presence*	Results
Minnis *et al.*, 2006 June 2001-August 2003 Zimbabwe	655 (60%) 18-35 yrs sexually active females from larger Hormonal contraception-HIV study. HIV negative, not pregnant or trying to conceive.	randomized control trial *response rates for reporting pregnancy occurrence* *Validity of self-reported HC used against disbursement records*	FTFI ACASI	yes, in later study visits interviewed using different mode *no*	• Mode order had no effect on responses. • Increased reporting of pregnancy in ACASI (OR=1.5) • Increased inconsistent reporting in ACASI: 20% reported not using HC when it was distributed to them c.v. 5% in FTFI (note inconsistency reflects increase in socially undesirable status, since woman was *expected* to take HC).
Simoes *et al.*, 2006 September 2002-October 2003 Rio de Janeiro, Brazil	610 adults seeking drug Tx, who have used drug in past mo., have no psychiatric conditions or cognitive impairment. (18-93 yrs; mean=36 yrs); 85% male	randomized control trial *response rates for risky sexual behaviours*	FTFI ACASI	no *no*	• Increased reporting in ACASI, except for reports of sexual activity and having multiple partners. o MSM (AOR=2.52*) o sex for drugs (AOR=1.88*) o drugs for sex (1.30) o money for sex (AOR=1.37*) o sex with HIV+ partner (AOR=1.32) o inconsistent condom use (AOR=1.34) • ACASI users had decreased reporting of HIV testing, a socially desirable behaviour (AOR=0.82).
Hanck *et al.* 2008 April-June 2006 India	812 CSWs 18+ yrs	quasi-experimental picked every 3rd for ICVI *response rates for 7 a priori sensitive Qs*	FTFI ICVI (n=269) with cards for less literate women	no *no*	• Increased reporting of risky sexual behaviour with ICVI. o Client anal sex w/out condom (AOR=1.5; p=0.019); o client oral sex w/out condom (AOR 1.8*); o always used condoms w/ regular clients (AOR=0.4; p=0.012).

Table 2-3: Comparisons with Face-to-Face administered questionnaires (FTFI)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Biomarker presence*	Results
Bernabe-Ortiz *et al.*, 2008 August 2006 Lima, Peru	household surveys 18-29 yrs N=198, mean 22.7	quasi-experimental *response comparison by mode; allocated by random assignment of interviewer agreement*	FTFI CAPI (using PDA)	no *no*	• No differences in reporting between modes • Lower missing values and lower inconsistent responses using CAPI
Gregson *et al.*, 2002 July 1998-January 2000 Manicaland Province Zimbabwe	sexually experienced, literate individuals 15-49 yrs, R1 survey (road side trading centres, commercial and subsistence farming communities)	quasi-experimental *item non-response rate* *response rates for sexual behaviour Qs completeness and internal consistency of sexual behaviour questions in questionnaire*	FTFI ICVI	no *no*	• Low item non-response rate overall; higher in ICVI. • Increased reporting of multiple sexual partnerships with IVCI: o Current AOR males=1.33; p=0.028; AOR females=5.21*** o Past month: AOR males=1.71; p=0.002; AOR females OR=2.92*** o Past year AOR males=1.35; p=0.002; AOR females=1.97; p=0.003 • Multiple sex partners in past month: o Young males: AOR=1.78; p=0.01 o Single AOR=1.95; p=0.007 o Married males cohabiting AOR=2.08; p=0.035 o Males in subsistence farming AOR=6.04*** o Young females AOR=2.88* o Older females AOR=2.99* o Married women AOR=9.20; p=0.03 • Extramarital partners of married cohabiting women (currently, past month, & past year) were *only* reported in ICVI.

Table 2-3: Comparisons with Face-to-Face administered questionnaires (FTFI)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Biomarker presence*	Results
Gregson e al. 2004 July 1998-January 2000 July 2001-January 2003 Manicaland Province Zimbabwe	15-49 literate men and women (mean males=28 yrs; mean females=30 yrs) 2nd survey of a population based cohort n=6191	quasi-experimental *compared 1st round (see Gregson et al., 2002 above) with 2nd round response rates of sexual behaviours*	FTFI ICVI cohort used same method they had in 1st survey; new respondents (younger) used ICVI unless low literate who used FTFI	no *no*	• Increased reporting with ICVI found in first survey (see Gregson *et al.* 2002)diminished, esp. for uncommon behaviours. o In males, magnitude of OR was smaller than in first survey o In females, increased reporting for ICVI only with 'new sexual partner in last year (OR=2.37; 95%CI 1.67-3.37***); • Rates of missing responses & internal consistency remain similar to first survey.
Konings *et al.*,1995 1993 Uganda	490 15-49 yrs (male & female), + 60 intentionally selected CSWs	quasi-experimental (2 modes were alternated) *response consistency response rates sexual behaviours*	FFTI (long 5-30 min) FTFI (short 10-15 min) In-depth internal sub-sample	yes sub-sample of 75 respondents 3 wks later *no*	• Increased reporting for in-depth interview compared with both FTFIs. o Non-regular partner in last 12 mo.: o males: short=33.9% c.v. long=35.3% c.v. in-depth 45.5%; o females: short=10.7% c.v. long=13.9% c.v. in-depth 31.8% • Consistency: 23.3% respondents did not report sex in Qs but did report during in-depth interview.

Table 2-3: Comparisons with Face-to-Face administered questionnaires (FTFI)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Biomarker presence*	Results
Plummer *et al.*, 2004a Plummer *et al.*, 2004b September-December 1998 Mwanza, Tanzania	4958 youth who participated in both FTFI and ASCQ* FTFI/bio=9283: school grades 4-6, mean males=15.5 yrs & mean females=14.8 yrs. ASCQ=6079: school grades 5-6, mean males=15.6 yrs & mean females=14.6 yrs.	test-retest *agreement of responses* *response rates of sexual behaviours*	FTFI ASCQ	yes In 14 communities, ASCQ took place 5 wks earlier, in 6 communities the reverse *yes* *HIV* *gonorrhoea* *Chlamyida* *pregnancy (girls only)*	• Increased reporting of sexual behaviours in ASCQ • Consistency: o 77% agreement between 2 modes re 'ever had vaginal intercourse' o 62% of males & 41% of females report sex in both surveys. ↑ reporting for males in ASCQ (56% c.v. 52%***) • Increased reporting in ASCQ: o Ever sex: 40% c.v. 38% o Males forced sex: 5.8% c.v. <0.1% o Females forced sex: 12.3% c.v. 0.2% o 'I don't know' was greater in ASCQ than FTFI. • Among youth with positive biomarkers: o males had increased in reporting of self-reported sexual activity on ASCQ c.v. FTFI (75% c.v. 58%); o females had decreased reporting of self-reported sexual activity on ASCQ c.v. FTFI (31% c.v. 45%)
Sedyaningsih-Mamahit *et al.*, 2003 April 1995 Jakarka Indonesia	459 CSWs working in 228 brothels	test-retest *test-retest reliability between FTFI two weeks apart.* *response rates on condom use*	FTFI CD	yes 50 randomly selected for test-retest. 50 randomly selected to complete CD & collect used condom wrappers *no*	• Low response rate overall: over 2 wk period, of 50 CDs handed out, 40 (80%) were completed in at least one of the two weeks and 20 (40%) were completed in both weeks. • Increased reporting in CD: o 'never' condom use: 40% c.v 35% o 'occasional condom use': 50% c.v. 20% • Agreement between 2 weeks of CD: o condom 'never use': WK1=50% c.v. WK2=40% o 'occasional condom use: WK1=40% c.v WK2=30% o 'always' remained 20% for both weeks

Table 2-3: Comparisons with Face-to-Face administered questionnaires (FTFI)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Biomarker presence*	Results
Ramjee *et al.*, 1999 August-October 1998 Durban, South Africa	79 CSWs participating in vaginal microbicide trial; mean age=25 (range 18-44)	test-retest *agreement comparison of sexual behaviour reports*	CD FTFI weekly recall (WR) FTFI daily recall (DR) (WR asks how many partners in last month; DR asks how many on Monday, Tuesday, etc)	yes; each ppt was offered chance to participate in all three methods *no*	• Increased reporting using CD: • CD vs WR: o number of clients:23.3 vs 13.6*** o number of condoms:20.77 c.v. 10.32*** • CD vs DR: o number of days worked 6.7 c.v. 5.2; p=0.009 o number of clients 21.7 c.v. 17.4; p=0.027 o anal sex with clients 3.9 c.v. 0.8, p=0.004 • Complete agreement between vaginal sex with clients.

[a] modes: **ACASI**=audio computer-assisted survey instrument, where questions and responses are heard through headphones and respondent enters their response through the computer (desktop or laptop); **ASCQ**=assisted self completed questionnaire, where questions are read out loud by trained interview in a group setting (respondents spaced far apart); **CD=**Coital Diary where respondents self-complete a record of the sexual activity over time; **CAPI**= computer assisted personal interview, so interviewer administered & responses entered by interviewer into computer; **FTFI**: face-to-face interview interviewer administered questionnaire where trained interviewer asks questions and records respondent's answers; **ICVI**=interviewer controlled voting instrument where sensitive questions are recorded by respondent onto sheet and placed in locked ballot box; **In-depth interview**=trained interviewer spends considerable time (1 day to a few weeks) with respondent collecting data, questions are usually open-ended; **Interactive interview**=FTFI with several audio-visual aids (5 segment audio drama; male and female dolls, confidential response sheet); **phone-ACASI**=survey conducted over the phone using computerized data entry system (phone keypad used to enter responses); **Phone interview**=trained interviewers asks questions over a telephone.
* p<0.05; ** p<0.01; *** p<0.001

were less likely to report having been tested for HIV, a behaviour which is encouraged (AOR=0.85 95% CI 0.6-1.2).

Data from young people in India produced less consistent results where face-to-face interviewing was used as the comparison against both ACASI and interactive interviewing which included tools (e.g. drama, dolls) to help de-sensitise sensitive topics (see explanation in 2.3.2 above) (Jaya et al., 2008). More sexual behaviours were reported using interactive interviewing than face-to-face interviewing. When face-to-face interviewing was compared against ACASI, female respondents consistently reported fewer sexual behaviours in ACASI than FTFI. Females were two times as likely to report having been forcibly touched using FTFI (38.4% c.v. 14.2%; p<0.001). Reporting by males was more varied. While males were more likely to report having had sex (26.9% c.v. 21.4%; p=0.03) and having been forcibly touched (26.2% c.v. 21.4%; p=0.09) using ACASI, both male and females were more likely to report being emotionally attached to someone (males 28.3% c.v. 17.6%; females 17.2% c.v. 6.0%; p<0.001) or having touched someone sexually (males 21.7% c.v. 10.7%; females 6.0% c.v. 1.3%; p<0.001) using FTFI. For a number of other behaviours, there were no statistically significant differences in reporting between ACASI and FTFI.

In a study in Zimbabwe on hormonal contraception where eligibility of respondents was conditional on specific behaviours, ACASI users were more likely to report an undesirable study behaviour (Minnis et al., 2007). For example, it was a study condition not to get pregnant during the study and more pregnancies were reported in ACASI interviews than in face-to-face ones (OR=1.5; 95% CI 1.1-1.9). Likewise, the study asked some respondents to use hormonal contraception and 20% of ACASI users who had been given hormonal contraception reported not using it at the next study visit compared with only 5% of those who used FTFI. ACASI users were also more likely to report multiple partners than FTFI users (OR=5.7; 95% CI 2.1-15.2).

In two studies there were no reported differences using ACASI when compared against interviewer data collected using a computer (CAPI) (Caceres et al., 2007; Bernabe-Ortiz et al., 2008). In the five countries covered in these studies, a greater reporting of sexual behaviours using CAPI over ACASI was found only in China which the authors attribute to having a larger sample size (China n=199 c.v. <70 in the other countries) (Caceres et al., 2007). In the other four countries, where smaller numbers of respondents were recruited, no statistically significant differences were found (Caceres et al., 2007; Bernabe-Ortiz et al., 2008).

In the eight studies which compared face-to-face interviewing with a non-ACASI mode (ICVI, coital diaries, in-depth interviewing, and assisted self-completed questionnaires), all of them

found increased rates of reporting of sensitive behaviours against face-to-face interviewing. This was true for both socially desirable and socially undesirable behaviours.

Three studies compared FTFI against coital diaries, one in Indonesia (Sedyaningsih-Mamahit et al., 2003), one in South Africa (Ramjee et al., 1999) and one in Tanzania (Allen et al., 2007). In the two studies from Africa, women were respondents in a microbicide feasibility trial. In all three studies coital diaries provided increased reporting of sensitive behaviours. In Tanzania, increased reporting using coital diaries ($p<0.001$) were found for reports of vaginal cleaning (52.9% c.v. 36.4%), sex during menstruation (10.7% c.v. 0.7%), and sex with an irregular partner (28.4% c.v. 6.4%) when compared against FTFI (Allen et al., 2007). In Indonesia and in South Africa, which studied commercial sex workers, greater numbers of clients were recorded in coital diaries (South Africa) and there were increased reports of never using condoms (and a decrease in reports of always using condoms, a socially desirable status) (Indonesia) (Ramjee et al., 1999; Sedyaningsih-Mamahit et al., 2003). However, in South Africa, 36% (15/42) of the respondents reported forgetting to complete their diary at some point and all respondents reported keeping the diary hidden from their clients and regular partners. Diary loss was an even greater problem with the study in Indonesia, where only 20% of the 50 diaries were completed during the two week period asked of them (Sedyaningsih-Mamahit et al., 2003).

There were four studies that examined the use of an interviewer-controlled voting instrument (ICVI), where respondents marked their responses to sensitive questions privately and then posted them into a locked box. Two studies were in rural Zimbabwe which were run in the same cohort at two different time points, one was with commercial sex workers in India, and one with transgendered men and men having sex with men in India (Phillips et al., 2007; Hanck et al., 2008; Gregson et al., 2002b; Gregson et al., 2004). In Zimbabwe, while the differences were smaller in the second survey conducted three years later, sexual behaviours were more likely to be reported with ICVI than with a traditional FTFI. In the first survey, ICVI users were more likely to report multiple sex partners currently (males OR=1.33; $p=0.028$; females OR=5.21; $p<0.001$), in the past month (males OR=1.71; $p=0.002$, females OR=2.92; $p<0.001$), and in the past year (males OR=1.35; $p=0.002$, females OR=1.97; $p=0.003$). Married cohabiting women *only* reported extramarital partners when using ICVI. In both studies in India increased reporting of sensitive behaviours was also found with ICVI (Phillips et al., 2007; Hanck et al., 2008). This was true among commercial sex workers even when respondents breached the protocol (65/112) and disclosed their answers to the interviewer (Hanck et al., 2008). In the study from Bangalore, there was increased reporting among males of injecting drug use (4% vs 1%, $p=0.008$) and paying for sex with female sex worker (28% vs. 8%, $p=0.001$). However there

was no difference in reporting of sexual risk behaviours (never used a condom, non-condom use with main female partner, and selling sex to other men).

Mode order was only examined in one study where no difference were found (Minnis et al., 2007).

2.3.2.3 Comparison of respondent responses in two questionnaire delivery modes

Three studies examined agreement between a respondent's responses when they were asked the same questions using two different questionnaire delivery modes (Plummer et al., 2004a; Plummer et al., 2004b; Konings et al., 1995; Mensch et al., 2008). In Tanzanian school-going young people, respondents were administered the same questionnaire in two different modes (FTFI or ASCQ where respondents had the questions read aloud to them in a single gender group setting) five weeks apart (Plummer et al., 2004b; Plummer et al., 2004a). Sixty-two percent of males and 41% of females reported having sex in both surveys (Plummer et al., 2004a). There was 64.4% agreement in reporting of age at first sex and 47.3% agreement around the number of sexual partners (Plummer et al., 2004b). When differences in individual responses occurred, males were significantly more likely to report having had sex in ASCQ than in FTFI ($p<0.001$) (Plummer et al., 2004b). For questions on risky behaviours, such as condom use, forced sex, and pregnancy, respondents were more likely to report these behaviours in ASCQ. For example, while only one female reported being pregnant in both questionnaires, 1.4% reported pregnancy in ACSQ only compared to just 0.2% in FTFI only. Similarly, forced sex was reported by only one female in both surveys, but it was reported by 12.3% of females in ACSQ only compared with 0.2% in FTFI only (Plummer et al., 2004b). Similar findings were reported among males none of whom reported forced sex in both questionnaires but 5.8% reported it in ASCQ only and less than 0.1% reported it in FTFI only (Plummer et al., 2004b). There was also increased reporting of socially less desirable partnerships in ASCQ (stranger=4.4% c.v. 0.2%, $p<0.001$).

In Uganda, 23.3% of respondents reported not engaging in sex when asked in the face-to-face interview but then reported sexual activity in an in-depth interview (Konings et al., 1995). There was also a statistically significant difference ($p<0.01$) in reporting non-regular partners where differences were 10% higher in in-depth interviews among all three sub-samples (men, women, and female sex workers). In Malawi, amongst unmarried female adolescents, while not statistically significant, a larger proportion (8.2%; 95% CI 2.7-18.1) of ACASI users changed their response about sex from 'yes' to 'no' in a subsequent FTFI with a nurse than respondents who initially took an interviewer-administered questionnaire (6.5%; 95% CI 2.7-13.0) (Mensch et al., 2008).

2.3.3 Comparison of SAQ and FTFI against other modes

There were seven studies that compared both SAQ and FTFI with at least one other mode (including ACASI and its derivatives and random response technique). Six of these were conducted as randomized controlled trials (Langhaug et al., 2007; Potdar et al., 2005; Le et al., 2006; Mensch et al., 2003; Hewett et al., 2004; van Griensven et al., 2006), one used a quasi-experimental design (Lara et al., 2004) (see Table 2-4). Studies ranged geographically (Mexico, India, Viet Nam, Thailand, and Kenya) and five out of six of them focussed on youth (ranging from 15-24 years).

2.3.3.1 Comparison of response rates

Item non-response rates were reported in two studies (Langhaug et al., 2007; van Griensven et al., 2006). The study from Thailand found 80% of self-administered questionnaires had missing data and inconsistencies, this compared with 14% in those which were interviewer-administered (van Griensven et al., 2006). In this study no missing data or inconsistencies were found in ACASI and its derivative, PASI, questionnaires. In the study from Zimbabwe, item non-response was significantly higher with SAQ and Audio-SAQ than with ICVI and ACASI ($p<0.001$) (Langhaug et al., 2007).

2.3.3.2 Comparisons of reporting of sexual behaviours

Data on rates of reporting sexual behaviours are somewhat less clear. In India, two populations were studied, male college students who were asked to complete using SAQ, ACASI or undergo an interview, and similarly aged adolescent males living in slums who were asked to complete using either ACASI or undergo an interview (Potdar et al., 2005). In college males, there was increased reporting of sexual behaviours among ACASI users for heterosexual sex (AOR=1.8,$p<0.05$), oral sex with a female (AOR=2.08; $p<0.05$), homosexual sex (AOR=8.1; $p<0.05$) and having experienced coercive sex (AOR=11.35;$0<0.01$). In male youth living in slums, masturbation (AOR=22.53; $p<0.001$) and oral sex with a woman (AOR=2.4;$p<0.010$) was also higher among ACASI users. However, males residing in slums were less likely to report vaginal sex (AOR=0.23, $p<0.001$) when using ACASI compared with FTFI.

Data from youth in two districts in Kenya were also inconclusive. In both districts, youth reported more premarital sex to an interviewer than when using SAQ or ACASI (males 'ever sex' OR=0.58 against FTFI; females 'ever sex' OR 0.66 against SAQ). (Mensch et al., 2003). In addition, ACASI suffered from inconsistent reporting. Among unmarried 15-21 year old females, when they added a 'refuse to answer' button with ACASI, 14.7% of ACASI respondents refused to answer at least one sensitive question (Hewett et al., 2004). However, among females in Kisumu, when ACASI was compared against face-to-face interviews, researchers

found statistically significant ($p<0.001$) increased reporting for subsequent sexual behaviour questions around partnerships and types of sexual activity (sex with friend OR=6.26; sex with stranger OR=3.45; sex with male >10 years older OR 3.55) (Hewett et al., 2004). Part of this inconsistency may be attributed to study limitations, primarily political tension in one of the districts (Nyeri) which could have caused mistrust around data collection in these rural communities (Mensch et al., 2003).

Mensch and colleagues also report that in this same district, they experienced a lower assignment to ACASI, which would not be expected with randomization. Anecdotal data suggests that some interviewers might have over-allocated face-to-face interviews to themselves in the 'hope that by conducting more interviews, they would be looked upon favourably for possible future employment." ((Hewett, Erulkar, & Mensch, 2003), p.20). In countries where jobs are scarce, it may be necessary for researchers to be aware of the possible threat that ACASI holds for local field staff.

In addition to studying sexual behaviours, the study in Viet Nam also explored young people's attitudes and norms around sexual behaviours and their self-efficacy around condom use comparing SAQ, FTFI, and ACASI (Le et al., 2006). Respondents using ACASI were more likely to report liberal attitudes around premarital sex (a socially censured norm) and to report less confidence in their ability to access condoms (a socially condoned behaviour). More females refused to answer questions about condom use and refusals were greatest amongst SAQ and FTFI users. With regards to self-reports, ACASI users were more likely to report having experienced sex before marriage, and unmarried males were twice as likely to report having had sex with a commercial sex worker (OR=2.8, $p<0.05$). Younger males aged 15-19 were also two times more likely to report having had sex using ACASI (OR=2.79, $p<0.05$).

In both the Zimbabwean and Thai study, four modes (SAQ, FTFI, ACASI, PASI) were compared (van Griensven et al., 2006; Langhaug et al., 2007). In the Thai study, data generally showed no difference in reporting of sexual behaviours between SAQ, ACASI, and PASI when compared against each other. There was also no statistically significant difference between ACASI and its derivative PASI around reporting of sexual behaviours. However, regarding self-reports of the most sensitive behaviours, there was a statistically significant difference ($p<0.001$) between PASI when compared against FTFI (history of oral sex 37.3% c.v. 13.2%; sex today/yesterday 19.3% c.v. 6.1%; sold sex 8.2% c.v. 0.9%; bought sex 8.2% c.v. 2.5%). In the Zimbabwean study, after adjusting for covariates, Audio-SAQ and ACASI users were twice as likely to report sexual activity when compared to SAQ users (Audio-SAQ AOR=2.05 [95% CI: 1.2-3.4]; ACASI AOR=2.0 [95% CI: 1.2-3.2]), with no reporting difference between ICVI and SAQ users (ICVI AOR=1.0

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Bio-marker presence*	Results
Langhaug *et al.,* 2007 January-April 2006 Rural Zimbabwe	1495 youth (males 827; females 668) mean age=18.2 years,	randomized control trial *non-item response rate* *response rates sexual behaviours*	ICVI SAQ Audio-SAQ ACASI	yes *yes*	• Non-item response rate greatest in SAQ and Audio-SAQ*** • Increased reporting for ACASI • Sexual activity Audio-SAQ AOR=2.05 [95%CI: 1.2-3.4]; ACASI AOR=2.0 [95%CI: 1.2-3.2]) with no reporting difference for ICVI and SAQ (AOR=1.01.0 [95%CI: 0.6-1.8). • ACASI users reported a lower age at first sex (0.7-1.7 years lower) (p<0.045).

Potdar *et al.*, 2005
July-November 2003
Pune,
India
	unmarried males aged 18-22 yrs
	900 male college students (from 4 colleges);
	600 males living in 2 slums
		randomised control trial
		
		response rates sexual behaviours
			college:
			FTFI
			SAQ,
			FTFI/ACASI
			slums:
			FTFI,
			FTFI/ACASI
				no
				
				no
					• Increased reporting in ACASI:
					  • College males:
					  o Heterosexual sex AOR=1.8*
					  o Oral sex with female AOR=2.08
					  o Homosexual sex: AOR=8.10*;
					  o Experienced coercive sex AOR=11.35*
					  • Slum males,
					  o Masturbation (AOR=22.53);
					  o Oral sex with female (AOR=2.4);
					  o Anal sex with female (AOR=3.87);
					  o Oral sex with male (AOR=3.20).
					• Increased reporting in FTFI:
					  o Vaginal sex AOR=0.23*
					  o Anal sex with men AOR=0.59.

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Bio-marker presence*	Results
Le *et al.*, 2005 2006 Hanoi Viet Nam	2761 15-24 yrs, living in 2 towns; mean age=20 yrs	randomized control trial *response rates sexual behaviours, self efficacy Qs, and attitudes & norms*	FTFI SAQ ACASI	no *no*	• Increased reporting in ACASI: o 'Ever sex' (adol. 15-19 yrs OR=2.79**, unmarried OR=1.77***) o Sex w/ CSW (adol. 15-19 yrs OR=4.88, unmarried OR=2.08**). o Sex before marriage (both genders; females 2x***). o Liberal attitude towards Qs re norms and values. • Decreased reporting in ACASI (note that both of these are socially desirable behaviours) o Less confidence in accessing condoms***. o Refuse to complete question on correct condom use, FTFI=42%, SAQ=44%, ACASI=28% (females were more likely to refuse to answer this question)
Mensch *et al.*, 2003 April-October 2000 Nyeri, Kenya	unmarried adolescents aged 15-21 in 2 districts: Nyeri (n=4358)	randomized control trial Asked f/up sex Qs only if respondent said they had had sex *inconsistent reporting; response rates for sexual behaviours*	FTFI SAQ ACASI* F/up exit interview *ACASI, laptop was closed - respondent listened to Qs & used external keypad	no *no*	• Decreased reporting of premarital sex in SAQ & ACASI than in FTFI. o males: SAQ OR=.42***, ACASI OR=.34*** o females: SAQ OR=.38***, ACASI OR=.36*** • Increased lack of trust with ACASI: ¼ of surveys took place with others present. However this seems not to have affected responses: 41% of males with others present reported having had sex c.v. with 39% for those who took it independently. ** author notes study had limitations in that interviewers did not respect random allocation of modes and political tension in the area possibly causing mistrust around data collection in these rural communities.*

Table 2-4: Multiple Comparisons: (SAQ,FTFI, and others)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Bio-marker presence*	Results

Mensch *et al.*, 2003
Hewett *et al.*, 2004
April-July 2002
Kisumu, Kenya
	unmarried adolescents aged 15-21 Kisumu (n=2172)
	
	Hewett *et al* 2004 reports on 709 unmarried female adolescents aged 15-21 from larger study by Mensch *et al* 2003 Hewett *et al* 2004 also only compares FTFI (n-349) with ACASI (n=360)
		randomized control trial
		
		80% power to detect 10% difference between modes
		All sex Qs were asked irrespective of response to 'ever had sex' Q.
		
		inconsistent reporting;
		item non-response rate
		response rates for sexual behaviours
			FTFI
			SAQ
			ACASI*
			
			F/up exit interview
			
			*ACASI, laptop was closed - respondent listened to Qs & used external keypad
				no
				
				no
					• Increased reporting with ACASI:
					o Sex with stranger (OR=4.25***);
					o Tricked or coerced (OR=3.35***);
					o Ever had STI (OR=2.52*);
					o Females 'had more than 1 partner' OR=2.35***).
					• Decreased reporting with ACASI:
					o Males 'ever sex' OR=0.58*** (against FTFI)
					o Females 'ever sex: OR=0.66** (against SAQ)
					o Females 'ever sex' 2x less (against FTFI).
					• Consistency: ACASI had increased rates of inconsistent reporting
					• 14.7% ACASI refused to answer at least one sensitive Q; FTFI answered all sensitive Qs.

Table 2-4: Multiple Comparisons: (SAQ,FTFI, and others)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Bio-marker presence*	Results
van Griensven *et al.*, 2006 late 2002 Chiang Rai, Thailand	1282 students aged 15-21 from 2 vocational schools; 49.9% male, 60.4% aged 16-19 yrs.	randomized control trial *item non-response rate* *inconsistent reporting response rates for sexual behaviours*	FTFI SAQ ACASI PASI	no *yes* *urine tested for amphetamine type substance, nicotine, and their metabolites*	• Missing data and inconsistencies were found in 80% of SAQ questionnaires, 14% of FTFI questionnaires; no missing data or inconsistencies were for found in PASI or ACASI questionnaires. • Increased reporting with FTFI: o Used contraception at last sex (a more socially desirable behaviour): compared against PASI o Ever had sexual contact (not sexual intercourse, but any sexual stimulation) FTFI=64.7%; SAQ=41.2%; ACASI=53.8% PASI=43.3% • Increased reporting for ACASI/PASI (SAQ not reported here as was always in between FTFI and ACASI/PASI:

	FTFI	ACASI	PASI
ever oral sex	13.2	42.9	37.3
ever sold sex	0.9	5.5	6.7
ever bought sex	2.5	7.1	8.2
ever had genital sore or ulcer	2.5	8.0	6.7
partner/self ever been pregnant	7.6	11.7	11.0

• Difference between PASI and ACASI not statistically significant.

Table 2-4: Multiple Comparisons: (SAQ,FTFI, and others)

Author, Publication Date Year Study Took Place Geographic Location	Description of Study Population	Study Design & *Results Reported*	Modes Compared[a]	Internal comparison & *Bio-marker presence*	Results
Lara *et al.*, 2004 November 2000 May 2001 Mexico	females 15-55 yrs in 3 pop'ns: a) 1480 in 3 public hospitals (11% in-patient) b) 612 in rural community c) 1000 in house-to-house survey in Mexico City	quasi-experimental *response rates for abortion*	FTFI SAQ ACASI RRT	no *no*	• RRT yielded highest reporting of attempted abortion in all 3 study samples (only statistically significant in one): o hospitals: 22% c.v. ACASI=13% c.v. FTFI=12%; p=0.012 • If omit RRT & examine only literate women, using logistic regression, SAQ reports highest number of attempted abortions. • Highest level of missing responses was with SAQ with 6.8% of questionnaires having missing data; SAQ was not feasible for illiterate women.

[a] modes: **ACASI**=audio computer-assisted survey instrument, where questions and responses are heard through headphones and respondent enters their response through the computer (desktop or laptop); **CD**=Coital Diary where respondents self-complete a record of the sexual activity over time; **FTFI**: face-to-face interview interviewer administered questionnaire where trained interviewer asks questions and records respondent's answers; **FTFI/ACASI**: Face to face interview for non-sensitive questions, followed by ACASI for sensitive questions; **In-depth interview**=trained interviewer spends considerable time (1 day to a few weeks) with respondent collecting data, questions are usually open-ended; **PASI**=palm-assisted self interviewing which is a derivative of ACASI using a hind-held minicomputer or palmtop; **RRT**= random response technique: interviewer administered where respondent is randomly asked either sensitive question or non-sensitive question and the interviewer records the response but does not know which question is being answered.
** p<0.05; *** p<0.001

[95% CI: 0.6-1.8) (Langhaug et al., 2007). ACASI users reported a lower age at first sex (0.7-1.7 years lower) ($p<0.045$). In a post-survey questionnaire, ACASI users reported increased ability to answer questions honestly ($p=0.004$) and believed their answers would be kept secret.

ACASI only performed poorly when compared against the random response technique (RRT) used to assess abortion rates in three sub-populations in Mexico (Lara et al., 2004). When asked about attempts to interrupt a pregnancy RRT users reported the highest rates of attempted abortion in all three study samples, but only the differences in the hospital survey showed statistical significance (RRT=22%, SAQ=19%, ACASI=13%, FTFI=12%, $p=0.012$).

However when RRT was dropped from the analysis because the response cannot be attributed to a specific question, respondents using SAQ reported higher numbers of abortions than the other two methods. Unfortunately, in the rural community survey (in Chiapas) SAQ also had the highest level of missing responses and illiterate women, who comprised 39% (121/313) of those randomly assigned to SAQ, were unable to complete the questionnaire using that method.

2.3.4 Inconsistent reporting between initial sex question and subsequent sexual behaviour questions.

Out of 26 studies included here, there were four where there was increased reporting in face-to-face interview over ACASI in the initial question on vaginal sex (Hewett et al., 2008; Hewett et al., 2004; Mensch et al., 2003; Mensch et al., 2008) (van Griensven et al., 2006). However, in all subsequent sexual behavioural questions, there were increased reports from ACASI users. Moreover, youth in Kenya and Malawi who used ACASI described a more varied picture of their sexual partnerships. Amongst unmarried female adolescents in Kenya, 56% of sexually active females using face-to-face interviews reported their boyfriend was their partner compared with only 10% of ACASI users who described the bulk of their partners as strangers, relatives, and older men ($\geq$10 years older) (Mensch et al., 2003). An analogous picture appeared with a similar population of unmarried female adolescents in rural Malawi (Mensch et al., 2008). Similarly, in Thailand, where the initial question was about sexual contact (not vaginal sex specifically), reporting was also higher here among FTFI users than in the three self-administered modes (SAQ, ACSI, PASI) (van Griensven et al., 2006). Yet, similarly, rates of reporting for subsequent sexual behaviour questions were lower with FTFI than with SAQ, ACASI, and PASI (reported in the section above and shown in Table 2-4).

2.3.5 Comparison with biological markers

While five of the 26 studies used biological markers as external comparators, only four of them examined sexual biomarkers (Langhaug et al., 2007; Mensch et al., 2008; Hewett et al., 2008; Plummer et al., 2004a; Plummer et al., 2004b), with one study evaluating drug use (van Griensven et al., 2008). Sexual biomarkers included Chlamydia, gonorrhoea, trichomoniasis, HIV, and current pregnancy in females. While prevalence of biological markers varied among studies involving adolescents, absolute numbers were relatively small. In Malawi where 84% of the study population was tested for biomarkers, one percent of the study population tested positive for Chlamydia (n=4), two percent for trichomoniasis (n=8), and six percent for both HIV (n=25) and gonorrhoea (n=23) (Mensch et al., 2008). Multiple STIs were rare. In Tanzania, only one percent of adolescents (males n=12 and females n=49) tested positively for one of the biological markers (HIV, Chlamydia, gonorrhoea, or pregnancy in females) (Plummer et al., 2004a). In Zimbabwe, seven young women (1.06%, 95% CI 0.28-1.84%) had acquired HIV since the baseline survey in 2003 as had one young man (0.12%, 95% CI 0.0-0.36%). Eight participants (males=1; females=7) were HSV-2 positive (0.54%; 95% CI: 0.2 – 0.9%). Sixteen young women were pregnant at the time of the survey. (Langhaug et al., 2007)

In the study from Brazil among urban women, those who used ACASI had stronger associations between their reported risk behaviours and STIs, with positive associations among 16 of the 21 self-reported sexual behavioural measures (seven of which were statistically significant) (Hewett et al., 2008). STI positive respondents using FTFI were more likely to underreport sexual behaviours than their STI negative peers. Among youth in Tanzania, fifty-eight percent of males and 29% of females with biomarkers reported being sexually active in both surveys. In the study from Malawi, the proportion of unmarried female adolescents who tested positive for a sexual biomarker but reported no sexual activity was similar between FTFI and ACASI; this occurred 8-10% of the time (Mensch et al., 2008). This lack of mode association may be because the absolute numbers of youth with positive biomarkers was very small and there were too few to demonstrate a difference.

2.4 Discussion

The results outlined here reaffirm data from elsewhere that questionnaire delivery modes do affect self-reported sexual behaviour (Tourangeau et al., 1996; Tourangeau et al., 2007; Turner et al., 1998; des Jarlais et al., 1999b; Metzger et al., 2000a). This systematic review however, is the first to examine data from developing countries that compares self-reports of sexual behaviours between various questionnaire delivery modes. Despite wide variation in geography and populations sampled, we found strong evidence that computer-assisted self-

administered interviewing decreases item non-response rates and increases rates of reporting of sexual behaviours. This was true when ACASI and its derivatives (PASI, phone-ACASI, CAPI) were compared against other self-administered and interviewer-administered questionnaire delivery modes. Data entry errors were also reduced when controlled by a computer programme: in studies where there were no differences in reporting of sexual behaviours, ACASI remained able to improve the quality of data entry (Jaspan et al., 2007; Bernabe-Ortiz et al., 2008; Seebregts et al., 2008).

Validation of self-reports against biomarkers for sexual activity were rarely available. And while small sample sizes amongst youth make it difficult to generate conclusions, the study among women in Brazil suggests more accurate reporting using ACASI than face-to-face interviewing.

These studies also support the acceptability and feasibility of using computers in developing country settings. In those studies where it was examined, ACASI and its derivatives were found acceptable, easy to use, and respondents, particularly female youth, reported feeling more comfortable using a computer to report sensitive behaviours than they did with other methods (Le et al., 2006; Rumakom et al., 2005) (Langhaug et al., 2007). A frequently cited randomised controlled trial that compared response agreement for non-sensitive questions between face-to-face interviewing and ACASI among three economic groups of women in Zimbabwe also supports the evidence found in this review (van de Wijgert et al., 2000) (It was excluded from this review on the basis that it only examined 'non-sensitive' endpoints.) In that study, women from all educational levels reported in qualitative data that they found ACASI easy to use and preferred it to FTFI. They reported feeling less embarrassed as there was no need for eye contact with ACASI and believed that individuals would be less likely to hesitate reporting sensitive behaviours using ACASI. Where acceptability has been examined, similar findings have emerged from the US (Metzger et al., 2000a; Millstein et al., 1983; Kissinger et al., 1999; Kurth et al., 2004). Acceptability of computer technologies may vary geographically and be related to level of exposure. Generally, an increased sense of trust and sense of privacy is expressed by those who live in countries where computers are less commonly used. An exception to this was found in the study from Kenya where youth in one district expressed distrust and suspicion of the technology. Here, qualitative data attributed this lack of trust to the existing political tension in the area.

Results of studies that did not compare ACASI emphasize that *any* effort made to improve the environment (e.g. providing increased privacy or an impression that confidentiality is being maintained) when answering sensitive questions increases the reporting of sexual behaviours

(Jaya et al., 2008; Hanck et al., 2008; Gregson et al., 2002b). This includes work conducted by Gregson and Hanck using informal confidential voting boxes and interactive interviewing assessed in India (Gregson et al., 2002b; Hanck et al., 2008; Jaya et al., 2008). ACASI has not been compared to interactive interviewing and more research comparing these modes are needed in order to better establish their comparative strengths and limitations. Additional research probing respondent's reactions around the comparative acceptability of these modes would also increase our understanding of any differences found. In particular it could help ascertain how the alterations made to face-to-face interviewing are perceived by the respondent. For example with ICVI or interactive interviewing, do respondents experience an increased sense of privacy or find that an increased sense of confidentiality is being maintained - or both – when compared to interviewer-administered modes? Recent research has highlighted the need for more data on the opinions of users which should be incorporated into randomized controlled trials of questionnaire delivery mode comparisons (Kaplan, 2001; Kushniruk, 2002).

The two studies that compared coital diaries also demonstrated increased reporting of sensitive behaviours (Ramjee et al., 1999; Allen et al., 2007). Given that data from coital diaries is collected prospectively, it is possible that the increase noted is due to less reliance on recall, decreasing the impact of this bias. Authors however, highlighted a number of limitations to using coital diaries. Firstly, they require more logistical support than other methods. Ensuring appropriate completion requires respondents to be trained and diaries need to be dropped off and collected within certain time periods. Secondly, coital diaries have a low completion rate (20% in one study). Finally, additional time must be factored in for data entry. One approach to balancing their increased administrative requirements against their enhanced reporting possibilities is to include coital diary data from a sub-sample of a study population to complement the data collected from a larger survey.

One of the strengths of this review is that a number of the studies reported both socially censured and socially sanctioned behaviours (Hanck et al., 2008; Le et al., 2006; Lau et al., 2003; Potdar et al., 2005; Sedyaningsih-Mamahit et al., 2003; Minnis et al., 2007; Simoes et al., 2006). Conclusions drawn from these studies are strengthened when users of a mode are found to report not only an increase in socially censured behaviours but also a decrease in reporting of socially acceptable behaviours (Tourangeau et al., 2007). Reports for computer self-administered questionnaires followed this pattern. In a study in India, more college men using ACASI reported engaging in violent behaviour after drinking than those using FTFI (3.0 vs. 1.7%) (Potdar et al., 2005). Similarly, in a study in Zimbabwe where hormonal contraceptive

use was a study prerequisite women were more likely to report that they were not using them in ACASI compared to FTFI (Minnis et al., 2007).

Equally heartening is the growing comparative literature around questionnaire delivery modes in developing countries. As shown in Figure 2-1 above, over 50% of studies reviewed here were conducted between 2000 and 2004, however, almost two-thirds of them were published between 2005 and 2008, after the QDM trial was already underway. There has also been an increased interest in ACASI and its derivatives: of the 28 studies reported here, 20 of them included ACASI in their comparison (and 17 of those have been published since 2003).

There are however, some limitations to this review. A number of studies did not show statistically significant differences around reporting of sexual behaviours between questionnaire delivery modes. This is in part attributable to the small sample size of these studies, or when youth were sampled, the small number who reported sexual behaviours overall. Studies did not report the same sexual behaviour outcomes, nor did they always disaggregate their data by gender or age. This made it difficult to make comparisons across studies or to conduct a meta-analysis. There were only three studies that included biological markers of sexual behaviour as part of their analysis. Biological markers offer complimentary evidence that can be used to explore directions of effect. For most sexual behaviour variables, it is assumed that higher levels of reporting represents more valid reporting, but the ability to triangulate against objective data improves our understanding of the differences in self-reported sexual behaviours between questionnaire delivery modes. Researchers are encouraged to incorporate biological markers (or other externally valid outcomes) into these evaluations whenever possible so as to broaden the evidence within these comparative studies.

There is one anomaly that emerged within this review that bears comment. When FTFI was compared against ACASI (and its derivatives) a number of studies noted increased rates of reporting in the initial sexual behaviour question using FTFI, a pattern which was subsequently reversed in the following sexual behaviour questions (Hewett et al., 2004; van Griensven et al., 2006; Jaspan et al., 2007; Mensch et al., 2008). It bears noting that this discrepancy took place in studies where respondents were youth, and two of the studies focussed only on unmarried adolescent females for whom this behaviour is highly censured. These discrepancies seem plausible when you consider the greater difficulty around changing your response in front of a person compared with an inanimate object such as a computer. As reported above, qualitative data on acceptability of ACASI emphasizes that it decreases embarrassment around answering sensitive questions. As such, these initially lower rates of reporting could be attributed to an

initial hesitation in reporting sexual activity, where, once primed, a respondent might find it easier to answer subsequent questions. This possibility is supported by data from Hewett *et al.* who report that a large majority of their discrepancies in ACASI came from those respondents who initially denied being sexually active and then selected a sexual partner or acknowledged experiencing coerced sex (Hewett et al., 2004).

In 2003, a technical meeting on "Measurement of Trends in Sexual Behaviour" called for more rigorous comparative studies to be conducted before anything more definitive could be concluded (Cleland, Boerma, Carael, & Weir, 2004). Since then, there has been a noteworthy increase in the number of published articles in peer-reviewed journals reporting on comparisons of questionnaire delivery modes. For this review, which focussed exclusively on research performed in development country settings, the majority of articles were published after 2003 (n=21/28). Data here strongly suggest the use of computer assisted methods.

This is important when we realise that the principal data collection tool for sexual behaviours in developing countries remains the interviewer-administered questionnaire. Despite the continued need for more rigorous comparative research, it would seem detrimental to research goals to continue to employ interviewer-administered questionnaires when such a wide variety of self-administered options are available.

Others are also echoing for this shift. Macro Inc, responsible for the Demographic Health Surveys conducted globally, have recently begun to use computer-administered questionnaires (Macro International Inc., 2009). And if we look beyond the narrow confines of sexual behaviour research, a recent review from South Africa on the use of hand held computers in resource poor settings presents compelling data from seven studies and over 90,000 interviews that the advantages to the respondent and researcher outweigh the initial outlay costs (Seebregts et al., 2008). It seems we owe it to ourselves and our respondents to move in this direction.

3 FORMATIVE RESEARCH CONDUCTED WITHIN COMMUNITY RANDOMIZED TRIAL

3.1 Rationale for developing a community-based HIV prevention programme for youth

As outlined in Chapter 1, young people remain at the centre of the HIV epidemic. Those living in southern Africa, and young girls in particular remain at greatest risk. Interventions are urgently needed to help young people engage in safer sexual behaviours (Shaw & Aggleton, 2002; UNAIDS Interagency Task Team on Young People, 2006). While numerous programmes aimed at adolescents have been developed over the course of the epidemic, relatively few have been rigorously evaluated, particularly in sub-Saharan Africa (Kirby et al., 1994; Hughes & McCauley, 1998; UNAIDS Interagency Task Team on Young People, 2006; Ross et al., 2007; Jewkes et al., 2008). This chapter outlines the rationale for developing a multi-component adolescent reproductive health intervention for Zimbabwean youth and details the formative research that took place within the two surveys prior to the experimental evaluation that is this thesis.

Goaded by UNAIDS, through their rallying cry, "know your epidemic, know your response", there has been a wider recognition that there are a host of diverse epidemics that make up the global HIV/AIDS pandemic (Wilson et al., 2008; Mshana et al., 2006; Sherr et al., 2008). Its complexity is reflected in the dissimilar needs of varying age groups (adolescents emerging sexuality coupled with longer gap before marriage versus concurrency within married couples), target groups (needs of vulnerable populations such as injecting drug users, sex workers, and migrants versus countries hosting a generalized epidemic affecting the entire population), and sociological and biological effects of gender (intergenerational age of partnerships coupled with unequal gender relations). Moreover, the theoretical underpinnings of most interventions are not explicitly stated. In 2004 the Joint United Nations Programme on HIV/AIDS (UNAIDS) commissioned a series of systematic reviews to provide policy makers with evidence on the effectiveness of HIV prevention for young people (UNAIDS Interagency Task Team on Young People, 2006). Evidence was assembled for interventions conducted in schools, focused on specific vulnerable populations (e.g. injecting drug users), using mass media, improving young people's access to health services, and working within communities. There was good evidence that school-based interventions can reduce reported sexual risk taking, with the caveat that social desirability bias which is associated with self-reported sexual behaviour, can, in this context potentially lead to differential misclassification of behaviours between trial arms (Kirby & Obasi, 2006). There was also evidence that facility-based

programmes or ones that use outreach are effective in assisting young people specifically at risk (e.g. injecting drug users, commercial sex workers) (Hoffmann, Boler, & Dick, 2006). Interventions that used mass media demonstrated an increase in knowledge and condom use self-efficacy, and could positively influence social norms and inter personal communication (Bertrand & Anhang, 2006). There was also evidence that providing training to make health clinics more 'youth friendly' increased clinic usage by young people (Dick et al., 2006). However, this review found relatively sparse data to support or argue against the implementation of broader, more community-based approaches, which aim to change societal norms in order to support individual behaviour change (Maticka-Tyndale & Brouillard-Coyle, 2006).

Four types of community programmes were examined: those targeting youth through new or existing organizations and those targeting the community as a whole, either through kinship networks or through the entire community. Twenty two programmes met their inclusion criteria which included targeting 15-24 year olds, ensuring the programme was delivered in a developing country, describing the evaluation process and specifying one of the following outcome measures: HIV/AIDS knowledge, skills or reported behaviour related to preventing sexual transmission of HIV, HIV prevalence/incidence, and community awareness of the conditions that contribute to youth's vulnerability (Maticka-Tyndale et al., 2006).

Specific weaknesses within community-based studies included the lack of articulated theoretical frameworks (n=3/22) and lack of rigorous evaluation (only 9 of the 22 were experimentally designed). This made it difficult to assess many of the studies stringently. In the one study where HIV prevalence was evaluated it was not reduced significantly. In summary, none of the studies produced strong, unequivocal evidence of positive effects, but this was in large part due to their inability to be rigorously evaluated. Subsequent to the publication of this review, additional publications re-emphasized how young people's sexual risk behaviours needed to be understood and tackled within the broader socio-economic context in which they lived (Leclerc-Madlala, 2008; Luke, 2005; Wight et al., 2006).

In 1999, prior to the publication of this review, Zimbabwe's HIV epidemic was at its peak, with HIV rates among antenatal clinic attendees reaching over 35% (Ministry of Health & Child Welfare (Zimbabwe), Health Information and Surveillance Unit, & Dept of Disease Prevention and Control, 2000). Young people also had high risks of HIV infection. Among 15-19 year old female antenatal clinic attendees, 27% were infected with HIV. At that time, models predicted that 70% of 15 year old Zimbabwean males were expected to die of AIDS during their lifetime (UNAIDS, 1999). These high levels of HIV were compounded by the fact that nearly half of the

population was aged under 15, fuelling concerns that the epidemic was still growing. And yet, while HIV rates for older adolescents were high, rates in younger people aged 10-14 remained low. This gap between older and younger adolescents was seen by many as a 'window of opportunity' in which programmes could be implemented to prevent this population from becoming infected. It was within this context that the Regai Dzive Shiri trial was conceived (Power et al., 2004).

3.1.1 An adolescent reproductive health trial in Zimbabwe

In this chapter I describe the Regai Dzive Shiri[2] (RDS) parent trial that ran in rural Zimbabwe from 2002 - 2007 (NIMH RO1 MH65570 and RO1 MH 66570-04S2), following in-depth feasibility work conducted between 1999-2001 (funded by the Wellcome Trust GR058481AIA) (see Figure 3-1 for an overview of all RDS research). The overall aim of the RDS trial was to measure the effectiveness of a four year multi-component HIV prevention adolescent reproductive health programme in reducing the incidence of HIV- 1, *Herpes simplex virus type 2* (HSV-2), and unintended pregnancy in females among a cohort of rural Zimbabwean young people. The intervention worked directly with young people to improve their reproductive health knowledge and promote safer sexual behaviours. The community at large was engaged by working with adults and clinic staff within these communities (see section 3.3.1 below).

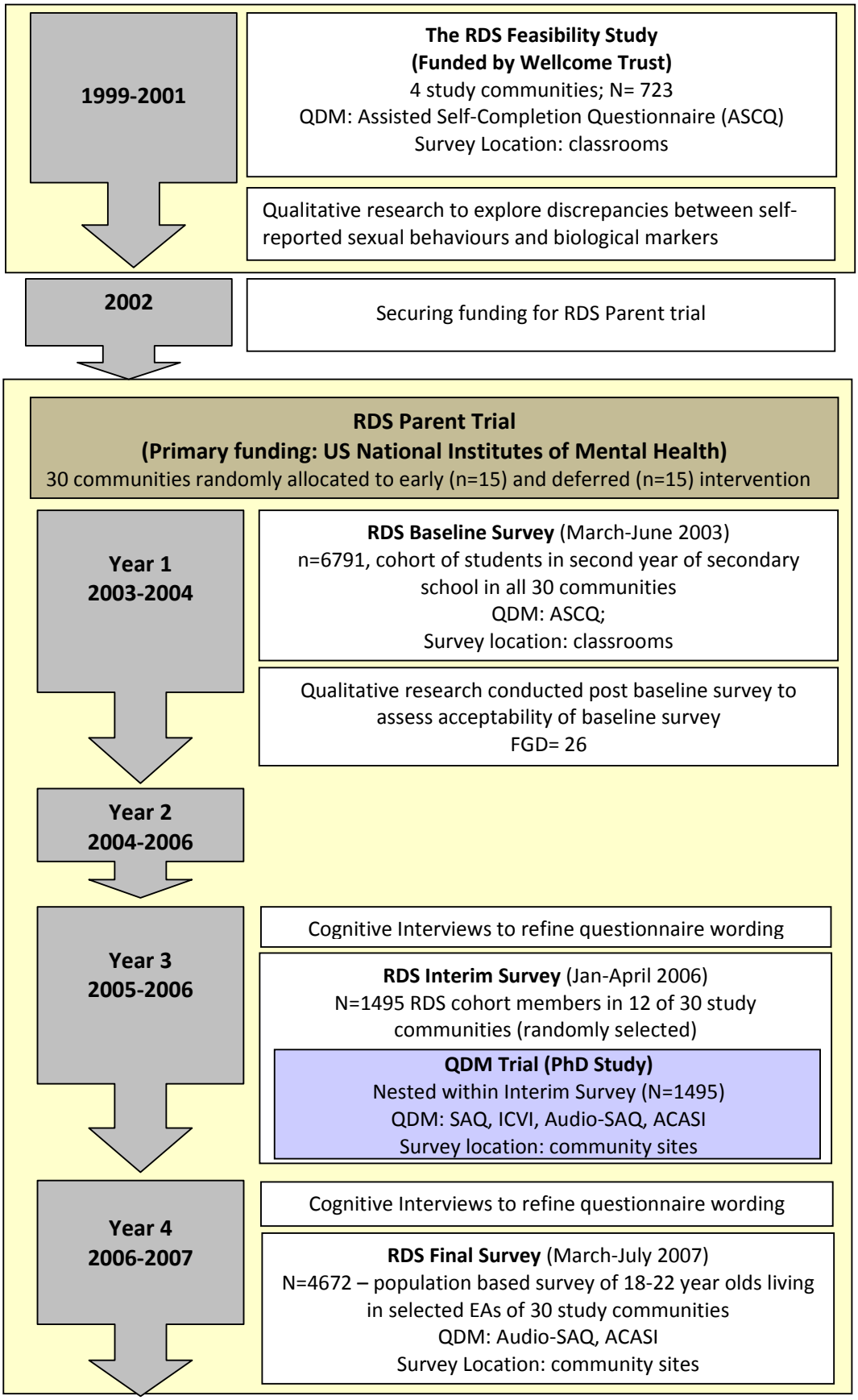
During both of these surveys particular attention was paid to exploring and improving the validity of self-reported sensitive behaviours. This formative research framed the development of the experimental evaluation of the four questionnaire delivery modes (the QDM trial) which was nested within the interim survey of the RDS parent trial (see Figure 3-1).

3.1.2 Ethics

Both the feasibility study, the parent RDS trial and its ancillary studies all received approval from the ethics committees at University College London, the London School of Hygiene and Tropical Medicine, and from the Medical Research Council of Zimbabwe (see Appendix B for copy of ethics approvals). Participants were told that they would not be given the results of their HIV or HSV-2 tests during the survey but that free voluntary counselling and testing services would be provided by research staff at community clinics for any community members wishing to know their HIV status, throughout the four years that the trial was underway.

[2] The trial's name is the first part of a Shona proverb "Regai dzive shiri mazaii haana muto" which literally translates as "give the eggs a chance to hatch because juicy birds are better to eat than eggs which have no sauce. The proverb is used to support the notion of giving young people time to group up. The name was suggested by pupils during formative focus group discussions in pilot study. The trial has become widely known as the Regai Dzive Shiri Project, and community members in study communities will often greet staff asking them, "how are your birds doing?"

Figure 3-1: Overview of RDS Trial Design



3.1.3 My role in this research

This thesis emerged through my work with the RDS trial both as the assistant project director during the feasibility study and the evaluation manager during the parent trial. In both capacities, I oversaw the day-to-day running of all research activities providing on-site management for the project in the office and in the field when research was being conducted. I was responsible for research administration including protocol and questionnaire development (conceptual frameworks and design of the four quantitative surveys and all qualitative research) and staff training and supervision (field surveyors and the qualitative research team). My direct involvement in all aspects of the RDS trial's research provided me with a more in-depth understanding of the specific challenges researchers face in accessing sensitive information from young people in the broader context of rural southern African life. The quality of the research that led to the experimental evaluation was enhanced by my full involvement in the trial from its onset during the feasibility study through to its conclusion. Specifically, by living and working full time in Zimbabwe, I was able to be in the field throughout the process which provided an invaluable contribution to the rigour of this work.

I formulated the specific research questions addressed here, designed and conducted the literature and systematic review that provides that background for this work, designed the variations of the questionnaires for each delivery mode, was highly involved in developing the analysis plan, conducted secondary analysis, interpreted the results, and wrote this thesis. In doing this, I received valuable advice from numerous individuals who were connected to this the RDS trial; primarily Frances Cowan (project director and principal investigator for the RDS project, who provided overall guidance), Robert Power (development of qualitative research), Lorraine Sherr (qualitative analysis) and Richard Hayes (research design and statistical analysis). Statistical expertise was provided for the RDS parent trial by Sophie Pascoe, the RDS trial statistician and by Yin Bun Cheung for the comparative methods analysis. As the author of this work, I take sole responsibility for the content presented herein.

3.2 Formative research in the feasibility study.

In 1999, funding was awarded by the Wellcome Trust to a collaborative group of researchers[3] to undertake a 20-month feasibility study in four rural communities in Masvingo Province, Zimbabwe, 300 km south of Harare. The specific objectives of this feasibility study were to:

[3] Collaborative group: Dr Frances Cowan, Professor Anne Johnson, Professor Judith Stephenson, Professor Robert Power, Dept of HIV and Sexual Research, University College London; Professor Richard Hayes, Dr Shabbar Jaffar.

- develop and pre-test an enhanced adolescent reproductive health program for HIV/STI prevention that was acceptable to pupils, parents, teachers and community leaders.

- assess the acceptability and feasibility of undertaking a community randomized trial of the program using biological outcome measures of effectiveness complimented by self-reported sexual behaviour.

- develop a salivary and or urinary assay for HSV-2 antibody.

Study communities were chosen by the Provincial Ministry of Education as representative for the province. Beyond meeting the specified objectives, this feasibility study enabled the group to develop a strong research team, build strong linkages with relevant ministries and local stakeholders, and develop the logistics for administering a large community randomized trial in rural Zimbabwe. The development, pre-testing and refinement of both educational materials and specific quantitative and qualitative research instruments were also undertaken.

3.2.1 Questionnaire development and design

At the onset of the feasibility study for the parent trial in 2000, focus group discussions (FGDs) were held with young people to uncover the most appropriate term to use in questionnaires when referring to sexual intercourse. Young people suggested the term *kusangana pabonde* (literally translated, it means 'sleeping on the mat'). They also indicated that questions should be written in their indigenous language (Shona). During the feasibility study our choice of questionnaire delivery method was primarily guided by what was feasible and appropriate for this rural Zimbabwean adolescent population. A useful format had been developed in a similar trial evaluating an adolescent reproductive health programme in Mwanza, Tanzania, where a trained surveyor had read their questionnaire aloud to a group of around 25 single gender pupils 'under exam conditions' (with the pupils sitting individually and well separated from each other). Personal communication with their survey team indicated that this questionnaire delivery mode (which they termed 'Assisted Self Completion Questionnaire' (ASCQ)) had performed well in a similar population of youth (rural sub-Saharan Africa) (Angela Obasi and Mary Plummer 1999, personal communication 2 December).

3.2.2 Feasibility Study Methods

Informed written consent was received from parents/guardians of eligible school-registered youth in their 8th (n=530) or 9th (n=197) years of schooling in the four study schools. Trained

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Infectious Disease Epidemiology Unit, Dept. of Epidemiology and Population Health, at the London School of Hygiene and Tropical Medicine; Dr Mary Bassett, Dept of Community Medicine, University of Zimbabwe

surveyors who were recent school leavers (approx 4 years older) and resident outside these rural communities conducted the survey. Behavioural data were collected using a self-completed questionnaire read aloud to participants in a single-gender exam setting within school classrooms. Questionnaire administration was conducted solely in front of the research team. Questionnaire booklets were collected by the surveyor and placed in sealed envelopes in front of the pupils.

First void urine samples were collected from participants to test for biological markers of sexual activity (HIV antibody ,*Chlamydia* trachomatis (CT) and *Neisseria* gonorrhoeae (NG)). Those identified with a treatable STI received free antibiotic treatment (Cowan et al., 2002). All survey documentation (questionnaires and biological samples) was numbered with a study ID and kept securely by the research team.

A few months following the feasibility survey, pupils who had completed the questionnaire were invited to take part in eight focus group discussions (with single gender groups of 10 pupils) and eight in-depth interviews to investigate discrepancies between self-reports of sexual behaviours and presence of biological markers found in the survey (see Results below). Groups were facilitated by a trained qualitative researcher. Notes were transcribed and translated (from Shona to English) before being coded manually using an inductive framework (Glaser & Strauss, 1967).

3.2.3 Feasibility Study Results

3.2.3.1 Measurements of self-reported sexual behaviour in this feasibility study

Eighty-three percent (748/900) of parents/guardians consented to have their child participate. A total of 714 school-going youth from the four schools took part (males n=406; females n=308). Rates of sexually transmitted infection were high with 3.5% (95% CI 2.3-5.3%) of participants who tested positive for HIV, 0.4% (95% CI 0.01-1.3%) who were CT positive, and 1.9% (95% CI 1.0-3.3%) who were NG positive. Fewer girls reported having had sexual intercourse than boys (4.8% [95% CI 2.7-7.7%] c.v. 17.8% [95% CI 14.1-21.5%]). Among those who did, 67% (95% CI 31-89%) of girls and 10% (95% CI 4.0%-18.8%) of boys said they were either pressured by their partner or had been forced to have sex. Despite concerted efforts to ensure privacy, confidentiality and the use of appropriate sexual terminology, very few of the adolescents who had biological evidence of being infected with gonorrhoea, *Chlamydia* or HIV reported having had sex in the feasibility study questionnaire (Cowan et al., 2002); only one of 16 pupils (6.3%; 95% CI 2-30%) who tested positive for HIV and four of the 16 pupils (25%; 95% CI 7-52%) with either *Chlamydia* or gonorrhoea had reported having ever had sex on the questionnaire.

3.2.3.2 Qualitative results

Follow-up focus group discussions with the participants indicated that while still considered appropriate, many participants reserved the term *kusangana pabonde* for consensual sex, a socially censured behaviour for youth. For young women particularly, admitting to wanting to have sex is considered culturally inappropriate and they suggested this may have affected the validity of their responses. In addition, they expressed concern about confidentiality and believed that teachers, who took attendance registers before the start of survey delivery, may have been able to access their questionnaire responses. For this reason participants admitted that they had sometimes given conflicting answers within the questionnaire in order to confuse the researchers (and teachers, who did not have access to the completed questionnaires, nor to the qualitative data). Qualitative data collection was not able to establish how often this occurred.

3.2.4 Implications of these results for the parent trial design

The results of the feasibility study supported the viability and acceptability of conducting an adolescent reproductive health program among young people using a community randomized trial. We demonstrated that it was possible to achieve high participation rates and to conduct biological surveys even in young adolescents where individual parental consent was necessary.

Yet, despite feasibility around questionnaire administration, rates of inaccurate reporting of sexual behaviours (i.e. 15-fold inaccuracy among HIV positive adolescents) highlighted researchers' concerns on how to interpret the findings. This study also clearly demonstrated that evaluations that rely on self-reports of sexual behaviour are likely to be biased in this setting, emphasizing the importance of using externally validated outcome measures and appropriate questionnaire delivery modes. The feasibility study also emphasized the importance of ensuring that confidentiality, as perceived by the pupils, is maximized within a school survey setting. This had two important implications for the subsequent design of the parent trial; firstly, programme effectiveness must be primarily determined using biological outcome measures; secondly, validity of self-reported sexual behaviour data needed to be maximised. To this end, renewed attention was paid towards the development of tools to more accurately measure self-reported sexual behaviour in Zimbabwean adolescents.

3.3 Overview of the RDS parent trial design

The RDS parent trial received funding from the United States National Institutes of Mental Health (R01 MH66570-01; Current Controlled Trials Number: ISRCTN70775692) to start in September 2002 (see Figure 3-1 above). As mentioned earlier, the main aim of the RDS trial

was to measure the effectiveness of a multi-component HIV prevention intervention delivered to secondary school pupils, out-of-school youth and the wider community in reducing the incidence of HIV-1, the incidence of *Herpes simplex virus* type 2 (HSV-2), and the incidence and prevalence of unintended pregnancy among young Zimbabweans after four years of intervention delivery.

The secondary objectives of the RDS parent trial were to:

i) estimate the impact of the intervention on reported sexual behaviour, knowledge and attitudes regarding reproductive and sexual health, gender empowerment, and self-efficacy around condom use.

ii) use process evaluation to assess the delivery of the three intervention components and the feasibility and acceptability of providing VCT in rural community settings.

iii) use quantitative and qualitative research methods to describe the evolution of sexual behaviour in adolescents in rural Zimbabwe.

iv) refine and assess the validity of research instruments for measuring sexual behaviour among Zimbabwean adolescents

The RDS trial was designed as a cluster randomised trial of a multi-component HIV prevention intervention for adolescents based in rural Zimbabwe. In brief, a cohort of young people enrolled in their ninth year of schooling (Form 2) at study schools were recruited at the beginning of 2003. Thirty communities were randomized to either early (n=15) or deferred intervention status (n=15). The baseline survey was conducted between March and June of 2003, prior to programme implementation (Cowan et al., 2002). The interim survey was conducted in 2006 among cohort members in 12 of the 30 randomly selected study communities in order to ascertain the likely power of the trial by determining HIV prevalence and rates of loss to follow-up in year 3. The final evaluation was run in 2007, after four years of programme implementation. At each survey, participants completed a questionnaire and provided a blood sample which was tested for HIV and HSV-2. Young women provided a urine sample which was tested for pregnancy.

Data for the research which forms the basis of this thesis, the trial comparing questionnaire delivery modes (the QDM trial), was primarily collected during the interim survey run in 2006 (Chapters 3-5). Item response rates and rates of reporting socially censured behaviours were compared in four questionnaire delivery modes. Biological markers were compared against self-reports of sexual activity. Quantitative and qualitative data from respondents on the feasibility and acceptability of the four modes were also analysed. Results from this extensive

analysis formed the basis for deciding on the questionnaire delivery mechanism in the final survey. Additional comparative data were collected during the final evaluation survey conducted in 2007, analysing item response rates and rates of reporting sexual behaviours in two questionnaire delivery modes (Chapter 6). All research took place in both early and deferred study communities.

3.3.1 Regai Dzive Shiri Intervention

The intervention was theoretically based in social learning theory and the stages of change model and aimed to promote safe sexual behaviours in young people and challenge social norms in communities that leave young people vulnerable to infection (Prochaska & DiClemente, 1992; Bandura, Adams, & Beyer, 1997). The intervention was comprised of three components (Cowan et al., 2008):

The youth programme for in-and out of school youth, was delivered by carefully selected and trained Zimbabwean school leavers in their year between leaving school and starting university (a one day selection meeting which used a wide variety of participatory exercises identified highly motivated youth with strong participatory leadership skills). These volunteers lived in the rural study communities for 8-10 months of the year. They acted as both role models for young people and as a bridge between adults and youth. As professional peer educators, they used well-structured, theoretically based materials which they delivered in a highly participatory manner. The programme was delivered not just to those enrolled in the trial cohort but to all pupils and those out-of-school youth who wanted to take part.

The community programme ran a 22 session community-based programme which aimed to improve reproductive health knowledge, intergenerational communication and community support for adolescent reproductive health. This component arose from focus group discussions held with parents during the feasibility study where they lamented the collapse of traditional communication structures and acknowledged their limited communication skills (Cowan et al., 2002; Power et al., 2004). The community intervention comprised two ten session modules and it was only possible to progress to module 2 after attending the majority (75%) of module 1 sessions.

The clinic programme aimed to improve the accessibility of clinics for youth including improved diagnosis and treatment of STIs and information and access to condoms.

The three components were highly integrated. For example trained nurses ran sessions in the youth and community components. Likewise, the professional peer educators ran youth corners in the clinics and facilitated sessions within the community programme. No specific intervention was introduced in the deferred study arm but standard HIV prevention activities were implemented through the District AIDS Action Committees by local and international governmental and non-governmental organisations across both early and deferred implementation communities. The RDS trial intervention was delivered to deferred communities after the final survey was completed in 2007.

3.3.2 Regai Dzive Shiri community selection, mobilization and randomization

At the end of 2002, thirty communities in seven districts within three provinces of south-eastern Zimbabwe were selected for inclusion in the RDS parent trial (see Figure 3-2 below). A "community" was defined as a rural health clinic, its catchment's population and the secondary schools serving this population. Communities selected had at least 250 Form 2 pupils[4], an absence of adolescent HIV prevention programmes, and willingness from the community leadership to participate.

Community sensitization took place at national, provincial, and district levels. Strong links were established with other relevant ministries and community stakeholders. In each community, five people were trained as community advisory board (CAB) members (150 in all) and were instrumental to successful community sensitization and cohort recruitment. Eligible study participants were drawn from study school registers. Community meetings ensured communities were informed about the study and parents/guardians of eligible pupils could provide written informed consent. Survey teams visited the homes of those who failed to attend these meetings.

In February 2003 the 30 communities were allocated to the two arms of the trial using restricted randomization (Cowan et al., 2008). This process was carried out in front of meeting attendees who judged it to be transparent.

3.3.3 The baseline survey of the trial cohort

The purpose of the baseline survey was to recruit the cohort in which the impact of the intervention would subsequently be evaluated and determine the prevalence of HIV, HSV-2 and pregnancy (in young women only), self-reported sexual behavioural knowledge and attitudes. It also assessed if there was balance between the two arms of the trial.

[4] Pupils in Form 2 are in their ninth year of schooling.

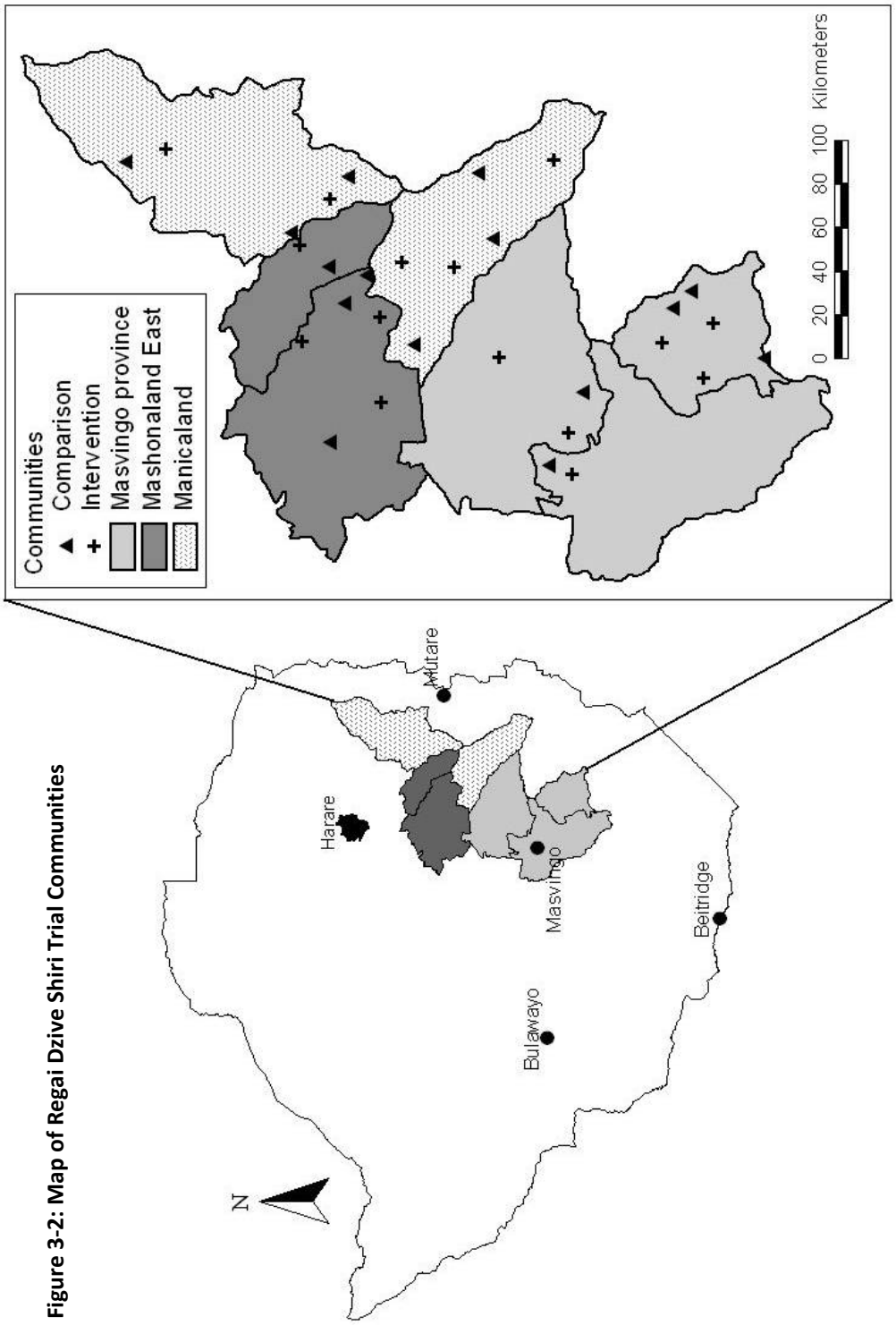


Figure 3-2: Map of Regai Dzive Shiri Trial Communities

3.3.3.1 Methods for the Regai Dzive Shiri trial baseline survey

Young people whose parents/guardians had consented were invited to take part in the RDS baseline survey. After reading an information sheet they were asked to sign an assent form to confirm their agreement or refusal to participate in the study. This assent form assured pupils that the confidentiality of their study ID and identifying details would be strictly maintained.

Participants in the baseline survey were asked to self-complete a questionnaire in a classroom setting under exam conditions (similar to the procedure outlined in the feasibility study, section 3.2.2). They completed the questionnaire in a single gender setting as it was read out loud to them in Shona (the indigenous language) by a trained surveyor of the same gender. Participants provided a finger prick blood sample for HIV and HSV-2 antibody testing and girls additionally provided a urine sample for pregnancy testing. The questionnaire collected information on socio-demographic characteristics, self-esteem and mattering (i.e. the respondent's perception of how much they matter to others), sexual knowledge and attitudes, sexual behaviour including sexual intercourse, other risky behaviours, condom use self efficacy and future aspirations.

In response to the data from the RDS feasibility study described above (see Section 3.2), steps were taken when designing the baseline survey for the RDS parent trial to both increase the privacy of participants and to improve the wording of sexual behaviour questions. In order to broaden its definition beyond consensual sex, the term *kusangana pabonde* was expanded to include forced sex. The initial question on sexual activity was rephrased to read:

> 'When you made love [sleeping on the mat] for the FIRST time, (even if it was forced), with whom did you make love?'

This broadening of the definition was highlighted during the introduction that was read out to the respondents just prior to the section covering sexual activity and was repeated in *each* question that referred to sexual activity.

As cohort members were recruited through secondary schools, classrooms were still considered the most appropriate venue in which to deliver the questionnaire. However, every attempt was made to reassure the participants about the confidentiality of the data. Classrooms used by the survey teams were cordoned off using ropes in order to ensure that only members of the research team were allowed into the survey area. (Pupils witnessed the

research team politely escorting teachers and CAB[5] members away from the designated survey area.) As in the feasibility study, all survey documentation (questionnaires and biological samples) was numbered with a study ID. The study ID was linked to the cohort member's name on their assent form and on the *Cohort Register*, both of which were kept in locked trunks whose access was strictly supervised by the research team (also witnessed by the pupils).

3.3.3.2 Methods for a sub-study investigating QDM nested within the baseline survey

As part of the process of improving the validity of sexual behaviour measurement, we nested a sub-study within the baseline survey comparing item response rate and rates of reporting of socially censured behaviours using two questionnaire delivery modes. Ten percent of participants were randomly selected to self-complete the questionnaire whilst listening to a tape-recorded version through headphones (Audio-SAQ) while the remainder self-completed the questionnaire in a single-gender setting where the questionnaire was read aloud by a same gender trained surveyor (ASCQ) (described above in Section 3.2.1 above). Audio-SAQ participants sat in a room with both male and female participants in widely spaced seating arrangements similar to that of the group reading. However because they were far fewer of them (less than 10 per school), they sat at desks by themselves and the distance between each pupil was much greater. Both groups provided their responses in a questionnaire booklet; upon completion, each booklet was placed in its own individual envelope and sealed by the surveyor in front of the pupil.

Item response rates and rates of reporting of sensitive behaviours were compared between the two delivery modes. In addition to comparing responses directly, focus group discussions held after the baseline survey were conducted to explore the acceptability of the two questionnaire delivery modes with participants. These questions were part of a larger discussion centred on obtaining feedback about the baseline survey and exploring participants' understanding of the consent process and their appreciation of the baseline survey. Two same-gender qualitative researchers ran each discussion with one acting as facilitator and the other as note-taker. Field notes were transcribed electronically at the office. Data were analysed within an inductive framework, according to the general principles of Grounded Theory (Glaser et al., 1967) using Nvivo, a qualitative data retrieval and analysis software programme.

[5] Community Advisory Board (CAB) members are adults in study communities who were selected and trained by RDS to be our study representatives at community level.

3.3.3.2.1 Laboratory analysis

Blood samples were collected onto cotton-fibre-based paper (No. 903, Schleicher and Schuell) The samples were tested for HIV-1 antibody at the National Microbiology Reference Laboratory in Harare using a validated testing algorithm (U.S.Department of Health and Human Services, Public Health Services, & Center for Disease Control and Prevention, 2000). All specimens were tested using two ELISA tests (Vironostika® HIV Microelisa System BioMerieux, Inc., Durham NC and AniLabsytems EIA kit (AniLabsystems Ltd, Oy Toilette 3, FIN-01720, Vantaa, Finland), with western blot used in the case of discrepant results. Dried blood spot (DBS) samples were also tested for antibodies to HSV-2 using a type specific HSV-2 assay [Focus HerpeSelect EIA, Focus Technologies, Cypress CA). Urine samples were tested on site for pregnancy using Cortez OneStep hCG Rapidip InstaTest®.

3.3.3.2.2 Data Analysis

All questionnaire data from the baseline survey were double-entered into an Access database and range and consistency checks were performed. All statistical analyses were performed using Stata 9.2 (College Station, TX).

3.3.3.3 Results from the baseline survey

3.3.3.3.1 Participation rates

Seven thousand eight hundred and eighty five Form 2 pupils were eligible for inclusion in the study cohort. Parents/guardians of 91.5% (n=7,215) of these pupils agreed to their child's participation, 8.1% declined (almost all due to religious beliefs around blood draw) and 0.2% of parents were not contactable. The assent rate among young people was high; for those whose parents had given consent, 94.1% agreed to participate (n=6791) giving an overall consent rate of 86.3% (Cowan et al., 2008).

3.3.3.3.2 Demographic characteristics

The baseline characteristics of study participants are described here. Boys were six months older than girls (males=15.5 years, females= 14.9 years; $p<0.001$). While both girls and boys reported relatively low levels of knowledge about sexual matters, girls reported poorer knowledge than boys ($p<0.05$). For example, 78% of girls compared with 71% of boys ($p<0.001$) said they knew little or nothing about preventing pregnancy (including two of the girls who were pregnant); 70% of girls compared with 62% of boys ($p<0.001$) said they knew little or nothing about HIV (including 32 (63%) of those infected); and 81% of girls compared with 68% of boys ($p<0.001$) said they knew little or nothing about other sexually transmitted infections. Girls were also significantly less likely than boys ($p<0.001$) to report that they would find it easy to access condoms (7% compared with 24%), or to use a condom in the future (17% compared

with 46%), or to tell their partner they must use condoms (24% compared with 49%) {Pascoe, 2009 7711 /id}.

Twenty (0.6%) boys and 31 (1.0%) girls had HIV-1 antibody detected. Twelve participants (0.2%) tested positive for HSV-2 {Cowan, 2008 168 /id}. Four (0.12%) girls were pregnant. Overall 64 (1%) had at least one biomarker (HIV, HSV-2 or positive pregnancy test), 40 girls (1.2%) and 24 boys (0.7%). Three percent of girls and 11.9% of boys ($p<0.001$) reported that they were sexually active with a median age at first intercourse of 12 years for both males (range 3-21 years) and females (range 3-16 years). There was excellent balance between early and deferred implementation arms in terms of rates of HIV-1 and HSV-2 infection and other behavioural and socio-demographic variables.

3.3.3.3.3 Comparison of self-reported activity with biomarkers of sexual activity

Results from the sexual behaviour data suggest that young people continued to remain reluctant to report their sexual behaviour accurately (Cowan et al., 2008). Inconsistent self-reports were found in all four pregnant girls who reported they had never had sex. There were also high levels of inconsistency between self-reports of sexual activity and presence of HSV-2 which can only be sexually acquired. Of the eight HSV-2 positive girls (two of whom were co-infected with HIV), five consistently reported not having sex. Only two of the four HSV-2 positive males reported that they had ever had sex (Pascoe et al., 2009). In addition, of the 51 HIV positive participants, only one of the girls (1/31) and 20% (4/20) of the boys reported having had sex. While the possibility of long term survival following mother-to-child-transmission among some of the HIV positive orphans cannot be dismissed, other factors suggest infection is a result of sexual acquisition. More than half of HIV positive orphans had lost their father, but not their mother or both parents. Recent research in South Africa attributes HIV infection in children with HIV negative mothers to breast-feeding from non-biological women or exposure through dental visits. However the actual numbers of such cases are few (n=7/3471) and the age range was much lower (ages 2-9). Moreover, in the RDS baseline survey, there was an increased reporting of sexual risk taking by orphans, particularly females, providing additional supportive evidence that HIV transmission among these youth occurred primarily through sexual encounters (for a more detailed discussion, see Pascoe et al., 2009).

Due to the low prevalence of biomarkers within this population and that their interpretation in this younger population can be more challenging, another approach is to explore internal consistency within self-reports of sexual activity. We found internal consistency in self-reporting of sexual behaviours was high. Only 13% percent of the girls and 28% of the boys

answered the 14 sexual behaviour questions inconsistently, answering some questions as sexually active individuals but then selecting the response option 'I have never had sex' in other sexual behaviour questions. The two HSV-2 positive girls who initially reported being sexually active, indicated that they had never had sex in later sexual behaviour questions. As mentioned in Chapter 1, while internal consistency provides evidence of reliability, it cannot guarantee validity, illustrated well by the fact that three of the four pregnant girls consistently reported never having had sex.

3.3.3.4 Results for the comparison of socially censured behaviours by questionnaire delivery modes:

3.3.3.4.1 Quantitative data

During the evaluation of sensitive questions by mode, all questions where the questionnaire delivery mode was clearly recorded were included in the analysis. Ninety-one percent (n=6,189, 2958 girls and 3231 boys) of the cohort completed the questionnaire using ASCQ and 5% (n=362, 188 girls and 174 boys) using Audio-SAQ. (The questionnaire delivery mode for the remaining four percent was unknown.) The item response rate and the proportion of pupils reporting a socially censured behaviour were compared for several questions and are shown in Table 3-1.

Overall, pupils in both delivery modes answered almost all the questions. Comparison of response rates for some sensitive behaviours was variable and the numbers are too small to justify use of statistical testing. There was a trend towards increased reporting of marijuana use in boys when they used Audio-SAQ (10.1% vs. 6.6%) and experiencing forced sex in girls (3.2% vs. 1.6%). Boys also reported higher rates of having had two or more sexual partners (4.6% vs. 3.8%). This sub-study highlighted the need to explore the impact of questionnaire delivery modes on the reporting of sensitive behaviours more rigorously.

3.3.3.4.2 Qualitative data collection regarding the two questionnaire delivery modes

Twenty-six focus group discussions (n_{males}=14; $n_{females}$=12;) were held at 15 of the 82 study schools to ask participants about the relative merits of the two questionnaire delivery modes. What emerged from the qualitative data was the separation between the utility of reading aloud and its acceptability within this group setting. While many less-literate participants reported that their comprehension was improved by hearing the questionnaire read out loud, there were some participants who reported difficulty listening while reading along. Moreover, ASCQ pupils listening to the questionnaire in a group setting felt uncomfortable asking for clarification, as they were acutely aware that each query slowed down the whole group.

Table 3-1: Item response and answers recorded by participants completing the questionnaire in group (ASCQ) or tape-recorded (A-SAQ) settings.

		Boys (nASCQ=3231;nA-SAQ=174)				Girls (nASCQ=2958; nA-SAQ=188)			
	QDM	N	item response rate %	answered 'yes' %	95%CI	N	item response rate %	answered 'yes' %	95%CI
ever had sex	A-SAQ	165	94.8	11.5	6.6-16.4	183	97.3	1.6	0.0-3.5
	ASCQ	3166	98.0	11.8	10.7-13.0	2933	99.2	3.0	2.4-3.6
tried marijuana	A-SAQ	169	97.1	10.1	5.5-14.6	183	97.3	1.1	0.0-2.6
	ASCQ	3177	98.3	6.6	5.7-7.5	2934	99.2	0.5	0.2-0.7
ever forced	A-SAQ	154	88.5	2.6	0.05-5.1	185	98.4	3.2	0.7-5.8
	ASCQ	2948	91.2	2.3	1.8-2.8	2921	98.8	1.6	1.2-2.1
condom ever use	A-SAQ	173	99.4	8.1	4.0-12.2	186	98.9	3.2	0.6-5.8
	ASCQ	3215	99.5	7.9	7.0-8.9	2949	99.7	3.6	2.9-4.3
2 or more partners	A-SAQ	174	100.0	4.6	1.4-7.7	187	99.5	0.0	na
	ASCQ	3211	99.4	3.8	3.1-4.5	2954	99.9	0.5	0.2-0.8
dishonest responses	A-SAQ	174	100.0	19.5	13.6-25.5	185	98.4	23.2	17.1-29.4
	ASCQ	3212	99.4	23.4	21.9-24.8	2936	99.3	18.5	17.1-19.9

Instead, they claimed marking any response so as to keep up. One pupil stated, "But it is embarrassing to raise your hand and say, 'I don't understand this [question].' A person would *never* raise their hand.' (she laughs) (female, sch54). This was less of a concern for those that used Audio-SAQ, although they also stated they did not always pause and replay the tape if they had a query.

Despite repeated reassurances that there were no right or wrong answers, some participants continued to be confused about the rationale for the survey. Some thought that the questionnaire was to be used to establish their eligibility to participate in the programme. One boy reported, "others were not telling the truth, especially on questions to do with sexual life, because they thought they would be sacked from the programme [for being sexually active] (male, sch15). So, while the exam setting in ASCQ allowed us to maximize each pupil's privacy by separating them as much as possible within the classroom, it is possible that this setup also allowed them to equate the environment to an exam and not a questionnaire; encouraging them to assume that there was a 'right' answer, as you might expect in an exam. In our case, it seems they may have translated the concept of 'right' answer to a 'socially correct' one.

3.3.3.4.3 Privacy of questionnaire delivery setting

In the focus group discussions following the baseline survey, participants could identify and were appreciative of measures taken by the researchers to increase their privacy and keep the survey area secure. Most important to them was the significant spacing between themselves in the classroom. Despite this, some pupils reported being able to 'guess' which multiple-choice box had been selected by others. They attributed this to the fact that all pupils were completing the questionnaire in unison, making it possible to 'know' which response option was being marked by others. This belief caused anxiety as some participants were thought to have spread rumours about an individual's sexual experience based on these guesses. Pupils using ASCQ were more inclined than Audio-SAQ users to suspect another pupil of looking at their answers. One girl commented, '… it was not possible to write 'Yes' [I had sex] instead of 'No' [I didn't] because the one beside you would see your actions. (She exchanges looks with another participant and laughs.)' (female, sch41). Reading the questionnaire aloud also increased the level of embarrassment within the group setting. Despite enormous efforts taken by the research team to read questions in a neutral tone, and confirmation from pupils that the term itself was not offensive, pupil's still maintained it was 'embarrassing' to repeatedly hear the term *kusangana pabonde* ('sexual intercourse) read out loud.

This feeling of embarrassment was less pronounced among Audio-SAQ users; they instead spoke of how the headphones made them feel 'alone.' Even though they had not experienced the group setting, after listening to comments from others in the group discussions, they believed that the tape recorded version increased their ability to answer sensitive questions honestly. One girl commented,

> "The tape [recorded method] would make people tell the truth because you are [working independently] … but with the group [setting] you cannot tell the truth because other people [will] laugh at some of the [responses to] questions and you [would] automatically change your answer." (female, sch50)

3.3.3.4.4 Study identification numbers:

While most pupils appreciated the use of study ID numbers, some thought it interfered with their ability to answer questions honestly. For example one male pupil remarked,

> "On the [questionnaire] you said we should not write our names but there was a number [study ID]. You were going to [know] that 'this one smoked mbanje [marijuana]' and have me expelled from school." (male, sch15)

This was reiterated by another male who said, 'I didn't answer freely because there was a number [study ID] that was assigned against our names [and which was also] on the [questionnaire].' (male, sch28)

As described earlier in Chapters 1 and 2, the penalty for disclosing sexual activity is high and includes corporal punishment and school expulsion. Anxiety about the possibility of disclosure naturally decreases the likelihood that someone who is sexually active will admit to it. An additional cultural barrier is found within the Shona proverb 'a secret cannot be kept by two people' which challenges entirely the notion of confidentiality . Within a broader context, the political climate within which these surveys took place was not conducive to trusting researchers' promises to maintain confidentiality. While young people were not voting themselves, they were witnessing the anonymity of the process being compromised through public voting, missing and tampered ballot boxes, and fear and intimidation around the polling area (which were often schools).

Throughout the FGDs, young people gave the impression that they have little experience with their privacy/confidentially being respected. They assumed that knowing something was tantamount to revealing it to someone, which in these instances could result in serious negative repercussions. Despite researchers concerted efforts to maximize confidentiality, young people still face many barriers. While they reaffirmed that researchers had told them their answers would not be revealed, respondents reiterated having an underlying fear of 'being cheated."

3.4 Use of Interim Survey to compare four Questionnaire Delivery Modes

Given what we learned in the feasibility study and baseline survey of the parent trial we decided to conduct an experimental comparison of four questionnaire delivery modes to determine the most valid means of collecting sexual behaviour information from young people in rural Zimbabwe. Additional funding was sought and granted from the United States National Institute of Mental Health (competitive supplement RO1 MH066570-04S2) to conduct a randomized controlled trial evaluating four questionnaire delivery modes. The interim survey for Regai Dzive Shiri provided the ideal opportunity to conduct a robust evaluation of several different questionnaire delivery modes triangulated against biological markers of behaviour. Rates of item non-response and reporting of pre-selected sexual behaviours could be compared between delivery modes. These data, combined with information from participants concerning the acceptability of these modes would help frame the selection of questionnaire delivery mode for use in the final survey of the parent trial.

During the development of the questionnaire delivery methods trial in 2004 and 2005, there was little published research on this topic. While considerable methodological literature existed in developed countries (e.g. North America and Western Europe), there was almost no data available from developing countries (Lara et al., 2004; Gregson et al., 2002b; van de Wijgert et al., 2000) and specifically on youth (Mensch et al., 2003; Plummer et al., 2004b; Rumakom et al., 2005). Recent research by a colleague in Zimbabwe working in similar conditions to us, suggested an improved version of face-to-face interviewing using a confidential voting box for responding to sensitive questions(Gregson et al., 2002b). When compared with standard face-to-face interviewing, they found an increase in reporting of sensitive sexual behaviours when these data were collected using the voting box. A few studies had been conducted in developing countries around the use of computer methods which had received significant attention in the US and Europe (Rumakom et al., 2005; Mensch et al., 2003). While not conclusive, these data suggested increased reporting of sensitive behaviours with computer methods.

Therefore, when considering the methods to be evaluated, we relied on the limited published data available and on our own information from the feasibility study and the baseline survey of the parent trial. We wanted to compare questionnaire delivery modes that could be used by young people in a survey environment where data were collected at a single time point. Modes such as coital diaries and random response techniques, discussed in Chapter 1, were not applicable within this framework. The following four questionnaire delivery modes were considered valid modes to be explored in this rigorous manner: i) self-administered questionnaire (SAQ), ii) SAQ accompanied by an audio soundtrack (Audio-SAQI); iii) face-to-face interview with responses to sensitive questions placed in a confidential voting box (ICVI); and iv) audio computer-assisted survey instrument (ACASI). They are outlined below in Table 3-2.

Evaluation for this study was divided into three phases i) questionnaire design ii) experimental comparison of questionnaire delivery methods; iii) qualitative and quantitative data collection on method acceptability. Methods for obtaining these are described in more detail in the next chapter.

In summary

> The Regai Dzive Shiri trial was designed to rigorously evaluate a community-based adolescent HIV prevention intervention carried out amongst young people in rural Zimbabwe.

Table 3-2: Description of questionnaire delivery modes used in this evaluation

Questionnaire Delivery Method	Description of Method
Self-administered questionnaire (SAQ)	The participant self-completes a paper version of the questionnaire, which lists questions, their instructions, and responses; where necessary, skip patterns are indicated.
Audio-self-administered questionnaire (Audio-SAQ)	The same SAQ paper version of the questionnaire is completed while the participant listens to the questions, instructions and responses being read through headphones from a personal CD player (voice is gender specific). Note there are fewer skip patterns than in SAQ as complex skip patterns were eliminated from this version.
Informal confidential voting interviews (ICVI)*	A trained interviewer administers the questionnaire in a standard interviewer-administered format. When sensitive questions arise, the interviewer offers the participant a ballot sheet, labelled with their specific bar-coded ID number, which the participant uses to privately record their responses. Where applicable, answer cards assist the participant choose their response. On completing the questionnaire, the participant folds their ballot sheet and posts it into a locked ballot box*.
Audio computer-assisted survey instrument (ACASI)	The participant completes the questionnaire on a laptop while listening to the questions, instructions and responses through headphones. The participant uses a mouse to click on their chosen response. Skip patterns are pre-programmed. Laptops were powered through a truck battery that was recharged using a solar panel.

** this is a modified version of the method reported by (Gregson et al., 2002b)*

Data collected during the feasibility study for the parent trial indicated that validity of behavioural measurement needed improvement as there was considerable mis-match between reported sexual behaviour and biological markers of sexual activity.

Improving the validity of sexual behaviour measurement was therefore one of the main objectives of the RDS trial.

During the baseline survey for the RDS trial, a quantitative and qualitative comparison collection of questionnaire data collected using two questionnaire delivery methods was conducted; differences in item response rates and reporting of sensitive behaviours between methods were found.

A formal experimental evaluation of four questionnaire delivery modes was then proposed and funded. It was nested within the interim trial survey. The methodology used and results of the QDM trial will be described in the next three chapters.

4 METHODS FOR REGAI DZIVE SHIRI INTERIM SURVEY COMPARING FOUR QUESTIONNAIRE DELIVERY MODES

As outlined in Chapter 3, following concerns about the validity of sexual behaviour data and the comparative results collected using two questionnaire delivery methods in the baseline survey, a formal experimental evaluation of four questionnaire delivery methods was proposed and funded for the interim survey (a competitive supplement from the US National Institute of Mental Health NIMH (R01 MH06657-0-04S2).

The primary objective of this evaluation was to conduct an experimental comparison of four questionnaire delivery modes to determine the most valid means of collecting socially censured information from young people in rural Zimbabwe. The most valid of these was to be used in the final outcomes survey for the parent trial.

The detailed objectives of this evaluation were:

i) To use cognitive interviewing to develop and refine an existing self completion questionnaire (Chapter 4).

ii) To compare self reports of socially censured data including sexual behaviours, poverty, psychological morbidity, and stigma between four questionnaire delivery modes (Chapter 5).

iii) To determine the reliability of sexual behavioural data collection through the triangulation of self-reported sexual behavioural data collected by four questionnaire delivery modes against biological markers of sexual activity such as HIV and HSV-2 antibody status and current pregnancy in females (Chapter 5).

iv) To determine the reliability of sexual behavioural data through the comparison of responses by the same individual within a short time interval using two different questionnaire delivery modes (Chapter 5).

v) To use quantitative and qualitative data to assess young people's acceptability towards the four questionnaire delivery modes (Chapter 6).

This chapter describes the methods used to conduct the experimental evaluation. This first section focuses on questionnaire design. The second section focuses on the development of the experimental evaluation and provides a detailed description of the four questionnaire delivery modes. Particular attention is paid to how the questions were adapted to

compensate for each method's uniqueness while maintaining the integrity of the questionnaire as a whole. This chapter concludes with a summary of the field survey methodology and a description of the statistical analysis used in this experimental evaluation.

The results of the randomized controlled trial are presented in full in Chapter 5. Methods used to assess the acceptability of the different questionnaire delivery modes (objective (v)) are described in chapter 6.

4.1 Questionnaire design

The RDS interim survey questionnaire evolved over the course of the trial. The content and format of the questionnaire was initially devised as part of the feasibility study and subsequently modified for the baseline survey of the parent trial. Questions were developed based on a review of similar local and regional surveys including The Zimbabwe Demographic Household Survey – 1999 (Central Statistical Office & Macro International Inc., 2000), the Zimbabwe Young Adult Survey (Ministry of Health & Child Welfare (Zimbabwe) et al., 2004), the Shaping the Health of Adolescents in Zimbabwe 2006 Survey (Kang, Dunbar, Roley, & Laver, 2006), UNAIDS global guidelines ((UNAIDS, 1998) and from a national sexual behavioural youth survey in South Africa (Reproductive Health and HIV Research Unit, 2003). Additional questions were developed using UNICEF guidelines for monitoring and evaluating vulnerable children(United Nations Children's Educational Fund (UNICEF), 2005). Several new scales were included and are described in more detail below (Dunkle et al., 2004; Qadir, Stewart, Khan, & Prince, 2005; Patel, Simunyu, Gwanzura, Lewis, & Mann, 1997).

The baseline survey questionnaire collected information on socio-demographic characteristics, self-esteem and mattering (i.e. the respondent's perception of how much they matter to others), sexual knowledge and attitudes, sexual behaviours including sexual intercourse, other risky behaviours, condom use self efficacy and future aspirations. Results from this survey indicated that 34% of the cohort were orphans who were at greatly increased risk of HIV (age-sex adjusted odds ratio 3.4; 95% CI: 1.9-6.1) (Cowan et al., 2008). Qualitative data collected through a series of in-depth interviews with cohort members suggested that poverty, lack of psychological well-being, mobility, caregiver support and stigma were likely to be associated with this increased risk. As a result, domains covered by the interim survey questionnaire were expanded from those at the baseline survey to allow us to explore and quantify these and other factors.

Table 4-1: Summary of Domains for interim survey questionnaire

Domain	Question No's	Sample Question
Demographics		
• orphaning	10-17	Is your biological father/mother still alive?
• education and income	7-8; 40-43	What is the highest level of school you have completed so far?
• marital status	24-25	Are you currently married?
• household composition	2-4; 99-103	What is the highest level of education the head of household head has achieved?
Reproductive Health Knowledge	91-94	A girl will not become pregnant if she has sex standing up.
Sexual Behaviour	47-59; 61-65; 76-78; 87-90	The last time you had sexual intercourse, did you use a condom?
Self efficacy	95-98	It is easy for me to get condoms if I need them.
Personal HIV risk assessment	75;76;86	What do you think are your chances of getting HIV?
Vulnerability to HIV		
• poverty • (UNICEF guidelines, Young Adult Survey)	5; 26-35; 38-39	In the last week, have you had to go an entire day without eating because there was no food in your household?
• mobility	1;6	How often in the last five years have you changed households (please do not consider holidays or temporary visits)?
• Psychological well-being: the *Shona Symptom Questionnaire (Patel et al 1997)*	21 (a-n)	There were moments when I felt life was so tough that I cried or wanted to cry.
• caregiver support: the *Parent Bonding Instrument (Qadir et al 2005)*	18 (a-o); 19-20	She appeared to understand my problems and worries. She tried to control everything I did.
• stigma • UNICEF guidelines	22 (a-b); 23 (a-c); 36	How often have you been left out when new clothes or shoes are handed out in your household?
• self esteem	37; 44	I am a failure.
• alcohol & drug abuse	45 (a-h)	Have you ever tried any of the following (substances)? (beer, etc)

Domain	Question No's	Sample Question
Gender Relations		
general relationship scale (Dunkle et al 2004)	66 (a-j)	I have more to say than my partner does about important decisions that affect us (males)/ My partner has more to say than I do about important decisions that affect us (females)
relationship control scale (Dunkle et al 2004)	60 (a-j);	If a wife does something wrong she should expect her husband to punish her.
STI Diagnosis And Treatment	79-85	The last time you had any of these [STI] symptoms did you seek treatment?
Clinic Assessment	71-74	If your friend asked for advice on where to go to seek treatment for a sexually transmitted disease (STD) where would you advise that person to go?
Internalized HIV Stigma (Young Adult Survey)	67-70	If you knew that a shopkeeper or food seller had HIV, would you buy food from them?
Intervention Exposure	104-108	How many Regai Dzive Shiri meetings have you attended?
Honesty of Questionnaire Completion	109	Please tell us how honest your answers have been.

The domains covered in the interim survey questionnaire are described below and summarized in Table 4-1. A full version of the questionnaire is included in Appendix C. Particular domains which are new to this questionnaire are described below in more detail.

4.1.1 Orphaning

There were two questions that specifically asked about a participant's orphan status; one question asked about their biological father and the other about their biological mother. A maternal orphan was defined as someone who knew that their mother had passed away and whose father was alive. Likewise, a paternal orphan's father had passed away while his/her mother was still alive. Participants who had lost both their biological parents were considered dual orphans.

4.1.2 Poverty

Measuring poverty is complex and is difficult to assess using only a single indicator. As such, a number of variables were included from several sources to assess a participant's poverty level (Ministry of Health & Child Welfare (Zimbabwe) et al., 2004; United Nations Children's Educational Fund (UNICEF), 2005). We asked about both visual indicators which focus on

household structures and access to utilities (type of toilet, water source, number sleeping in the primary sleeping room) as well as asset-based indicators which examined the affordability of essential needs (cooking oil, medications, school fees) or ownership of essential assets (tables, chairs, blankets, radio, fridge).

In addition, data were collected relating to income including a participant's primary economic activity over last 12 months, frequency of paid employment and level of participant's involvement in the decision process for spending money earned.

A total of three scores were created: one each for the visual indicators and the asset based indicators respectively and then a score combining both scales. Each item in each scale was coded on a scale of 0 to 1 where 0 was the item considered to be the lowest SES category and 1 the highest SES category. Scores in each scale were then added and the sum of each scale used to calculate a mean score for each participant. This mean score distribution was then divided into 5 categories with approximately equal numbers for each participant in each category (Pascoe et al., 2005).

4.1.3 Psychological Well Being: the Shona Symptom Questionnaire

We used the *Shona Symptom Questionnaire* (SSQ) to describe the mental health burden of young people participating in the survey. The SSQ is a locally validated, 14 item, indigenous measure of common mental disorders (Patel et al., 1997) and was developed and validated among patients attending primary care clinics and attending traditional medical practitioners in Harare. Importantly, it combines items that are both etic (those that reflect the concerns of the health care provider) and emic (those that are socio-culturally meaningful to the patient) (Patel & Mann, 1997). The aim of the SSQ is to measure psychiatric morbidity. It was originally validated against a gold standard that was defined as a patient being diagnosed as having a mental disorder by a health care worker and scoring 12 or more on the Revised Clinical Interview Schedule (CISR)(Lewis, Pelosi, & Araya, 1992). Compared with this gold standard, using the cut off of 8 or more out of 14 items, the sensitivity of the SSQ for common mental disorder was 63% and specificity 83%.

4.1.4 Stigma

Psychological well-being is also associated with a person's perception of being stigmatized. We developed questions using guidelines developed by UNICEF on assessing levels of community stigma (United Nations Children's Educational Fund (UNICEF), 2005). To supplement these global definitions of stigma, we conducted 11 focus group discussions with youth (n=6: in- and out-of school) and adults (n=5: local community, clinic staff, local RDS

Intervention staff) in our trial communities to establish local knowledge on how a child was 'known' to be stigmatized. This qualitative analysis highlighted other, more locally pertinent aspects of stigma ranging from referring to someone as an inanimate object to specific treatment in a household (being asked to work more than peers, being given food on a separate plate, always being given second hand items when new items were provided to others). Additional questions on stigma were created using this information. Similarly phrased questions have subsequently been used by other researchers examining stigma in children and young people in Zimbabwe (Howard, Matinhure, McCurdy, & Johnson, 2006; Nyamukapa et al., 2008)

4.1.5 Caregiver Support: The Parent Bonding Instrument

Caregiver support was evaluated using the *Parent Bonding Instrument* (PBI) which explores the relationship between parents and their children (Qadir et al., 2005). This instrument consists of 25 items which are divided into two sub-scales, one assessing a care-giver's level of attention/supervision (12 items score range 0-36) and the other assessing their overprotective nature (13 items (score range 0-39). While developed for use in developed country settings, this scale has been used in Asian cultures, where parents are traditionally revered by their children (Qadir et al., 2005). While parental authority is also a strong aspect of Shona culture, the scale had not been tested in Zimbabwe, nor had it been used with populations where a child's primary caregiver is often someone from their extended family or where there might be a sequence of primary caregivers over time. Therefore, in our setting, rather than assume the primary caregiver is the biological mother, we applied the PBI to the participant's primary female care giver (which could have been their biological mother).

4.1.6 Mobility

As a result of orphaning and/or poverty, children are often moved from one extended family household to another, sometimes ending up in child-headed households (Nyamukapa et al., 2008; Howard et al., 2006; Central Statistical Office et al., 2007). Sixty in-depth interviews with cohort members revealed that this mobility was often accompanied by high levels of distress (one girl was transferred five times in seven years, moving after the death of each of her primary caregivers). We therefore included questions to establish the length of time a participant had been living in their current home as well as the number of times they had moved in the previous year.

4.1.7 Alcohol and Drug Use

There were seven questions on alcohol and drug abuse which explored alcohol consumption (beer, wine and locally brewed alcohol) and inhaling of marijuana, tobacco or glue. Frequency of use ranged from never having tried a substance to using it regularly. Participants were asked about their lifetime exposure to these various substances. Response options ranged from never use, through to occasional use, to regular use.

4.1.8 Sexual Behaviour

As already emphasized in Chapter 3, initial wording of questions relating to sexual behaviour arose from data collected during focus group discussions held as part of the feasibility study which were revised for the baseline survey following further qualitative investigation of wording.

Given our experiences in the feasibility study and the baseline survey, extensive formative research was carried at the time of the interim survey to further refine our sexual behavioural questions (Mavhu et al., 2008). Seven qualitative researchers with broad experience in sexual behavioural research held 65 gender specific cognitive interviews with a random sample of study participants (aged 16-20 years). Participants were selected from two study communities that were not included in the interim survey. This was done to avoid the possibility of interim survey participants incurring a bias from being too familiar with the questions in advance.

4.1.8.1 Cognitive interviewing methods

Our cognitive interviewing examined four basic cognitive stages that influence the question-answering process: question comprehension, information retrieval from memory, decision processes used when answering, and processes for response generation (Tourangeau, 1984; Tourangeau & Rasinski, 1988). Interviewers read our questions and response choices to the respondents before engaging their cognition using two standard techniques (Willis, 1999; Sudman et al., 1996b; Willis, 2005). During the 'think-aloud' technique, the respondent was trained in advance to verbally articulate their thought processes for answering each question. These were recorded by the interviewer who interjected little. During verbal probing, the interviewer asked the participant to provide additional information they thought was relevant to the question.

After the resulting initial rephrasing, a second round of interviewing asked ten respondents to complete the questionnaire. They were then interviewed retrospectively to ensure rephrased questions were correctly interpreted and to ensure they could successfully complete skip patterns.

After each round of interviews, interviewers shared respondents' comments and suggestions. These were reviewed by myself and the senior social scientist and analyzed thematically following general principles of grounded theory (Glaser et al., 1967).

4.1.8.2 Results from cognitive interviews

Culturally, Shona women and especially young women, are not expected to initiate any aspect of sexual activity. Young women emphasized they would not admit to these activities if questions were phrased such that they were seen as the initiators. As such, our initial question, 'have you ever kissed a boy or a man?' was rephrased to emphasize the passive tense: 'have you ever been kissed by a boy or a man?'

As mentioned in Chapter 3, formal terms for vaginal sex in Shona are euphemistic; they focus on sleeping together and not on the actual sexual act. While slang terms exist, they are colloquial and geographically specific. Cognitive interviewing confirmed two acceptable formal terms: *kusangana pabonde* 'meeting on the reed (sleeping) mat' (used in the feasibility study and the baseline survey) and *kurara mese* 'sleeping together'. While participants concurred that both were acceptable, they recommended the latter term as less archaic and one which could be more easily formatted to include forced sex. However, due to its euphemistic nature, female respondents highlighted that without further elaboration, sexually active girls could easily take advantage of the term's vagueness. One female respondent mentioned that, 'otherwise it could mean that I was sleeping next to my brother.' Female respondents recommended describing vaginal sex within the question to make it less elusive.

Despite agreeing that consensual sex exists, participants noted that is it culturally inappropriate for young women, to consent to sex (especially first sex) without a struggle, as this was equated with being 'loose'. This cultural expectation makes it extremely difficult to draw a distinction between consensual and non-consensual sex. As a result of these two contextual requirements, our baseline question 'have you ever had sex?' was rephrased to "have you ever slept together with a boy or a man (meaning that his private part entered your private part) with you or without you consenting to it?'

Despite this, some female respondents claimed they would still be hesitant to answer this question affirmatively. In our baseline questionnaire, forced sex was asked about in its various manifestations including threats, coercion or rape. Cognitive interviewing highlighted the distinction between 'forced sex' which takes place within a consenting relationship and rape which is defined as forced sex with a family member or stranger. Given this heightened

cultural sensitivity to girls being allowed to 'want' sex, two additional questions were included, one on forced sex and one on rape (which has it own specific term 'chibaro' in Shona).

Cognitive interviewing also suggested that young women find it difficult to divulge their number of lifetime sexual partners. While male respondents claimed no difficulty in writing a numerical answer to this question, female respondents asked for categorical response choices which would help sanction reporting greater numbers of partners.

Another ambiguous concept relates to the term 'regular sexual partner' which can convey the frequency of sexual encounters or its level of emotional attachment. Cognitive interviewing linked the term to emotional attachment, and the question was phrased, 'someone whom you really regard as your sexual partner'.

Data from across Africa suggest that young people engage in anal sex because it is perceived to protect against pregnancy and HIV (Matasha et al., 1998; Lane, Pettifor, Pascoe, Fiamma, & Rees, 2006). Given its high risk of STI transmission, we felt it important to determine the prevalence of anal sex within rural Zimbabwean youth. However, cognitive interviewing highlighted young people's tremendous discomfort with questions on anal sex. As no formal term exists the question resulted in a graphic, anatomical description. With the added sensitivity around the illegality of homosexual behaviour within Zimbabwe, the anal sex question was omitted from this survey as it became apparent that it could compromise the questionnaire's overall acceptability. (This was, however, revisited for the final survey and included there. See Chapter 7).

Subsequent cognitive interviewing revealed that using the passive tense in all our sexual questions allowed young women to affirm their participation in sexual activity. All other rephrased questions were equally well understood. As outlined in the previous chapter, appropriate wording was originally developed following several focus group discussions and in-depth interviews with young people. We used phrasing that is commonly used by sexual health researching in Zimbabwe in national and regional surveys (Ministry of Health & Child Welfare (Zimbabwe) et al., 2004; Central Statistical Office et al., 2000) (Kang et al., 2006). The new subtleties that emerged here emphasise the value of cognitive interviewing in the development of questionnaire wording, the relative importance of open-ended versus categorical responses and the trade-off between accuracy of formal terminology and acceptably of euphemistic phrases.

As in the baseline survey, the section on sexual behaviour was introduced by a paragraph reminding participants of the importance of answering these questions honestly and

reassuring them again that confidentiality would be maintained. Less sensitive questions about dating, kissing and fondling were asked before proceeding to ask about each participant's experience with sexual intercourse. Participants who responded affirmatively to the initial question on sexual activity were then asked about their sexual partners, condom use at first and last sex, and numbers of lifetime partners.

4.1.9 Gender Relations Scales

We used two scales developed in South Africa to explore participant's gender attitudes within their sexual partnerships: the general relationship scale (10 items, score range 0-40) which assessed overall sexual partner attitudes which was answered by all participants irrespective of their current sexual behaviour and the relationship control scale (10 items, score range 0-40) which was asked of those who currently had a regular sexual partner. (Dunkle et al., 2004). Survey participants were asked to rank their agreement to various statements using a four point (strong agree to strongly disagree) Likert Scale.

4.1.10 STI Diagnosis and Treatment

There were a series of questions that enquired about exposure to sexually transmitted infections (STI). The set of six trigger symptoms were outlined (i) penile/vaginal discharge, ii) itching or burning in penile/vaginal area, iii) pain on urination, iv) penile/vaginal sore or ulcer, v) wart on anus or vulva, and vi) genital swelling and participants were asked to state whether they had ever experienced them. If participants acknowledged personal exposure to an STI, they were asked about their access to clinical diagnosis and treatment and whether condom use had been suggested at that clinical visit.

4.2 Development of Four Questionnaire Delivery Modes

As was outlined at the end of Chapter 3 (see Table 4-2) , four questionnaire delivery modes were chosen to be assessed in this experimental evaluation. A brief description is provided below that emphasizes the similarities and differences between the methods themselves.

4.2.1 Summary of Four Questionnaire Delivery Modes

4.2.1.1 Self-Administered Questionnaire (SAQ):

This questionnaire delivery mode required the questionnaire to be printed in booklet form. Each question was numbered, included an instruction on how to complete the response options printed in italics underneath, and finished with a set of response options from which the participant chose.

4.2.1.2 Audio Self-Administered Questionnaire (Audio-SAQ)

This questionnaire delivery mode builds on the method described above and includes an audio player which participants used to listen to a gender specific voice read the questions, instructions, and answers to each of the questions printed in the booklet. By replacing the tape recorders used in the baseline survey with CD players, we were able to improve the sound quality of this delivery mode. Equally important, by using a CD player, we were able to use skip patterns (see more on the importance of this below). Key buttons on the CD players were painted red.

4.2.1.3 Informal Confidential Voting Instrument (ICVI)

This questionnaire booklet was printed in two parts. ICVI interviewers were carefully selected , trained and supported. Interviewers used the first booklet to read the questions and response options to the participant and completed the booklet on their behalf. Questions on orphaning, poverty, and drug and alcohol abuse were asked in this section. In the second booklet, the questions were read aloud by the trained interviewer but the participant marked their responses on a private ballot sheet.

At three separate points during questionnaire administration, different questions requiring an answer using the ballot (including questions on sexual behaviour, exposure to STI and possible treatment and diagnosis, and self-reported honesty in completing the questionnaire) were asked. Upon questionnaire completion, the ballot paper was folded and placed into a locked ballot box made of heavy wood. Keys to the ballot boxes were kept by the data team at the office in Mutare.

4.2.1.3.1 Development of the Ballot Sheet for ICVI

As originally designed by Gregson and colleagues, responses to sensitive questions were all numerical and recorded on a strip of paper (identified using a study ID) which was then placed into a locked ballot box (Gregson et al., 2002b). In order to maximize the similarity between all four questionnaire delivery modes in this survey, we were required to develop a more complex ballot sheet which allowed participants to respond with non-numerical answers (see Appendix D). Answer cards were printed for those questions where there were several responses and where it might be difficult for the participant to remember all possible response options. For example, in the question categorizing their first sexual partner, there were a total of nine response options (see Figure 4-1 below).

Figure 4-1: Sample Answer Card for Question 52, Males Round 1

52.	Who did you have sex with for the FIRST time?	
	A.	She was a stranger
	B.	She was a teacher in my school
	C.	She was my employer
	D.	She was a family member
	E.	She was a sex worker
	F.	She was my girlfriend
	G.	She was my wife
	H.	She was someone else (older girl with or without a child, housegirl)
	I.	I have never had sex

Participants wrote the corresponding letter to their answer in a box on the ballot sheet.

4.2.1.4 Audio Computer-Assisted Survey Instrument (ACASI)

For this survey, the audio computer-assisted survey instrument (ACASI) involved a laptop with a mouse for clicking responses and headphones through which participants listened to the questions, instructions and response options. The project statistician developed a flow chart to guide the data manager's programming of the ACASI questionnaire for each round and each gender and to indicate skip patterns (a copy of the flow chart can be found in Appendix E). The data manager programmed the questions, instructions, and responses and possible skips using Questionnaire Development System (QDS) software (Nova).

The ACASI programme also allowed for specific checks to be included in the programme. For example the Study ID was gender specific; when it was entered into the system, the QDS software matched the gender on the Study ID against the gender of the questionnaire. As such a participant with a male Study ID could not answer a female questionnaire. In addition, this software allowed the data manager to specify age range checks for some questions.

Because electricity was not a requirement for the interim survey sites, additional measures were put in place to recharge the laptops and the batteries for the CD players in the field. Each team was provided with a truck battery which was connected to a solar panel. These were placed outside the survey rooms in the sun to enable continuous charging. When electricity was available the truck batteries, laptops, and rechargeable batteries (used in the CD players) were all recharged.

4.2.2 Randomization to One of Four Delivery Modes and Questionnaire Completion

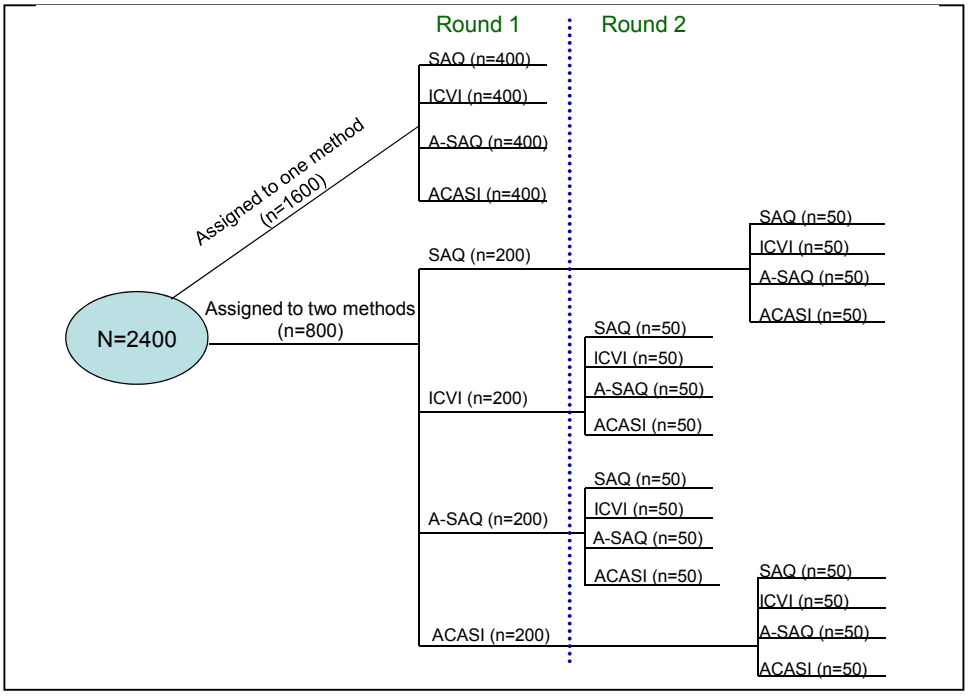
Using a random permuted block design, cohort members were randomized to one of four questionnaire delivery modes: SAQ, Audio-SAQ, ICVI and ACASI in Round 1. In order to allow for internal comparison, thirty five percent of Round 1 participants were randomised to complete the questionnaire on a second occasion (Round 2), when they completed a shortened version of the questionnaire (using one of the same four modes). This resulted in 20 different permutations to which participants could be allocated (see Figure 4-2 below). Random permutated blocks of 112 were used taking into account order of the delivery mode in each round. Each method permutation was then assigned a block number and order with its code. These codes were placed into sequentially numbered opaque envelopes in block and number order. Following written, informed consent, each study participant picked the next envelope in the block sequence. Checks were made to ensure that envelopes were allocated sequentially (e.g. spot checks in the field and back at the office when the field staff checked in). If a participant was assigned to complete the questionnaire in both Round 1 and Round 2, they were asked to return to the survey site one week later to complete their Round 2 version. The start and end time for completing each questionnaire was recorded.

A shorter version of the questionnaire was created for those participants assigned to Round 2 which included key sensitive questions. In total, 16 versions of the questionnaire were created: one male and one female version for each of the four questionnaire delivery modes for use in Round 1 (long version n=8) and Round 2 (short version n= 8). There was an English and Shona translation for each of these 16 questionnaire versions (see Appendix C for a copy of the questionnaire that combines all versions).

4.2.3 Issues Pertaining to the Audio Recording for Audio-SAQ and ACASI

Research conducted in the US by Nass *et al.* indicates that the use of synthetic speech hinders disclosure of personal information and that women are more perceptive of this nuance than men (Nass, Robles, Heenan, Bienstock, & Treinen, 2003). This research already had planned to use the voices of two real people, one male and one female for the audio recording. (It would not have been possible to use a synthetic voice as the software could only read in English.)

Figure 4-2: Interim Survey Questionnaire Mode Permutations (the number of participants randomised to each method assumes an 80% participation rate)



Voices were chosen based on specific criteria, including their need to be low in pitch and clearly understood. It was also important for voices to be 'anonymous' so that participants would not recognize them as coming from the survey staff. The female voice used to record the taped sessions during the baseline survey had performed well and was asked to participate again. The original male voice had left the area so a new male voice, belonging to a project staff member (who was not on the research team) was used.

The voice transcription requirements for Audio-SAQ and ACASI were different. In ACASI, the computer programme required the tracks for the questions and instructions to be recorded separately from each response. However, in Audio-SAQ, where the recording was downloaded onto a CD player, each track included everything that was to be read out for that question: the question, the instruction (where necessary), and the responses (where necessary). In addition, in Audio-SAQ, where questions included skip patterns, the entire set of questions had to be read as one sound file. For example, as can be seen in Figure 4-3 below, the questions and responses from Q10 through Q13 had to be recorded as one sound file. Note that the skip instruction differed slightly from that in SAQ to allow just the one skip to occur (see question 10 in Figure 4-4 below.

Given the excessive length of these sound files, the man and woman whose voices were used in the recordings used the pause button during the recording session to avoid any transcription errors.

The two voices were recorded on a digital recorder. As the evaluation manager, I supervised the readings of all the questionnaires (including those in the baseline survey). Care was taken to ensure that the voice was consistent in tone, was empathetic without being judgemental and that the reading speed was appropriate. Sound files were downloaded at the office by the assistant data manager, checked for clarity and then organized before being loaded onto a CD (Audio-SAQ) or imported by the data manager into the ACASI programme.

In order to make Audio-SAQ and ACASI as efficient as possible, we limited the number of times response instructions were heard. We decided that once a participant had heard the same instruction a few times, it would not be read aloud again. However it would always appear in print in the booklet or on the screen under the question. The same rule applied for standard answers such as 'yes', 'no', and 'I don't know'; these responses were read out the first few times and then the voice would remain silent as the responses appeared on the screen (or the participant read them in the booklet). If an instruction was changed (for example moving from "tick one box only" to "tick all the responses that apply"), when the previous instruction returned, this was reinforced and read aloud one more time.

4.2.4 The Initial Sexual Behaviour Question

In a questionnaire administered to urban girls from Harare aged 16 to 19 years using ACASI, there was a four percent increase in reported sexual behaviours if the participant was asked the question a second time after reporting never having had sex (personal communication, Mi-Suk Kang Dufour, September 2005). Given this substantial increase we decided to incorporate this into our questionnaire design. In SAQ, Audio-SAQ, and ACASI, if the participant responded that they had not had sex, they were asked the question again, with an additional statement acknowledging the difficulty of answering this question honestly, yet emphasising the importance of reporting this behaviour accurately. This was not possible in ICVI as the participant answered this question on the ballot sheet where no interviewer check was possible without revealing their answer.

Figure 4-3: Sample of transcript for one track of Audio-SAQ reading. Highlighted information was read aloud.

T13.

10. a Do you know who your biological father is?

Put an X in one box only

Yes ☐1

No ☐2 →→ PRESS THE RED BUTTON ONE TIME TO SKIP TO QUESTION 14

If you do not know who your father is, press the red button one time to move to question 14.

10.b. If you know who your father is, is he still alive?

Put an X in one box only

Yes ☐1

No ☐2

I don't know ☐88

11. If your father is still alive, is he still married to your mother?

Put an X in all boxes that apply to you

Yes, they are still married ☐3

No, he is separated or divorced from her ☐2

No, they were never married ☐1

No, my mother has died ☐0

My father is dead ☐99

I don't know ☐88

12. If your father has died, how old were you when he died?

Put an X in one box only

0-5 years ☐0

6-10 years ☐1

11-15 years ☐2

16-20 years ☐3

21 years or older ☐4

I don't know ☐88

My father is still alive ☐99

13. If you father is still alive or has died, until what age did you live with him?

Put an X in one box only

I never lived with him ☐0

I have always lived with him ☐1

I was years old when I stopped living with him ☐2

I don't know ☐88

4.2.5 Instructions and Practice

A practice session was designed for each questionnaire delivery mode and run individually for each participant by a surveyor prior to commencing their questionnaire completion. Instructions and practice questions were developed for each questionnaire delivery mode (copies of the instructions are in Appendix F). All instructions welcomed participants, provided an overview of the survey, and explained the difference between questions where participants were to choose just one response compared to where participants chose all the responses appropriate to them. Participants using SAQ, Audio-SAQ, and ICVI were shown how to mark their responses, using an 'X' and not a tick (√). Audio-SAQ instructions included information on how to use the CD player including the use of the pause button if they needed extra time to answer a question and how to skip questions where applicable. ICVI instructions were limited to ballot sheet completion.

A separate practice programme was developed for ACASI (see Appendix F) using simple non-sensitive questions pertaining to shopping in town. Participants were instructed in each questionnaire response option (e.g. choosing one response only versus choosing all responses, and how to enter a numeric value). In addition participants learned which buttons allowed them to repeat a question, go back to an earlier question, or proceed to the next question (which was not automatic for questions where you could answer multiple responses as the programme had no way of knowing when a participant had finished selecting their responses). Surveyors were trained to go through the instructions and practice questions with each participant, repeatedly if necessary, until they had assessed that the participant was sufficiently proficient with the mode.

4.2.6 Differences Between Questionnaire Delivery Modes

Particular care was taken to ensure that question wording was the same in all four versions. Questions differed only as a result of participant gender (e.g. males: have you ever made someone pregnant? vs. females: have you ever been pregnant?).

4.2.7 Variations in Skip Patterns Across Questionnaire Delivery Modes

What did vary was each mode's ability to allow skip patterns. Questions were altered to reflect the ability of each questionnaire delivery mode. For example, where it was necessary to insert a skip pattern into the questionnaire, participants using self completion methods (SAQ and Audio-SAQ) had a 'skip' instruction printed next to the question, whereas with ACASI, the computer programme ran the skip automatically.

4.2.7.1 Layout for skip patterns in SAQ and Audio-SAQ

In SAQ and Audio-SAQ, instructions for skip patterns were printed right next to the response as shown in this example from SAQ:

Figure 4-4: Sample of Question 10 from SAQ, Round 1, showing possible skip instructions

10. Is your biological father still alive?			
Put an X in one box only			
Yes	☐1		
No, he has died	☐2	→→	GO TO QUESTION 12
I don't know if he is alive or dead	☐3	→→	GO TO QUESTION 13
I don't know who my biological father is	☐4	→→	GO TO QUESTION 14

Audio-SAQ participants had fewer skips than SAQ participants as it was felt it was too risky to have them continuously push the fast forward track button and it increased their chances of inadvertently skipping questions that shouldn't be skipped. In ICVI, interviewers followed printed skips based on participant's responses (the ballot sections had no skips).

4.3 Preparatory work leading up to the Implementation of the Interim Survey

4.3.1 Study Population

As described in Chapter 3, the Regai Dzive Shiri trial was conducted in 30 rural communities in seven districts in three provinces in eastern rural Zimbabwe (Masvingo, Manicaland, and Mashonaland East). The trial's interim survey was conducted between January and April 2006 in 12 of the 30 study communities, selected by restricted randomization to ensure balance between intervention and control arms of the trial and between the three provinces (see Table 4-2 for a list of the interim survey communities by province and trial status). All baseline survey participants that had lived in these 12 communities at baseline (n=2766) were eligible to take part in the interim survey.

4.3.2 Sample Size Considerations

The actual sample size was approximately 350 per group (total 4 groups) and about 115 per community (total 12 communities). Statistical power is estimated using the power simulation approach (Feiveson, 2002). The alternative hypothesis is at least one group would be different from the other three groups. For a baseline of 15% prevalence of reporting having sex, the study has about 85% power to detect a risk ratio of 0.5 (or 2.0) in at least one group.

Table 4-2: List of Interim Survey Communities and the number of cohort members in each community by province and trial status.

Provice	District	Trial Status	No. of Schools	Cohort Total
Mashonaland East	A	Early	2	203
		Deferred	3	189
			prov total	*392*
Manicaland	A	Early	4	310
		Deferred	3	206
	B	Early	2	155
		Deferred	2	110
			prov total	*781*
Masvingo	A	Early	2	306
	B	Deferred	2	140
		Early	2	160
	C	Deferred	3	474
		Early	3	267
		Deferred	2	246
			prov total	*1593*
			Deffered total	1365
			Early total	1401
		Interim Survey Cohort Total		**2766**

4.3.3 Survey Site Selection

Meetings with CAB members (described in Chapter 3 Section 3.3.3.1) were held three months prior to the beginning of the interim survey to select venues for the survey to be conducted. These venues had to be accessible to young people and suited to the survey. At these meetings, we described the study rationale and outlined survey site requirements.

Survey sites had to be:

- Less than one hour's walk from any cohort member's house within that study community;
- In a location deemed acceptable to young people, for example shops near an peri-urban growth point (small group of shops), or a community hall that wasn't seen as belonging exclusively to adults;
- Large enough so that participants felt they were completing the questionnaire in private, or have a sufficient number of smaller rooms such that each method and gender could be assigned a separate room. If there was not sufficient space within the building, the site needed to include shaded and private space close by (for example a large tree); this was to be used for ICVI;

- Relatively close to public toilets so female participants could provide us with a urine sample discreetly;

- As the survey was scheduled to take place during the rainy season, we asked that buildings have a roof. However, it was not essential to have complete walls that went from the floor to the ceiling as this would have eliminated many possible buildings.

Electricity was not a requirement as this would again have eliminated most public buildings in rural areas.

CAB members were asked to select appropriate sites which were reviewed and the final selection was conducted by myself and the field coordinator between December 2005 and January 2006. Based on the above specifications, we found suitable survey sites in newly built shops at business centres and growth points, community halls, churches, abandoned buildings, and clinics[6]. To ensure that all cohort members could reach a study site in less than an hour's walk, all study communities were allocated more than one survey site. All community and government officials were duly notified.

4.3.4 Letters of Invitation

Personalized invitation letters were printed at the project office in Mutare (a copy of this can be found in Appendix G) and were distributed in communities one month prior to the survey being run in that community. Each letter invited the cohort member to attend the interim survey, listed the dates and locations of survey sites specific to their community and requested them to bring a form of photo ID (e.g. birth certificate or national ID) and their invitation letter. Project field staff worked with school administrations and CAB members to distribute the letters in study communities. In addition, posters advertising the survey site locations were placed around the community in youth centric locations (such as the grinding mill) two weeks prior to our arrival.

4.3.5 Survey Team Training

A three day training was held prior to survey administration which reviewed the detailed Interim Survey Standard Operating Procedures (available from the author). The training covered study rationale, ensured that each survey staff had practical experience with each of the four questionnaire delivery modes, and emphasised the importance of ensuring

[6] Our most unique site was an unused piggery, where the different stalls could be used to house the different questionnaire delivery modes.

participants' privacy by demonstrating to them how confidentiality was continuously maintained in the field. This included vigorous monitoring of survey rooms to ensure participants' privacy was maintained and using large envelopes to seal individual booklets (SAQ, Audio-SAQ, and ICVI) in front of survey participants.

To differentiate between the 16 questionnaire booklets in the field, booklets were covered using four different colours, one for each mode, with two colours of ink (males=blue; females=red) used to distinguish gender (see Table 4-3 below). The words 'Round 1' and 'Round 2' were clearly marked in the top left hand corner of each cover (see Appendix H for sample booklet covers).

Table 4-3: Field Differentiation of four questionnaire delivery modes

Questionnaire delivery mode	Colour of booklet paper	Colour of ink on booklet cover	
		male	female
SAQ	blue	blue	red
Audio-SAQ	green		
ICVI	yellow		
ACASI	pink		

4.4 Methods for the interim Survey

4.4.1 Identification, Registration, and Consent.

Confirmation that a participant was a cohort member was established by matching the name on their ID (national ID, birth certificate, and/or invitation letter) with the name on the RDS *Cohort Register*[7]. Once confirmed as a cohort member, participants were asked to provide written informed consent[8] (see Appendix I). Surveyors were available to read this to less literate participants. Informed consent was established by asking participants to summarize their understanding of the survey before signing the consent form. Consent or non-consent was recorded on the form and in the *Cohort Register*.

Following consent, the participant's RDS Study ID was matched to their numbered *Label Envelope* (sorted in numerical order and pre-sorted for each community at the office). The

[7] If a surveyor had any doubts as to the legitimacy of the identity of the youth, they were instructed to ask them a series of open ended descriptive questions about the baseline survey. Answers to these questions had to be sufficiently detailed to assure the survey assistant that the youth had participated in the baseline survey and therefore was an eligible cohort member.

[8] While parent/guardian consent and pupil assent had been obtained during the baseline survey and was still valid, most participants were now of legal age to give their own consent. As such we decided to ask them to re-consent as adults in this study.

Label Envelope included all of the requisite study labels for the survey (consent form, cohort register, questionnaire delivery mode allocation and questionnaire, biological specimens, and lab forms) and had a pre-printed checklist on the front that ensured that participants completed all survey stations and that all study labels were used.

Following positive consent, participants were then asked to select and open the next envelope which randomly allocated them to a questionnaire delivery mode (this was described earlier (in section 4.2.2 see Appendix J for a copy of the code sheet). If the participant selected a code that allocated them to complete a questionnaire in Round 2, the specified booklet for that mode was labelled with the participant's study ID and placed in a large labelled envelope and set aside for completion in the following week.

The participant's relevant questionnaire for Round 1 was labelled and they were escorted to a room where they could complete their questionnaire. If the participant has been allocated ICVI, Audio-SAQ or ACASI and the method was not available (e.g. all interviewers were busy, all laptops were occupied), the participant was asked to proceed to the nurse's station and provide their biological samples first.

4.4.2 Collection and Testing of Biological Samples

All participants were asked to provide a finger prick blood specimen which was collected, processed and analysed as described previously in Chapter 3. Female participants were also asked to supply a urine sample for pregnancy testing, which again were tested, processed and analysed as described previously.

4.5 Statistical analysis plan

4.5.1 Data Handling

All interim survey data was kept in lockable containers until they were returned to the project office in Mutare.

Questionnaire data that were collected on paper (SAQ, Audio-SAQ, and ICVI) were coded by trained data clerks prior to data entry. ACASI data was downloaded from each laptop and imported directly into the database. Data were entered into an MS Access database (10% double entered) and cleaned. Data range and consistency checks were performed and preliminary analyses undertaken.

4.5.2 Statistical Analysis For A Priori Questions

The statistical analysis plan was developed by myself, Frances Cowan (PI), Sophie Pascoe (project statistician) and Yin Bun Cheung, a senior statistician at the London School of Hygiene and Tropical Medicine. Yin Bun Cheung undertook all pre-planned statistical analyses. I undertook some additional analyses with support from the project statistician (Sophie Pascoe).

All statistical analyses were performed using Stata 10 (College Station, TX).

Global null hypotheses of parameters, being identical across all four methods, was tested at the 5% level. If the global null hypothesis was not rejected, no pair wise test of difference between pairs of individual methods was undertaken. Otherwise, pair wise comparisons were conducted between methods and tested at the 5% level.

4.5.2.1 Non-item response rate

An overall item non-response rate was calculated for all questions in the questionnaire. This 'global' item non-response was defined as the number of questions applicable to all participants but not answered. "I don't know" was considered a valid response. In addition, six sensitive questions were pre-selected prior to analysis to compare item non-response rates and reporting of sexual behaviours between the four questionnaire delivery modes. These included ever been kissed, ever had sex, age at first sex, condom use at last sex, lifetime number of sexual partners, and experiencing (or having a female partner experience) an abortion. Item non-response rates were calculated as the proportion not answering each question (excluding those participants where the question was not applicable).

4.5.2.2 Prevalence of sexual behaviours

Participants with missing values for the six sensitive questions were excluded from prevalence analysis. The prevalence of reporting kissing and ever having sexual intercourse were compared between the four methods. For those who reported ever having sex, prevalence of age at first sex, number of lifetime partners and condom use at last sex were compared between the four methods. As discussed earlier (see 4.2.4 above) the question 'have you ever had sex?' was asked twice (Q50 and then again in Q63) for those using SAQ, Audio-SAQ and ACASI. In the primary analysis, only the response to Q50 was used in the comparison; in the secondary analysis while the figure for ICVI remained unchanged, prevalence estimates were based on the response to Q50 and Q63, with the response to Q63 replacing any missing or negative responses to Q50. For secondary analysis of number of lifetime partners and condom use at last sex, positive responses from Q63 were included from SAQ and ACASI (but remain

unchanged for ICVI and Audio-SAQ because the respondent could not go back to those questions).

For binary variables, binomial distribution was used to estimate 95% confidence intervals (CI) for the proportion parameter for each interview method separately. For continuous variables, the mean age at first sex and mean number of lifetime partners were calculated and 95% CI estimated. Logistic regression which accounted for clustering was used to compare the proportions between the four methods. The Wald test was used to test the null hypothesis of no interview method effect. The correlation between reported sexual behaviour and biomarkers of sexual activity were also compared between the methods. Analyses were adjusted for the following a priori covariates: gender, education, orphaning, marital status, HIV and HSV-2 status, and pregnancy (females only).

4.5.3 Analysis of Skip Patterns

There were a possible 20 skip patterns included in the questionnaire (dependent on method). Data from SAQ and Audio-SAQ (where participants were independently responsible for skip patterns) were analysed to see how successfully participants completed each of their skips. A successful completion was defined as a participant answering the next appropriate question after the skip was established (e.g. if they answered 'yes' to sex in Q50, they should proceed to the next question, and if they answered 'no' they should skip to a later question).

4.5.4 Comparisons with Biological Markers

For males and females, a positive HSV-2 test and/or incident HIV (acquired since the baseline survey) and for females positive pregnancy test was taken as biological evidence of ever having had sex. Among participants who had biological evidence of having had sex, the proportion reporting 'no' to the question on having had sex in the questionnaire constituted a false reply. In the primary analysis, only responses to Q50 were used to compare the four methods. In the secondary analysis, positive responses to Q63 in SAQ, Audio-SAQ and ACASI were used to replace the missing or negative reply in Q50.

4.5.5 Internal Comparisons Between Round 1 and Round 2

Answers to the question 'have you ever had sex?' were compared between Round 1 and Round 2 (completed one week later). Those participants who responded 'no' to this question in Round 1 but changed their response to 'yes' in Round 2 were defined as 'positive conversions.' Likewise, those participants who responded 'yes' in Round 1 but 'no' in Round 2 were defined as 'negative conversions.' McNemar's chi square test was used to assess the

effect of answering this sensitive question using an alternative method in Round 2. Discordant pairs of answers (i.e. positive and negative conversions) between Rounds 1 and 2 were compared separately for each Round 2 method against combined Round 1 methods. Those who had completed the same method in both rounds were excluded from the analysis. For example, the answers given by those who completed using SAQ in Round 2, were compared to answers given by those who completed using ICVI, Audio-SAQ or ACASI in Round 1, and those completing using SAQ in both round 1 and 2 were excluded.

4.5.6 Time to Completion of Questionnaire:

Times were rounded to their nearest five minutes for comparison of the start and end times. Mean and 95% CI of completion time by questionnaire were calculated. If global test of no difference across four interview methods was rejected at the 0.050 level, P-values for the pairwise comparison were examined.

4.5.7 Self-reported Honesty

At the end of the questionnaire, participants were asked to report on their level of honesty when answering questions throughout the questionnaire. Self reported honesty around questionnaire completion was compared across all five ordered categories between the four methods. The five point scale was collapsed into a three point scale (completely and very honest, fairly honest, and not very honest and not honest at all). ICVI users were asked to assess their level of honesty both overall (which was compared against the other three methods) as well as specifically on the ballot sheet. For ICVI respondents, an additional comparison of the differences between these two honesty reports was analyzed.

4.5.8 Statistical Analysis for Other Sensitive Questions

Additional questions on other sensitive issues including mental health, poverty, drug and alcohol use, orphaning, and circumcision were also compared across questionnaire delivery modes. This was done as a post hoc analysis. Both item non-response rates and proportion reporting these factors were examined. No adjustments were carried out for these analysis. Participants who failed to answer any questions in the questionnaire were excluded from this analysis.

4.6 Summary

This chapter has outlined the development of the questionnaire's contents, has provided a detailed description of the development of the four questionnaire delivery modes, and outlined the design of the experimental evaluation. Specifically it has focused on how the

questions were adapted to compensate for each method's uniqueness while maintaining the integrity of the questionnaire as a whole. This chapter concludes with a summary of the field survey methodology and a description of the statistical analysis used to evaluate differences in the four questionnaire delivery modes.

The following two chapters present the results of this experimental evaluation. In the next chapter, item non-response and reporting of socially censured behaviours are compared between questionnaire delivery modes. Analysis of biological markers is also included. The following chapter (Chapter 6) examines the qualitative and quantitative data used to assess the acceptability and feasibility of the questionnaire delivery modes.

5 EXPERIMENTAL RESULTS FROM THE QDM TRIAL NESTED WITHIN THE REGAI DZIVE SHIRI INTERIM SURVEY COMPARING FOUR QUESTIONNAIRE DELIVERY MODES

In this chapter I present the quantitative results of the experimental comparison of socially censured data collected using four questionnaire delivery modes. I begin by presenting demographic characteristics of the interim survey respondents. In the second section, I report on the results from the pre-specified sexual behavioural data, including item non-response rates, prevalence of reported sexual behaviours, and the correlation between biomarkers and self-reported sexual behaviour data by questionnaire delivery mode. I then look at changes in responses to self-reported sexual behaviour data when the same respondent is asked the question a second time in a separate round. I conclude this chapter by examining comparative data from post hoc analysis of other socially censured behaviours including psychological well-being, poverty, orphaning, drug and alcohol use, and circumcision.

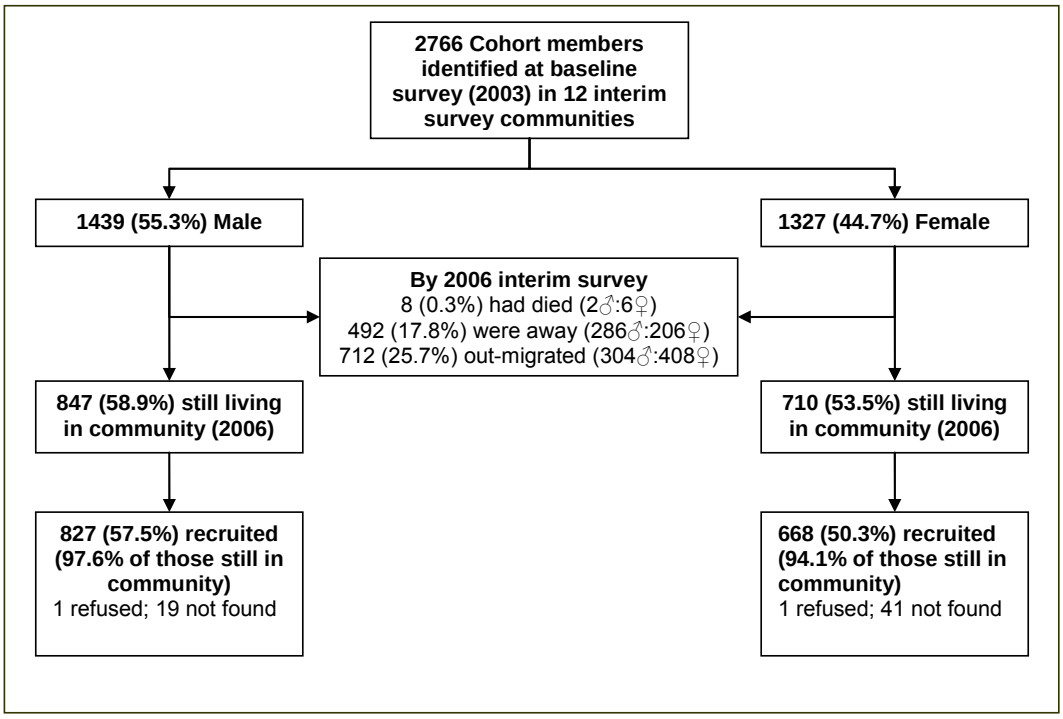
5.1 Analysis and effects of clustering

Initial random effects analyses showed no evidence of community clustering (p ranging from 0.253 to 1.000 in various outcomes). The analyses taking account of clustering were comparable to those assuming no community clustering. Therefore the analyses reported here do not take account of community clustering for simplicity and for availability of robust choices (e.g. Fisher's exact test).

5.2 Demographic data

Fourteen hundred and ninety five respondents from the original cohort took part in the interim survey (827 males and 668 females). This represented 54% of those eligible to participate from the baseline survey but 96% of those eligible who were still living in study communities (n=1557) at the time of this survey (see Figure 5-1). When baseline characteristics were compared between respondents and non-respondents, interim survey respondents were more likely to be male than non respondents (55% c.v. 48%; p<0.001), were younger (26% < 15 years c.v. 20%; p<0.001) and less likely to be orphaned (64% c.v. 66% p=0.016). However, they were no more or less likely to have reported being sexually active (6% c.v. 8%; p=0.088). There was an equal proportion of interim survey respondents from each study arm.

Figure 5-1: Flow chart indicating interim survey participation



Demographic characteristics of interim survey respondents by study arm are presented in Table 5-1. Overall 45% of respondents were female. Respondents were aged between 15 and 23 (mean age 18.2 years). While there was reasonable balance between the four arms of the study, there was some variation in orphanhood and educational status between arms. Just over four percent (95% CI: 3.3-5.3%) of respondents were married, 7.6% of females and 1.6% of males. Educational attainment was high with 87% (95% CI: 84.8-88.3%) of respondents having completed the four required years of secondary schooling. Overall 40% (95% CI: 37.5-42.6%) reported that they had lost one or both parents.

HIV antibodies were detected in 2.3% of young women (95% CI: 1.1-3.4%) and 0.4% of young men (95% CI: 0.0-0.8%). Seven young women (1.06%, 95% CI 0.28-1.84%) had acquired HIV since the baseline survey in 2003 as had one young man (0.12%, 95% CI 0.0-0.36%). Eight respondents were HSV-2 positive (0.54%; 95% CI 0.2 – 0.9%), seven of whom were females and one of whom was male. Sixteen young women, (2%; 95% CI: 1.2-3.6%) were pregnant at the time of the survey.

Table 5-1: Characteristics of interim survey respondents by questionnaire delivery mode (N=1495; males=827, females=668)

Characteristic	Overall		Questionnaire Delivery Mode			
			SAQ	ICVI	Audio-SAQ	ACASI
	N	%	(n=373)	(n=365)	(n=376)	(n=381)
Demographic & Household						
Mean age (years)	1495		18.3	18.2	18.3	18.3
Males	1495	55.0	56.0	54.2	57.4	53.5
Never been married	1465	95.7	95.5	94.7	95.2	97.3
Completed Form 4	1475	86.6	81.0	86.5	89.3	89.3
Orphanhood:	1432					
maternal orphan		6.9	5.7	8.9	8.1	5.0
paternal orphan		22.1	19.1	24.9	21.0	23.1
dual orphan		11.0	7.8	12.2	11.5	12.4
Socio-economic status						
unprotected sources of drinking water	1478	13.6	14.5	14.3	13.6	12.0
Biomarkers						
HIV+ incidence	1483	0.5	0.5	0.6	0.5	0.5
HIV+ prevalence	1493	1.2	1.1	1.4	1.1	1.3
HSV-2+	1493	0.5	0.0	1.1	0.3	0.8
pregnant (female only)	668	2.4	1.2	2.4	2.5	3.4
Study arm						
Intervention arm	1495	50.6	50.4	46.6	50.3	50.1

5.2.1 Comparison of completion times by questionnaire delivery mode

There was some difference between modes in terms of the time it took to complete questionnaires. On average respondents using ICVI took 62 minutes to complete their questionnaire, ACASI respondents averaged 68 minutes, and SAQ and Audio-SAQ respondents averaged 72 minutes. ICVI was significantly shorter than SAQ, Audio-SAQ, and ACASI ($p<0.001$). ACASI appears to take a slightly shorter time than Audio-SAQ, although it did not achieve statistical significance ($p=0.08$).

5.3 Comparison of item response rates of pre-specified sexual behaviours by questionnaire delivery modes

As can be seen in Table 5-2 the global item non-response rate varied significantly between the four questionnaire delivery modes ($p<0.001$) with the lowest non-response rates achieved by those using ICVI (mean=2.2 questions missed; 95% CI: 1.9-2.5) and ACASI (mean=2.6; 95% CI: 2.3-2.9); the mean numbers of questions not completed by those using SAQ and Audio-SAQ were 8.0 (95% CI: 7.2-8.9) and 6.3 (95% CI: 5.6-7.0) respectively.

5.4 Comparison of response rates for pre-specified sexual behaviour questions

Table 5-3 shows the difference between modes by reported prevalence of sexual behaviours. There is some evidence that Audio-SAQ and ACASI users were more likely to report sexual behaviours than those using other modes. For example, respondents using Audio-SAQ and ACASI were more likely to report having kissed someone or having had sex than respondents using the other modes, although this relationship is only of borderline significance (p=0.051 and p=0.068 respectively). After adjusting for covariates, adjusted odds ratio for reporting ever having had sex indicated that Audio-SAQ and ACASI users were twice as likely to report having had sex compared to those who completed the questionnaire using SAQ; there was no apparent difference in reporting between ICVI and SAQ users (ICVI adjusted OR (AOR) =1.0 [95% CI: 0.6-1.8]; Audio-SAQ AOR=2.05 [95% CI: 1.2-3.4]; ACASI AOR=2.0 [95% CI: 1.2-3.2]). Those using ACASI also reported starting sex between 0.7-1.7 years earlier than those using the other modes (p=0.045) and also reported more partners than those using other modes (mean number of partners for ACASI=2.6 versus SAQ=1.7; ICVI=1.5; Audio-SAQ=1.8; p=0.047). This trend in reporting of sensitive behaviours was not found for the question on abortion.

5.4.1 Difference between response to questions answered in Round 1 and Round 2

A total of 395 of the 641 respondents randomly allocated to complete the questionnaire twice (Rounds 1 and 2) did so. There were no differences in gender, age, marital status, educational level, employment status or reporting of sexual activity between respondents who completed Round 2 and those respondents who were allocated to Round 2 but failed to return to the survey site a week later. Respondents were more likely to have attended Round 2 if they were from a control community (71.8% were from control communities c.v. 51.1% from intervention communities; p<0.001).

Table 5-4 (a and b) presents the number of conversions by direction of change between the rounds by questionnaire method at each round. Of the 331 respondents who reported that they had never had sex in Round 1, 21 (6.3%) changed their answer and reported that they had had sex in Round 2 (positive conversion). This happened more commonly among those using ACASI as their Round 2 method (16.1% positively converted their answer vs. 1.2% of those who used SAQ and ICVI and 6.6% of those who used Audio-SAQ). Of the 52 respondents who reported 'yes' to having sex in Round 1, 12 (23.1%) changed their answer to a negative response in Round 2 (negative conversion). This happened more commonly in those who used SAQ or Audio-SAQ as their Round 2 method (46.7% and 33.3% vs. 8.3% of those completing ICVI in Round 2 and 0% of those using ACASI).

Table 5-2: Non-response rate [95% CI] for pre-specified sexual behaviour questions in parallel group comparison*

Behaviour	SAQ		ICVI		A-SAQ		ACASI		p-value
	%	[95%CI]	%	[95%CI]	%	[95%CI]	%	[95%CI]	
Global	8.0	[7.2-8.9	2.2	[1.9-2.4]	6.3	[5.6-7.0]	2.6	[2.3-2.9]	<0.001
Ever kissed	3.8	[2.1-6.2]	1.1	[0.3-2.8]	1.6	[0.6-3.4]	1.6	[0.6-3.4]	0.074
Ever had sex (Q50 only)	2.1	[0.9-4.2]	1.1	[0.3-2.8]	0.8	[0.2-2.3]	1.6	[0.6-3.4]	0.432
Ever had sex (Q50+Q63 if said 'no' the first time)	2.1	[0.9-4.2]	1.1	[0.3-2.8]	0.5	[0.1-1.9]	1.6	[0.6-3.4]	0.240
Age at first sex	23.7	[11.4-40.2]	0.0	[0.0-8.2]	9.3	[3.1-20.3]	2.4	[0.1-12.9]	<0.001
No. of sexual partners	13.2	[4.4-28.1]	2.3	[0.1-12.3]	31.5	[19.5-45.6]	0.0	[0.0-8.6]	<0.001
Condom use at last sex	5.3	[0.6-17.7]	4.7	[0.6-15.8]	29.6	[18.0-43.6]	0.0	[0.0-8.6]	<0.001
Abortion	3.5	[1.9-5.9]	1.4	[0.4-3.2]	1.1	[0.3-2.7]	1.6	[0.6-3.4]	0.091

** Percent for single item non-response rate*

Table 5-3: Reported prevalence [95% CI] of pre-specified sexual behaviour questions in parallel group comparison*

Behaviour	N	SAQ		ICVI		A-SAQ		ACASI		p-value
			[95%CI]	%	[95%CI]	%	[95%CI]	%	[95%CI]	
Ever kissed	1465	15.6%	[12.0-19.8]	15.5%	[11.9-19.7]	21.4%	[17.3-25.9]	21.1%	[17.0-25.5]	0.051
Ever had sex (Q50 only)	1474	10.4%	[7.5-14.0]	11.9%	[8.8-15.7]	14.5%	[11.1-18.5]	10.9%	[8.0-14.5]	0.341
Ever had sex (Q50+Q63 if said 'no' the first time)	1474	11.5%	[8.4-15.2]	11.9%	[8.8-15.7]	17.2%	[13.5-21.4]	15.7%	[12.2-19.8]	0.068
Age at first sex	161	15.9y	[14.3-17.5]	16.9y	[16.1-17.7]	16.7y	[16.0-17.4]	15.2y	[14.1-16.2]	0.045
No. of sexual partners	153	1.7	[1.3-2.2]	1.5	[1.2-1.9]	1.8	[1.3-2.4]	2.6	[1.8-3.3]	0.047
Condom use at last sex	149	45.7%	[28.8-63.4]	46.2%	[30.1-62.8]	59.5%	[42.1-75.2]	39.5%	[24.0-56.6]	0.373
Abortion	182	15.4%	[5.9-30.5]	9.5%	[2.7-22.6]	5.4%	1.1-14.9]	2.2%	[0.1-11.8]	0.135

** Percent for categorical variables; mean for quantitative variables. Non-respondents were excluded.*

Statistical comparison of discordant pairs between Rounds 1 and 2 using McNemar's test showed that while there was no statistically significant evidence of method effect when using ICVI or Audio-SAQ in Round 2 (p=1.0 for both), there was weak evidence that this happened with SAQ (p=0.07), with data suggesting you were more likely to negatively convert if you used SAQ in Round 2. There was strong evidence that answers were more likely to be converted positively when ACASI was used in Round 2 (p=0.004). The proportion of ACASI users reporting 'yes' to ever having sex in Round 2 increased by 12.7% (95% CI: 3.5-21.8).

Table 5-4: Response conversions between Rounds 1 and 2 (one week later)

1-4a: Positive conversions: respondents who reported they had never had sex in Round 1 but changed their response and reported they had had sex in Round 2					
Round 1 (no)	**Round 2 (yes)**				**Total (%)**
	SAQ (%)	**ICVI (%)**	**Audio-SAQ (%)**	**ACASI (%)**	
SAQ (92)	0/24 (0)	0/19 (0)	2/25 (8.0)	5/24 (20.8)	***7/92 (7.6)***
ICVI (79)	0/19 (0)	1/26 (3.8)	2/16 (12.5)	2/18 (11.1)	***5/79 (6.3)***
Audio-SAQ (77)	0/20 (0)	0/21 (0)	1/18 (5.6)	2/18 (11.1)	***3/77 (3.9)***
ACASI (83)	1/22 (4.6)	0/17 (0)	0/17 (0)	5/27 (18.5)	***6/83 (7.2)***
Total	***1/85 (1.2)***	***1/83 (1.2)***	***5/76 (6.6)***	***14/87 (16.1)***	***21/331 (6.3)***
1-4b: Negative conversions: respondents who reported they had had sex in Round 1 but changed their response and reported they had never had sex in Round 2					
Round 1 (yes)	Round 2 (no)				**Total (%)**
	SAQ (%)	**ICVI (%)**	**Audio-SAQ (%)**	**ACASI (%)**	
SAQ (8)	0/1 (0)	0/2 (0)	0/1 (0)	0/4 (0)	*0/5 (0.0)*
ICVI (14)	1/4 (20.0)	0/3 (0)	0/5 (0)	0/1 (0)	*1/13 (7.1)*
Audio-SAQ (15)	2/3 (66.7)	1/3 (33.3)	1/3 (33.3)	0/6 (0)	*4/15 (26.7)*
ACASI (15)	4/6 (66.7)	0/4 (0)	3/3 (100)	0/2 (0)	*7/15 (46.7)*
Total	***7/15 (46.7)***	***1/12 (8.33)***	***4/12 (33.3)***	***0/13 (0)***	*12/52 (23.1)*

5.5 Comparison of self-reported sexual behaviours with biomarkers of sexual activity

We also sought to compare reporting of sexual behaviour with the presence or absence of a biomarker for sexual activity. Biomarkers included incident HIV (acquired since the baseline survey in 2003), prevalent HSV-2, and/or current pregnancy in females. Overall, very few respondents had evidence of a positive biomarker (n=2 in males and n=28 in females). While both men with biomarkers reported that they had had sex, only 15/28 (53.6%) females with biomarkers reported having had sex. While the rate of discordance between biomarkers and reporting for females was high, there is no evidence in this small sample that discordance differed between questionnaire delivery modes (p=0.703).

5.6 Results from additional sensitive and socially censured questions

This section reports on post hoc analyses. I first examine skip patterns and responses to the sexual behaviour question when the respondent was asked this twice within the same questionnaire. I then explore response rates and reporting of six additional socially censured and sensitive types of data: psychological well-being, poverty, orphaning, drug and alcohol use, circumcision (males only), and self-reported honesty during questionnaire completion. These additional items were selected because they represent a wide variety of potentially sensitive areas. Mental health and alcohol and drug use have been defined elsewhere as sensitive topics (Klimes-Dougan, 1998; Moum, 1998; Brener et al., 2003). Qualitative research conducted within this trial (and presented in the following chapter) suggests that poverty and orphaning are subjects that cause distress in young people. Extensive research defines adolescence as a time when peer norms (perceived or real) often take precedence over broader social norms. Qualitative data from the RDS parent trial exploring the onset of sexual behaviours in youth highlight the intense pressure young men have to conform to peer norms. Given that male circumcision is not widely practiced in Zimbabwe, circumcised males would be considered 'different' rendering this a sensitive topic in this context. Finally, respondents were asked to tell us how honest they felt they were during questionnaire completion. Given its sensitivity, questionnaire delivery mode could impact on self-reported honesty.

5.6.1 Skip patterns

Overall there were up to 20 skip patterns that could be initiated depending on the questionnaire method (SAQ=20; ICVI=11; Audio-SAQ=10; ACASI=20). Respondents' ability to skip questions correctly differed between modes where 45.1% of SAQ respondents completed 100% of the initiated skips correctly compared to 94.0% of ICVI respondents, 58.2% of Audio-SAQ respondents and 99.0% of ACASI respondents.

One important skip pattern centred around the sexual behaviour questions. Here respondents were only required to answer in-depth sexual behavioural questions if they had given a positive response to the initial question that asked if they had ever had sex. However, not all respondents who said 'yes' to this question completed the requisite subsequent questions. This was particularly true of those using SAQ and Audio-SAQ where 14% and 12% respectively failed to answer the next question compared to 2% of ICVI users and 0% of ACASI users ($p=0.006$). Of note, for skip patterns which followed less sensitive questions regarding marriage and earning money, 100% of SAQ respondents instructed to skip completed this instruction successfully (there were no skips for these questions in the Audio-SAQ mode).

Likewise, SAQ and Audio-SAQ respondents who reported not having any of the six STI trigger symptoms all skipped the next five questions in the questionnaire correctly.

Yet, as noted earlier in this chapter, not all of the difference in response rates occurred in relation to skip instructions. While not statistically significant (p=0.07), respondents using SAQ were more likely to not answer the question on kissing, a question which *all* respondents were required to answer, than those using other modes (see Table 5-2:).

5.6.2 The value of asking a sensitive question a second time

Previously, in the section covering a priori analysis, I reported on comparisons of responses to ever having sex between two rounds of the same questionnaire administered a week apart. However respondents using SAQ, Audio-SAQ and ACASI who answered 'no' when asked if they had ever had sex were also asked this question a second time *within* the same questionnaire. There was a notable increase (4.1%) in respondents acknowledging their sexual activity when they were asked this question a second time. In Round 1, 3.2% (32/980; 95% CI 2.2-4.6%) of respondents and 7.7% (19/246; 95% CI 4.7-11.8%) of Round 2 respondents changed their response from 'no' to 'yes' when asked about their sexual behaviour for a second time within the same questionnaire (see Table 5-5). Respondents were more likely to change their response on ACASI than in Audio-SAQ or SAQ, an effect which was more pronounced in Round 2 (positive conversions: Round 1: SAQ=1.2%; Audio-SAQ=3.8%; ACASI=5.4%; Round 2: SAQ=1.1%; Audio-SAQ=2.6%; ACASI=17.8%). However, for those two modes where the skip instructions had to be followed by the respondents themselves (SAQ and Audio-SAQ), there were a large number of respondents who missed answering the second question (Q63). In fact, for these two modes, there were a larger number of respondents who missed answering the second question in SAQ and Audio-SAQ after saying they had not had sex in the first question, than those who positively converted (missed Q63: Round1: SAQ=15.9% Audio-SAQ=18.2%; Round 2: SAQ=12.0%, Audio-SAQ=6.4%). ACASI respondents always answered the second question, a result of the computer programme initiating the skip for the respondent.

Table 5-5: Proportion of respondents who positively converted their answer to 'ever had sex' within the same questionnaire ('no' in q50 and 'yes' in q63)*

Round 1	SAQ			Audio-SAQ			ACASI			Total	
	M	F	total	M	F	total	M	F	total	M	F
'no' in q50	175	152	327	182	137	319	178	156	334	535	445
'yes' in q63	2	2	4	7	3	10	10	8	18	19	13
missed q63	28	24	52	44	14	58	0	0	0	72	38
% positive conversions	1.1%	1.3%	1.2%	5.1%	2.4%	3.8%	5.6%	5.1%	5.4%	3.6%	2.9%
Round 2	**SAQ**			**Audio-SAQ**			**ACASI**			**Total**	
	M	**F**	**total**	**M**	**F**	**total**	**M**	**F**	**total**	**M**	**F**
'no' in q50	61	31	92	44	34	78	42	48	90	147	99
'yes' in q63	1	0	1	1	1	2	14	2	16	16	3
missed q63	9	2	11	1	4	5	0	0	0	24	8
% positive conversions	1.6%	0.0%	1.1%	2.2%	2.9%	2.6%	33.3%	4.2%	17.8%	10.9%	3.0%

** % positive conversions are those who said 'no' in Q50 but 'yes' when asked a second time in Q63.*

5.6.3 Additional sensitive questions

Comparisons described in this section are not identical to those described in the a priori analysis above. Whereas all of the sexual behavioural questions were answered using the ballot sheet, some questions in this section were answered using the standard interviewer administered format (IAQ), with the respondent answering the interviewer directly. The table below details the ballot status for each question analysed in this section.

Table 5-6: ICVI ballot status for sensitive questions

Sensitive topic	ICVI Ballot status
Psychological well-being	no ballot (IAQ)
Poverty	no ballot (IAQ)
Orphaning	no ballot (IAQ)
Drug & alcohol use	no ballot (IAQ)
Circumcision	ballot (ICVI)
Honesty in questionnaire completion	ballot (ICVI)

In the analysis of these seven sensitive issues, twelve respondents were removed from the analysis in Round 1 and one respondent from Round 2 due to data capture errors. All data were analysed using Stata 10.

5.6.4 Psychological well-being: the Shona Symptom Questionnaire

The Shona Symptom Questionnaire (SSQ) is a 14 item locally validated indigenous scale that assesses risk of affective disorders such as anxiety and depression. Respondents scoring 8 or

more are considered at risk while those who scored greater than 11 are considered severely at risk. The internal consistency of the SSQ scale was assessed by calculating the intra-class correlation coefficient (Cronbach's alpha) to ensure that the SSQ psychometric properties with this population-based sample were what we would expect from its use in other settings (high internal consistency is defined as alpha >0.7). The Cronbach's alpha was maximal when all 14 items from the scale were included (α=0.83).

Respondents with missing values for any of the SSQ items were excluded from this analysis. Chi-square test was used to assess the association between mode of administration and common affective disorders and affirmative response to each of the 14 SSQ statements. In the event of expected frequency smaller than 5, an extension of the Fisher's exact test was used instead (Mehta & Patel, 1983; Mehta et al., 1983). Given 16 tests of hypothesis, a nominal P-value <0.05/16=0.0031 was considered statistically significant according to the Bonferroni adjustment. Risk ratios (RR) were estimated for being at risk of common affective disorders using SAQ as the reference group.

Response rates for completion of the SSQ mental health scale were high; 93.9% of survey respondents completed the entire scale (Langhaug, Cheung, Pascoe, Hayes, & Cowan, 2009). Overall 91 (6.1%) respondents failed to complete one or more SSQ items; this varied by method (SAQ=41 (11.1%); Audio-SAQ=45 (12.0%); IAQ=5 (1.4%); ACASI=0 (0.0%); p=0.002).

As shown in Table 5-7,the prevalence of being at risk for common affective disorders as estimated by SAQ, Audio-SAQ, IAQ, and ACASI were 52.3%, 48.6%, 41.5%, and 63.6% respectively (p<0.001). There was no significant difference in prevalence between Audio-SAQ and SAQ (RR=0.93; 95% CI: 0.80 to 1.08), whereas IAQ was associated with a lower prevalence (RR=0.79; 95% CI: 0.68 to 0.93) and ACASI with a higher prevalence (RR=1.21; 95% CI: 1.07 to 1.38).

Estimates of prevalence of probable severe cases (score>11) were 19.6%, 23.6%, 14.2%, and 36.8% for SAQ, Audio-SAQ, IAQ, and ACASI respectively (p<0.001). Again there was no significant difference between Audio-SAQ and SAQ (RR=1.20; 95% CI: 0.90 to 1.61), and as before IAQ gave a lower prevalence (RR=0.73; 95% CI: 0.52 to 1.02) and ACASI a significantly higher reported prevalence than SAQ (RR=1.88; 95% CI: 1.45 to 2.43).

Table 5-7: Percentages of respondents giving affirmative responses to SSQ (boldface type indicates highest percentage for each statement)

SSQ Scores	SAQ %	Audio -SAQ %	IAQ %	ACASI %	p-value
Total number of respondents by method	327	331	359	375	
Overall response rate.	88.8	88.0	98.6	100.0	=0.002
CMD case (scored 8 or more affirmatively)	52.3	48.6	41.5	**63.5**	<0.001
CMD severe case (scored 11 or more affirmatively)	19.6	23.6	14.2	**36.8**	<0.001
SSQ Statements					
There were times in which I was thinking deeply or thinking about many things (thinking too much).	77.7	74.3	70.8	**87.2**	<0.001
I found myself sometimes failing to concentrate	61.2	68.6	54.6	**81.3**	<0.001
I lost my temper or got annoyed over trivial matters	54.1	56.5	59.9	**73.6**	<0.001
I had nightmares or bad dreams	68.2	66.2	66.9	**78.4**	<0.001
I sometimes saw or heard things which others could not see or hear	20.8	26.6	25.1	**31.5**	=0.014
My stomach was aching	60.9	56.2	52.9	**69.1**	<0.001
I was frightened by trivial things	44.0	38.1	35.9	**52.0**	<0.001
I sometimes failed to sleep or lost sleep	50.8	51.4	41.8	**59.7**	<0.001
There were moments when I felt life was so tough that I cried or wanted to cry	58.7	61.6	52.4	**72.5**	<0.001
I felt run down (tired)	68.2	61.3	59.1	**77.1**	<0.001
At times I felt like committing suicide	8.3	**13.0**	5.3	12.0	=0.001
I was generally unhappy with things that I would be doing each day	48.3	44.1	43.7	**57.3**	<0.001
My work was lagging behind (impairment of functioning)	40.4	47.4	42.3	**53.6**	=0.002
I felt I had problems in deciding what to do	52.9	54.1	50.4	**59.7**	=0.075

Table 5-7 also shows the percentages of affirmative responses for each of the 14 SSQ statements. All but two statements, "I sometimes saw or heard things which others could not see or hear" (p=0.014), and "I felt I had problems in deciding what to do" (p=0.075) showed a significant difference across modes of administration (each p-value being less than the

Bonferroni-adjusted P-value cut-off of 0.003). Out of the 12 statements that were significantly associated with questionnaire delivery mode, nine showed lowest prevalence when assessed by IAQ and 11 showed highest prevalence when assessed by ACASI.

5.6.5 Poverty

Response rates for completion of the poverty questions were high with less than 2% non-response rate. Overall levels of reported poverty were high with over 55% unable to afford cooking oil, 21% unable to afford soap to wash their clothes, 41% who could not afford clinic fees if they were sick, and 55% reporting school absenteeism due to lack of money for fees. There were 11% who did not own any everyday items (i.e. no tables, chairs or sufficient blankets) and over 18% reported going a day without food in the past week as there was no food in the household.

Error! Reference source not found. presents the proportion of respondents reporting each item by questionnaire delivery mode and adjusted odds ratios (AOR) adjusted for age and gender. For the majority of items respondents who answered the questionnaire using self-administered modes (SAQ, Audio-SAQ and ACASI) reported higher levels of poverty than those using the interview-administered mode (IAQ).

Differences in reporting of essential items were statistically significant ($p<0.05$) for all but three items (the ability to afford paraffin ($p=0.87$); the ability to afford meat or fish four times/week ($p=0.20$); the ability to afford to be able to drink tea at least once/day ($p=0.46$)). There was only one item where the proportion of respondents reported higher levels of poverty using IAQ (school absenteeism due to lack of fees) but the difference between the questionnaire delivery modes for this item was not statistically significant ($p=0.94$).

Those using self-administered modes to complete the questionnaire were between two and four times more likely to report not owning blankets, tables and chairs (SAQ AOR 4.2; 95% CI 2.28-7.75; Audio-SAQ AOR 2.46; 95% CI 1.29-4.68; ACASI AOR 3.51; 95% CI 1.89-6.53), and between two and three times more likely to report adults having to skip meals (SAQ AOR 3.10; 95% CI 2.05-4.70; Audio-SAQ AOR 2.56; 95% CI 1.68-3.90; ACASI AOR 2.48; 95% CI 1.63-3.78) and going a day without food in the last week (SAQ AOR 3.10, 95% CI 2.05-4.70; Audio-SAQ AOR 2.56; 95% CI 1.68-3.90; ACASI AOR 2.48; 95% CI 1.63-3.78), and three to five times more likely to report living in the poorest type of house built of poles and mud (SAQ AOR 5.36; 95% CI 1.54-18.63; Audio-SAQ AOR 3.65; 95% CI 1.00-13.22; ACASI AOR 4.41; 95% CI 1.24-15.69) than those using the interview-administered mode.

Table 5-8: Response rates for poverty questions by questionnaire delivery mode

Indicator	n/N	%				p-value	AOR [95% CI]*								AOR [95% CI]*					
		IAQ (n=364)	SAQ (n=368)	A-SAQ (n=376)	ACASI (n=375)		IAQ (n=364)	SAQ (n=368)		A-SAQ (n=376)		ACASI (n=375)			SAQ (n=368)	A-SAQ (n=376)		ACASI (n=375)	
Affordability of essential items:																				
Cannot afford:																				
to cook with oil at each meal	817/1483	45.0	**62.5**	56.4	56.3	p<0.001	1.0	2.02	[1.50-2.72]	1.57	[1.17-2.11]	1.58	[1.18-2.12]		1.0	0.78	[0.58-1.04]	0.78	[0.58-1.05]	
paraffin	651/1483	44.8	**45.1**	43.4	42.4	p=0.868	1.0	1.01	[0.76-1.35]	0.94	[0.70-1.26]	0.90	[0.67-1.20]		1.0	0.93	[0.70-1.24]	0.88	[0.66-1.18]	
to eat at least twice a day	414/1483	23.4	**32.1**	29.0	27.2	p=0.065	1.0	1.54	[1.10-2.13]	1.33	[0.96-1.86]	1.23	[0.88-1.72]		1.0	0.87	[0.64-1.19]	0.80	[0.58-1.10]	
to eat meat or fish at least 4x/wk	1059/1483	67.9	**75.0**	71.3	71.5	p=0.205	1.0	1.40	[1.02-1.95]	1.16	[0.85-1.60]	1.18	[0.86-1.62]		1.0	0.82	[0.59-1.14]	0.84	[0.60-1.16]	
to drink tea once/day	652/1483	40.4	45.1	44.7	**45.6**	p=0.462	1.0	1.20	[0.89-1.61]	1.19	[0.89-1.60]	1.23	[0.92-1.65]		1.0	1.00	[0.74-1.34]	1.02	[0.76-1.38]	
soap to wash clothes	298/1483	13.5	**25.8**	21.0	20.0	p=0.001	1.0	2.23	[1.52-3.26]	1.70	[1.15-2.52]	1.58	[1.07-2.35]		1.0	0.76	[0.54-1.08]	0.71	[0.50-1.01]	
to pay clinic fees if sick	598/1483	31.9	**50.0**	40.4	38.9	p<0.001	1.0	2.13	[1.57-2.88]	1.44	[1.07-1.96]	1.36	[1.00-1.85]		1.0	0.68	[0.51-0.91]	0.64	[0.48-0.86]	
medication if get sick	815/1483	48.6	**62.0**	56.1	53.1	p=0.003	1.0	1.71	[1.27-2.30]	1.35	[1.01-1.80]	1.19	[0.89-1.59]		1.0	0.79	[0.59-1.06]	0.70	[0.52-0.94]	
Sometimes I go to bed hungry	266/1483	14.3	**22.0**	17.0	18.4	p=0.052	1.0	1.68	[1.14-2.47]	1.22	[0.82-1.82]	1.34	[0.90-1.99]		1.0	0.72	[0.50-1.04]	0.80	[0.56-1.16]	
All in household own at least 1 pair of shoes	569/1483	27.7	**45.6**	37.5	42.4	p<0.001	1.0	2.18	[1.60-2.97]	1.56	[1.14-2.14]	1.92	[1.40-2.61]		1.0	0.72	[0.53-0.96]	0.88	[0.66-1.18]	
Have been absent from school because no money for fees	824/1483	**56.3**	56.0	54.3	55.7	p=0.945	1.0	0.97	[0.72-1.30]	0.91	[0.68-1.22]	0.97	[0.72-1.30]		1.0	0.94	[0.70-1.26]	1.00	[0.74-1.33]	
SES based on affordability of essential items:																				
Poorest 40%	743/1483	44.0	**55.2**	50.0	51.2	p=0.024	1.0	1.55	[1.16-2.09]	1.27	[0.95-1.70]	1.34	[1.0-1.80]		1.0	0.82	[0.61-1.10]	0.87	[0.65-1.16]	
Wealthiest 20%	249/1483	**20.9**	13.0	14.1	19.2	p=0.009	1.0	0.58	[0.39-0.86]	0.62	[0.42-0.92]	0.91	[0.63-1.31]		1.0	1.08	[0.71-1.65]	1.58	[1.06-2.36]	
SES based on ownership of sellable assets: [a]																				
Poorest 40%	647/1483	37.9	**48.6**	42.3	45.6	p=0.024	1.0	1.54	[1.14-2.08]	1.18	[0.88-1.60]	1.38	[1.02-1.87]		1.0	0.77	[0.57-1.03]	0.9	[0.67-1.21]	
Wealthiest 20%	257/1483	15.4	15.4	18.6	**19.7**	p=0.286	1.0	1.05	[0.70-1.58]	1.31	[0.88-1.95]	1.38	[0.94-2.05]		1.0	1.25	[0.84-1.85]	1.31	[0.89-1.93]	
SES based on ownership of fixed assets: [b]																				
Poorest 40%	648/1483	39.3	48.9	39.9	**46.7**	p=0.015	1.0	1.46	[1.09-1.98]	1.02	[0.75-1.37]	1.36	[1.01-1.84]		1.0	0.69	[0.52-0.93]	0.93	[0.69-1.24]	
Wealthiest 20%	95/1483	2.8	6.5	**8.5**	7.7	p=0.007	1.0	2.52	[1.18-5.36]	3.37	[1.63-6.98]	2.96	[1.42-6.19]		1.0	1.34	[0.77-2.34]	1.18	[0.67-2.07]	
SES based on combined scale (Fixed & sellable assets & ability to afford essential items):																				
Poorest 40%	594/1483	34.1	**44.6**	39.6	41.9	p=0.028	1.0	1.54	[1.14-2.09]	1.27	[0.93-1.72]	1.40	[1.03-1.89]		1.0	0.82	[0.61-1.10]	0.90	[0.67-1.22]	
Wealthiest 20%	293/1483	22.2	15.5	18.1	**23.2**	p=0.028	1.0	0.65	[0.44-0.96]	0.78	[0.54-1.12]	1.06	[0.75-1.51]		1.0	1.19	[0.80-1.76]	1.61	[1.11-2.36]	
Income:																				
Never given any money for own use	536/1453	**40.7**	36.5	32.4	37.9	p=0.139	1.0	0.83	[0.61-1.12]	0.69	[0.51-0.94]	0.88	[0.65-1.18]		1.0	0.84	[0.61-1.14]	1.05	[0.78-1.43]	
Never worked for money/pay	956/1460	62.0	**70.8**	66.4	62.9	p=0.054	1.0	1.58	[1.14-2.18]	1.25	[0.91-1.71]	1.04	[0.76-1.41]		1.0	1.25	[0.91-1.73]	0.83	[0.61-1.14]	
External aid:																				
Child in house receiving assistance	352/1479	24.4	20.6	**28.8**	21.3	p=0.034	1.0	0.80	[0.56-1.14]	1.25	[0.90-1.74]	0.83	[0.59-1.17]		1.0	1.57	[1.12-2.20]	1.03	[0.72-1.47]	
Food security:																				
Adult skipped a meal in last week	297/1466	10.2	**26.1**	22.6	22.1	p<0.001	1.0	3.10	[2.05-4.70]	2.56	[1.68-3.90]	2.48	[1.63-3.78]		1.0	0.82	[0.59-1.16]	0.80	[0.57-1.12]	
Gone a day without food in the last week	274/1473	10.4	**23.0**	21.2	19.7	p<0.001	1.0	2.55	[1.68-3.88]	2.30	[1.51-3.51]	2.08	[1.36-3.18]		1.0	0.90	[0.64-1.29]	0.82	[0.57-1.17]	

*Adjusted odds ratio (AOR) adjusted for age and gender

[a] sellable assets included ownership of oxcart, bicycle, motorcycle or car, plough, clock or watch, radio, fridge, tv, phone, or everyday items (such as blankets, tables or chairs).

[b] fixed assets included toilet (bush vs. Blair or flush); water source (unoprotected well or spring vs. protected well, borehole or piped water); house structure (built with poles and mud vs. bricks or cement); roof material (grass or thatch vs. tin, asbestos, or tiles); floor (dirt vs. cement)

However when the three self administered modes were compared against each other, no one mode appeared to consistently increase reporting above the others. Audio-SAQ or ACASI users were three to four times more likely to report living in a house built of poles and mud (Audio-SAQ AOR 3.69; 95% CI 1.01-13.4; ACASI AOR 4.53; 95% CI 1.27-16.15) and over one and a half times more likely to report living in houses with dirt floors (Audio-SAQ AOR 1.89; 95% CI 1.22-2.91; ACASI AOR 1.62; 95% CI 1.05-2.52) than those using SAQ. When Audio-SAQ and SAQ users were compared, respondents using Audio-SAQ were less likely to report being poor (0.69; 95% CI 0.52-0.93), but more likely to report having a child needing food assistance than SAQ users (1.57; 95% CI 1.12-2.20).

5.6.6 Orphaning

Orphans were examined as an overarching category and specifically as maternal, paternal or dual orphaning. When specific orphaning was compared, it was against non-orphans (and not against other categories of orphans).

Non-item response rates around orphaning were low. However, all of the 24 (1.6%) respondents who failed to answer the two questions establishing paternal and maternal orphanhood (and by default dual orphaning) used either SAQ (n=11) or Audio-SAQ (n=13,) the two methods where the respondent could passively miss a question. There were also a small number (n=55; 3.7%) of respondents who said that they did not know if their parents were alive or reported that they did not know their parents at all.

Table 5-9 presents data on reported orphan status by questionnaire delivery mode and adjusted odds ratios (AOR) adjusted for gender. Overall, 38.0% of respondents reported being an orphan (maternal, paternal, or dual). There was a significant difference in prevalence of reporting being orphaned between the questionnaire delivery modes. However, unlike in previous analyses, respondents interviewed by a surveyor were more likely to report being orphaned than the other three self-administered modes (SAQ=30.8%; IAQ=45.6%; Audio-SAQ=38.8%; ACASI=39.2%, p=<0.001).

When all three self-administered questionnaire delivery modes are compared separately against the interviewer-administered one, only respondents using SAQ were less likely to report orphaning. However when all three modes were combined and compared against the

Table 5-9: Response rates for orphan status by questionnaire delivery mode (boldface type indicates highest percentage)

Orphan Status	n/N	Prevalence (%)					AOR [95%CI]**				AOR (95%CI)**	
		SAQ (n=368)	IAQ* (n=364)	Audio-SAQ (n=376)	ACASI (n=375)	p-value	IAQ (n=364)	SAQ (n=368)	Audio-SAQ (n=376)	ACASI (n=375)	IAQ*** (n=364)	Self-Administered (n=1119)
orphan	564/1483	30.8	**45.6**	38.8	39.2	**0.001**	1.0	**0.53** [0.39-0.72]	0.76 [0.56-1.02]	0.77 [0.57-1.03]	1.0	**0.68** [0.54-0.87]
maternal	94/1483	5.0	**8.8**	7.2	4.8		1.0	**0.45** [0.24-0.82]	0.72 [0.42-1.26]	0.49 [0.26-0.89	1.0	**0.55** [0.35-0.86]
paternal	312/1483	17.9	**24.7**	20.4	22.4	**0.014**	1.0	**0.57** [0.39-0.83]	0.74 [0.51-1.06]	0.81 [0.57-1.16]	1.0	**0.70** [0.52-0.94]
double	158/1483	7.8	**12.1**	11.3	12		1.0	**0.51** [0.30-0.84]	0.83 [0.42-1.32]	0.88 [0.56-1.40]	1.0	0.73 [0.50-1.07]

*interviewer administered questionnaire, where ballot box was *not* used

**Adjusted odds ratio (AOR) adjusted for gender

*** Interviewer adminstered (compared against three methods that were self-administered

Table 5-10: Response rate for drug and alcohol use by questionnaire delivery mode (boldface type indicates highest percentage)

Alcohol & Drug Use	n/N	Prevalence (%)					AOR [95%CI]**					
		SAQ (n=368)	IAQ* (n=364)	Audio-SAQ (n=376)	ACASI (n=375)	p-value	IAQ* (n=364)	SAQ (n=368)		Audio-SAQ (n=376)		ACASI (n=375)
marijuana	126/1483	**10.8**	4.4	9.3	10.1	**0.009**	1.0	**2.64**	[1.43-4.88]	**2.19**	[1.18-4.09]	**2.56** 1.38-4.73
local alcohol	195/1483	13.3	11.8	11.5	**17.1**	0.100	1.0	1.13	[0.72-1.76]	0.94	[0.60-1.49]	**1.55** [1.02-2.37]
glue	54/1483	3.1	0.8	3.3	**7.5**	**<0.001**	1.0	**3.96**	[1.09-14.32]	**4.15**	[1.16-14.84]	**9.68** [2.91-32.17]
beer	281/1483	17.9	17.1	16.4	**25.6**	**0.004**	1.0	1.02	[0.68-1.53]	0.90	[0.60-1.35]	**1.81** [1.24-2.66]
wine	195/1483	12.9	9.9	13.1	**17.6**	**0.022**	1.0	1.32	0.82-2.13]	1.34	[0.84-2.14]	**2.02** [1.30-3.16]
tobacco	73/1483	**8.1**	2.5	3.8	5.9	**0.004**	1.0	**3.49**	1.60-7.60]	1.51	[0.64-3.57]	**2.55** [1.15-5.69]

*interviewer administered questionnaire, where ballot box was *not* used

**Adjusted odds ratio (AOR) adjusted for gender

interviewer-administered mode, respondents using the interviewer-administered mode are 1.4 to 1.8 times more likely to report orphaning (overall orphaning AOR 1.47; 95% CI 1.15-1.87; maternal orphaning AOR 1.82; 95% CI 1.16-2.88; paternal orphaning AOR 1.42; 95% CI 1.06-1.90).

5.6.7 Drug and alcohol use

There were two questions on locally brewed alcohol which were either made from fermented fruits or a specific plant's roots and leaves. As their potency was the same these two questions were combined here for analysis. Frequency of use ranged from never having tried a substance to using it regularly. Given the young age of this survey population, where any use would not have been culturally sanctioned, reporting any use of a substance was compared against never having tried it.

Non-response rates were less than three percent for all seven questions on drug and alcohol use. The bulk (95%; n=180/189) of these missing responses were found in questionnaires of SAQ (62%) and Audio-SAQ (33%) users. There were no missing responses in ACASI. The majority of respondents reported never having tried alcohol or drugs ranging from 80.1% (95% CI 78.6-82.7%) who said they have never tried beer to 96.3% (95% CI 95.2-97.2%) claiming to have never sniffed glue. Not surprisingly, young males had higher rates of reporting these behaviours than young females. While the numbers were small, increased reporting of drug and alcohol was seen predominantly by ACASI users (see Table 5-10). The prevalence of reporting using marijuana, glue, locally brewed alcohol, beer, and wine, was higher amongst ACASI users with only the differences in reporting locally brewed alcohol not being statistically significant.

As shown in Table 5-10, there was a marked difference in reporting between ACASI and IAQ users. Specifically, ACASI users were nine times more likely to report having tried glue (ACASI AOR 9.68; 95% CI 2.91-32.17), over two times as likely to report having used marijuana (ACASI AOR 2.56; 95% CI 1.38-4.78), wine (ACASI AOR 2.02; 95% CI 1.30-3.16) and tobacco (ACASI AOR 2.55; 95% CI 1.55-5.69) and over one and a half times more likely to report drinking beer (ACASI AOR 1.8; 95% CI 1.24-2.66).

5.6.8 Circumcision

All ICVI and ACASI users answered the circumcision question, while 10 SAQ (4.8%; 95% CI 2.4-8.7%) and 15 Audio-SAQ users (6.9%; 95% CI 3.9-11.2%) failed to provide an answer. Overall, 4.0% (95% CI 2.8-5.6) of males reported being circumcised. While the numbers were small,

reporting of circumcision did differ by questionnaire delivery mode. ACASI users were 11 times more likely to report being circumcised than IAQ respondents (OR 11.4 (95% CI 2.6-49.2).

5.6.9 Self-reported honesty

At the end of the questionnaire, we asked respondents to report how honest they had been throughout their responses. Almost 96% of respondents reported answering the questionnaire completely or very honestly (n=1398/1457) with only a few respondents reporting answering fairly honestly (3.2%; 46/1457) and even fewer reporting they had not answered honestly at all (0.8%;13/1457). There were no differences in respondents' self-assessment of their honesty between questionnaire delivery modes (p=0.2)

5.6.9.1 Comparison of self-reported honesty against biomarker/self-report agreement

There were 30 respondents who could be categorized as 'sexually active' using a biomarker, having either a positive biomarker for HSV-2, pregnancy, or new HIV infection since the baseline survey. Of these 30, 13 of them reported that they had never had sex in the questionnaire; and *all* of them claimed to have been 'completely honest' or 'very honest' throughout their questionnaire responses.

5.7 Summary

In summary:

- There was an appreciable and statistically significant difference between the four questionnaire delivery modes in both item response rates and rates of reporting sensitive behaviours and topics.

- Item response rates were lowest in ICVI and ACASI, where the respondent was externally prompted (interviewer or computer) for a response. This was true for both a priori and post hoc analysis. Respondents' inability to correctly follow skip instructions in SAQ and Audio-SAQ particularly contributed to this development.

- When compared against the interviewer-administered questionnaire, the three self-administered questionnaires (SAQ, Audio-SAQ, and ACASI) produced higher rates of reporting for a number of sensitive topics.

- In particular, ACASI users were more likely to report sexual intercourse, increased number of partners, younger age at first sex, experiencing symptoms which placed them at risk of common affective disorders, alcohol and drug use, and circumcision (among males).

- Reports of these behaviours by Audio-SAQ users were often similar to those of ACASI. SAQ had the lowest levels of reporting for these sexual behaviours.

- Round 2 comparative data suggests a trend towards sexual behaviour reporting increasing with ACASI and decreasing with SAQ.

- Despite the use of a ballot box to increase respondents' sense of privacy and control over their responses, ICVI users had lower levels of reporting for most behaviours and topics covered in the a priori and post hoc analysis. Increased reporting from interviewer-administered questionnaires was only found for questions related to orphaning.

- Evidence of positive biomarkers for sexual activity was too small to record a difference between questionnaire delivery modes. However, comparison of biomarkers against self reports highlights young people's difficulty in reporting sexual activity, especially for young women.

In the next chapter, I examine the feasibility and acceptability of these questionnaire delivery modes as described by the respondents.

6 ADDITIONAL RESULTS FROM RDS INTERIM SURVEY COMPARING FOUR QUESTIONNAIRE DELIVERY METHODS

In the previous chapter, I presented data from the experimental evaluation of sexual behaviours as well as ad hoc analysis on a range of other socially censured behaviours and issues. Two additional sets of data were collected that explored respondents' opinions of completing the questionnaire using their specific questionnaire delivery mode. The methods and results of this analysis are reported here.

6.1 Methods

6.1.1 Quantitative Anonymous Post Survey Questionnaire

Respondents from the last five communities were asked to complete a short anonymous questionnaire that used a five point Likert Scale to explore their impressions of the questionnaire delivery mode (see Appendix K). The questionnaire was administered after the respondent had completed their questionnaire in Round 1 and took about five minutes to complete. Questions covered respondents' impressions of the staff, their perceived ease of questionnaire completion, their sense of private space during questionnaire completion, and maintenance of confidentiality. There were a total of 17 questions, 13 of which were relevant to all four questionnaire delivery modes; the remaining 4 questions were method specific (see Appendix K). In order to avoid the problem of a "response set", a number of statements were reversed in orientation, where a positive attitude towards the topic was expressed by disagreeing with the statement. For example, if a respondent believed the survey staff maintained confidentiality, they would disagree with the following statement. 'I do not believe[9] the RDS staff when they say that the responses that I give are kept secret.' (Q.6). The five point Likert Scale was collapsed to a three point scale (strongly agree/agree, strongly disagree/disagree, and don't know) for analysis.

6.1.2 Qualitative Data Collection

Interim survey respondents from 10 of the 12 communities were randomly selected to be interviewed after they had completed the questionnaire(s) where they were asked to assess the acceptability of the method(s) they had used (see Appendix L for the topic guide). Where feasible, focus groups discussions (FGDs) were also held with respondents (who were purposively sampled to reflect all methods) to ascertain their views on the different

[9] In Shona, the word 'believe' is a considered to be a very strong word usually reserved for conversations connected to faith. So the team suggested we use the word 'agree' instead.

questionnaire delivery modes. Members of the social science team, already trained in qualitative field work, and a part of the interim survey interview team, conducted the interviews. Respondents were approached as they completed the survey and asked if they were willing to share their survey experiences. As questions were not of a sensitive nature (we were asking them about their impressions, *not* their actual responses), it was not deemed necessary to match interviewers' and respondents' gender; however, interviewers did not question a respondent they had just interviewed using ICVI. Discussions were designed to take no longer than five to ten minutes. All qualitative data were transcribed electronically and coded for thematic issues using Nvivo 7.0 (QSR, Australia).

6.2 Post survey questionnaire results

Out of the 697 respondents in the last five communities, 650 (93%) completed the anonymous post survey questionnaires assessing their overall survey impressions. Similar numbers of questionnaires were completed for all four survey methods (SAQ=168 (26%); Audio-SAQ=159 (25%); ICV=162 (24%); ACASI=161 (25%)). Overall, fewer females completed the post-survey questionnaire (n=308; 48%) except for ACASI where they took part in slightly greater numbers than their male peers (n=87/160 (54%)).

6.2.1 Survey environment

As described in Chapter 3, we went to great lengths to ensure single gender environments to enhance the privacy of respondents in their survey environment. During the anonymous questionnaire respondents were asked to describe their survey environment. They could report that they had completed the questionnaire all alone (or under a tree with an interviewer), in a room with only other males or only other females, or in a room with both males and females together.

Just over 30% (32%; n=179/558) of the respondents reported taking the questionnaire in a space by themselves; and half of these were ICVI users. Just under one-third (28%; n=159/558) took the survey in a room with both male and females. Almost 90% (89%; n=152/170) of respondents reported being in a room with only their same gender; 11% (n=10/89)of females and 10% (n=8/81) of males reported taking the survey in a room with members of the opposite gender. Three of the 18 respondents, all SAQ users, who took the questionnaire in this setup reported feeling others could see their answers. Irrespective of their specific survey environment, the majority (90%; 571/634) of respondents reported feeling they had enough privacy when completing the questionnaire.

6.2.2 Survey environment, feasibility and acceptability of questionnaire delivery modes

Results from the post survey questionnaire are presented in Table 6-1 which presents the proportion who agreed or strongly agreed with each of the statements around the survey environment. While there was no statistical difference between modes, between 13% (95% CI 8.4-19.6) and 17% (95% CI 11.4-23.6) of respondents across all four methods thought others could see their responses (p=.0690). Despite staff assurances that their responses would be kept secret, just over half of the respondents did not believe these guarantees and while not statistically significant, there was greater reporting of this by ICVI respondents (65%; p=0.070). Over 20% reported that they found some of the questions embarrassing (either to see in print or to hear being read aloud) and this appeared to be higher for respondents using ACASI and Audio-SAQ (Audio-SAQ, ACASI=29% c.v. ICV=23% and SAQ=19%; p=0.008). Despite reporting a higher level of embarrassment, only four percent of ACASI users reported that they could not answer questions honestly which was significantly lower than the other three methods (p=0.004). Responses to the statement relating to length of questionnaire indicated that for those methods that took longer to complete (SAQ and Audio-SAQ, see Chapter 5, section 5.2.1), respondents were more likely to agree that there were too many questions and that they became bored (p=0.038).

Respondents using CD players (Audio-SAQ) and laptops (ACASI) were asked to assess their difficulty in using this equipment during survey administration. More ACASI users reported facing challenges than Audio-SAQ users (Audio-SAQ=28%, ACASI=45%, p<0.001).

6.2.3 Relationship between maintaining confidentiality at baseline and belief in this at interim

Most interim survey respondents (87.8%; 557/636) believed their answers were kept secret at baseline. Yet, of those, only 39.0% (n=217/555) believed interim survey staff when they assured them that confidentiality would be maintained. There were no differences by questionnaire delivery mode (p=0.45)

Table 6-1: Anonymous Post Survey Questionnaire: Proportion (%) agreeing with each statement by questionnaire method (n=650)

Statements	SAQ n=168 n (%)	ICV n=162 n (%)	Audio-SAQ n=159 n (%)	ACASI n=161 n (%)	p value
Survey Environment					
Staff made me feel relaxed and able to answer honestly (1)	164 (98%)	153 (98%)	152 (99%)	160 (99%)	0.551
Staff were welcoming and looked after my needs (10)	138 (84%)	140 (90%)	130 (83%)	136 (85%)	0.431
The survey environment did not allow me to answer Qs honestly* (7)	21 (13%)	17 (11%)	26 (16%)	7 (4%)	0.004
I do not believe staff when they say responses are kept secret (6)	84 (51%)	103 (65%)	84 (53%)	84 (52%)	0.070
Ability to ask for assistance					
I was able to ask questions if I wanted to (2)	152 (92%)	151 (95%)	146 (92%)	148 (94%)	0.724
If I did not understand I was able to ask for help (5)	139 (84%)	144 (91%)	134 (84%)	138 (87%)	0.224
I didn't raise my hand even though I had a question to ask (8)*	24 (14%)	21 (13%)	32 (21%)	17 (11%)	0.231
Overall sense of privacy					
I had enough privacy while I was completing the questionnaire (9)	152 (92%)	139 (90%)	139 (90%)	141 (89%)	0.690
I felt like other respondents could see my answers (3)	26 (16%)	25 (16%)	21 (13%)	27 (17%)	0.358
I felt survey team could see my answers (12)	27 (16%)	11 (7%)	16 (10%)	25 (16%)	0.146
Sense of embarrassment					
Some of the Qs made me feel embarrassed* (4)	32 (19%)	36 (23%)	46 (29%)	46 (29%)	0.008
Even though I was giving answers privately, I was still embarrassed to hear Qs read aloud* (16)	NA	31 (20%)	34 (22%)	37 (23%)	0.925
Ability to use a method					
I did not understand how to use the ballot sheet/CD player/computer* (15)	NA	10 (6%)	16 (10%)	6 (4%)	0.251
I could hear the person who read out the questionnaire clearly* (14)	NA	144 (94%)	147 (94%)	147 (92%)	0.459
There were too many Qs and I became bored* (11)	29 (18%)	15 (10%)	28 (18%)	20 (12%)	0.038
The answer cards were useful (17-ICVI only)	NA	(146 (89.6%)	NA	NA	
Had never used a CD/laptop before, so found it difficult to use (17-Audio-SAQ/ACASI only)	NA	NA	44 (28%)	75 (47%)	<0.001
Impressions from Baseline Survey					
I believe that my answers from the baseline survey were kept secret (13)	147 (89%)	135 (87%)	137 (87%)	138 (86%)	0.930

** these questions were phrased negatively, but data reported here are for those who agreed with the statement*

N/A not applicable for SAQ where there was no voice and no instrument (ballot sheet, CD player, or laptop)

6.3 Qualitative Data Results

None of the 115 respondents approached for an interview declined. More males (61%) were interviewed than females. Seventy percent (n=81) of the interviews were held after respondents had completed Round 1 (using only one method). Of the 34 interviews held with respondents who had completed both rounds, 27 (79%) were with respondents who had used 2 different methods. In addition two focus group discussions were held with respondents who had been purposefully sampled to represent all four methods.

Emerging core themes related to the importance of environment, the ease of method use, and interviewer presence or absence, especially as it related to the broader nature of sensitive questions and to questionnaire comprehension (see Appendix M for additional quotations not found within the text). Where possible, I have compared qualitative responses with those from the post survey questionnaire outlined in the section above.

6.3.1 Comparisons with baseline survey environment between anonymous post survey questionnaire and the qualitative interviews.

Given that all interim survey respondents had participated in the baseline survey, we used the post–survey questionnaire to ask them to compare their experiences around the ease of reporting honestly. Thirty percent of respondents stated that it was easier to be honest during the interim survey while 63% reported their was no difference between the two surveys.

However, when asked about their experience during exit interviews respondents repeatedly compared the interim survey environment against that of the baseline, and in particular the negative aspects of completing the questionnaire in a group setting. They highlighted how concerned they were during baseline that their peers would be able to "know their answers." References to "peeping" and other similar terms were common, giving the impression that they felt less able to answer sensitive questions honestly during the baseline survey. Many of the interim survey sites were located at clinics and small shops where rooms were small. Respondents expressed appreciation that only a few youth participated in the interim survey at the same time.

Overall respondents stressed the importance of being able to complete the questionnaire 'on their own', so they could ensure that others couldn't see (or 'peep' at) their responses. One male noted, *'Today's method was the best because I was doing things on my own unlike at baseline [where] everyone could see my responses'* (R1, male ACASI). Respondents who used ICVI attributed their sense of privacy to the interviewer encouraging them to cover their ballot

sheet as well as the opportunity *for them* to fold and place it into the locked ballot box. One male, who took ICVI in both rounds stressed this importance: '*The reader emphasized the fact that I was supposed to guard what I was writing on the ballot sheet so that no one else could see and this pleased me.'* (male, ICVI, ICVI).

The importance of a private setting was again highlighted by respondents who had completed two different methods. While they sometimes reported there was no difference between the methods, this was often said in the context of privacy and confidentiality. When these were maintained, respondents claimed there were fewer differences between acceptability of methods. For example, one respondent who used SAQ and then ACASI commented that they 'were equally good *as privacy was maintained* in both cases.' (male, SAQ, ACASI, italics mine) In another instance a young man emphasized the similarities between Audio-SAQ and ACASI commenting that the difference, '*was only in the manner in which you gave your answer (paper versus clicking a mouse).'* (male, Audio-SAQ, ACASI)

There were a number of instances when respondents mentioned that one of the reasons they were more likely to tell the truth now than at baseline was that they were reassured that the project had not released baseline results into the community. One respondent mentioned that with the passing of time this made respondents more confident about the project's promise not to disclose individual survey results. *'The outcomes of this exercise will not be known by other people, [but] you only, will know our responses, and so nothing will make one lie.'* (ICVI, female)

However, this project-specific trust was counteracted by overarching community attitudes and experiences that didn't honour or respect adolescents' privacy. During interviews, respondents would often refer to other external experiences that made them doubt the project's ability to maintain their privacy. For example, despite the fact that parents (or any other community members) were not welcomed to the site nor did survey staff have any visible contact with them, respondents highlighted their overarching belief that private matters would still get back to them. In addition, we asked respondents to sit far apart from each other and to cover their responses with a blank sheet of paper to ensure that others could not see their responses. However respondents commented that while these instructions were similar to how they completed school exams that this 'system' was not foolproof and hadn't always kept their exam responses private.

6.3.2 Ability to use the questionnaire delivery mode

Some SAQ and Audio-SAQ respondents reported difficulties following the skip instructions. Qualitative interviews with Audio-SAQ respondents indicated they felt nervous about raising their hand during the survey as they were uncertain whether pausing the CD player would cause them to miss a question. As one respondent noted, "*You may not know which button to press to stop the CD player when you have a question. When you ask, you will find the CD player on the next question."* (male ICVI, Audio-SAQ)

With both Audio-SAQ and ACASI, respondents expressed concern that they would 'make mistakes' with the system and somehow give an answer that was not their own. One male who took Audio-SAQ and SAQ commented *'[Audio-SAQ] was fine but sometimes you …would suddenly be asked to press a red button so it requires one to …grasp issues quickly.'* Field notes from this interview showed that the respondent was 'wary of making mistakes…or missing some of the questions when using Audio-SAQ, so he preferred SAQ.' (field notes, male, Audio-SAQ, SAQ)

Despite staff being spoken of positively and that all respondents thought it possible to ask a question of them, many respondents admitted that they did not actually do this when they encountered a problem. In most cases, it was because they did not think their problem was important enough and so they would hazard a guess and carry on. This was most often mentioned from Audio-SAQ and ACASI users. However, with ICVI, respondents also mentioned that they would not ask questions of their interviewers because it got too embarrassing to keep stopping and asking them. '*It is uncomfortable to keep telling the interviewer that you did not understand and you end up saying 'yes' even when that is not your answer*.' (female, ACASI, ICVI, female.)

6.3.3 The novelty of ACASI

However, while more respondents expressed difficulty administering ACASI during the post-survey questionnaire, this was not reflected in the qualitative data where respondents focussed on the excitement of using the laptop due to its novelty . *'When they told me that I was going to use ACASI and I entered the room and saw a computer, I was shocked at first and I told myself that in our family, two of us have used the computer and I have done it whilst I am still this young'* (ACASI, female).

6.3.4 Increased sense of privacy with ACASI

Respondents who used ACASI perceived the method as more private and confidential because they did not perceive the study ID, entered by survey staff at the onset and not visible thereafter, to be linked to their identity *"I was quite happy with this method because no one had access to my answers."* (ACASI, female). Respondents who used ACASI reported a greater likelihood of answering questions on sexual activity honestly when using this method. A minority expressed concern that their responses on the computer screen might be visible to others. One respondent who took Audio-SAQ and then ACASI commented, "*They [the methods] are different; with [Audio-SAQ] things are said into your ears and you write down your answers. But [with ACASI] … there is a screen and so if someone is looking, they will be able to see what's being written"* (male, Audio-SAQ, ACASI). This was more true in situations where the survey environment might not have been as private as we desired. In one instance respondents who had completed the survey and were waiting outside re-entered temporarily during a short rain-shower, temporarily crowding the rooms. One ACASI user felt his responses might have been visible in this instance.

6.3.4.1 Ballot sheet appreciated but not sufficient

All ICVI users appreciated the use of the ballot sheet and the ballot box. "*[ICVI] is okay because the interviewer writes down your response on the less important issues but when it comes to sensitive questions, you provide responses on your own and so you can tell the truth without feeling shy. You did well when you ensured that the ballot box would be opened in Mutare."* (female, ICVI). However, for this same woman, and for others, the sense of privacy found from the ballot sheet was not sufficient to ensure a total feeling of privacy. *"I really understood that I had to answer sensitive questions on my own and that the ballot box would be opened in Mutare. However, it is just difficult to tell the truth in front of someone. I just had that feeling that the interviewer would be able to 'know' my responses"'* (female, ICVI)

6.3.5 Use of a voice increases comprehension

During qualitative interviews, respondents concurred with data from the post-survey questionnaire emphasizing how difficult it was to hear sexual concepts spoken aloud. As one male respondent remarked, "*my heart leapt a little*" when he heard them (male, Audio-SAQ). Yet another woman noted "*that the question 'have you ever had sex' made me panic as well as feel uneasy."* (female, Audio-SAQ, ACASI).

Respondents who completed the questionnaire using Audio-SAQ, ICVI or ACASI believed it helped their understanding to have the questions read aloud. "*[Audio-SAQ] is much faster in*

the sense that you would be reading and listening at the same time. As a result, you understand quickly and give answers that are well-thought through." (male, Audio-SAQ) Respondents using Audio-SAQ and ACASI often noted that it was easier to answer truthfully because they did not have to give their responses in front of someone. One young woman said, "*I liked [Audio-SAQ] a lot because ….I was able to divulge my private issues without any embarrassment."* (female, Audio-SAQ, ICVI)

Respondents using ICVI were divided about how beneficial they found having an interviewer. A few highlighted the benefits of being able to seek instant clarification from the interviewer (something they reported they failed to do when using another method). One young woman, *"insisted that she would prefer this method [ICVI] because it gave her an opportunity to get clarification from the interviewer promptly. [She] added that there are times when she was forced to give incorrect answers because she was embarrassed to raise her hand [with ACASI] even though the survey assistant had told her to do so*." (field notes female ACASI, ICVI) However, ICVI users predominantly reported feeling embarrassed having to respond to sensitive questions in front of someone as illustrated in the following quotes. *"With [Audio-SAQ], there is [no question] that you can't answer [truthfully] because no one else ….knows what you said. When you do not see any other person there is nothing to be afraid of, as you would be with [an interviewer]."* (male, Audio-SAQ, ICVI) Another respondent explained, "*but with [an interviewer]. I was just thinking that somebody was watching me."* (female, Audio-SAQ, ICVI) By contrast, respondents reported feeling more comfortable using the self-completion methods: *"I was telling the truth [with ACASI] because no one was ever going to know what I had written or said."* (male, Audio-SAQ, ICVI) This was particularly true for those who were able to compare ICVI with another method: *"When you are asked questions, for you to tell the real truth, you need to be on your own and so I view this method [ACASI] as greatly increasing someone's chances of telling the truth, and also because there won't be anyone to be ashamed of or to fear."* (male, ACASI, ICVI).

6.3.6 Ability to report on other sensitive issues

In both focus group discussions and interviews, respondents noted that questions on poverty and orphaning were just as sensitive as questions on sexual behaviour. '*…your mother and father are [deceased] and you can be distressed. [In ICVI] you will be facing someone… Tears may drop out my friend. But when answering with a computer no one would be there so no tears will come out and fall on the computer.'* (female ICVI, FGD, female). Respondents using ICVI felt this most acutely; questions on poverty were not among those answered confidentially through the ballot box. As one female noted, "*For example, the question 'Have*

you ever gone to bed hungry in your household?' is difficult to answer when it is directed to you because you may just feel embarrassed to say it's true that in our household we sometimes go to bed hungry." (female, ICVI, ACASI) During debriefing sessions, interviewers reported respondents breaking down during questions on orphaning and looking uncomfortable when asked about poverty (interviewers were trained in how to handle emotionally charged situations).

6.4 Summary

This chapter reports on the feasibility and acceptability of four questionnaire delivery modes as described by the respondents. Data was collected from respondents after survey administration through an anonymous questionnaire and during short interviews. This data supports the results reported in Chapter 5 as well as in the systematic review (Chapter 2) that self-administered modes, and ACASI in particular, are appreciated by respondents who recognize their increased ability to provide privacy in reporting of sensitive behaviours. Respondents highlighted the importance of an audio component for added comprehension and an augmented sense of privacy. Respondents also noted that sensitive questions were not limited to those on sexual behaviours but included poverty and orphaning. Evidence presented here and in the previous chapter formed the basis for deciding on modes for the final survey of the parent trial which included the use of Audio-SAQ and ACASI. This decision and a few comparative results from the final survey are discussed in the next chapter.

7 USE OF FINAL SURVEY TO COMPARE TWO QUESTIONNAIRE DELIVERY MODES

7.1 Criteria used to inform the questionnaire delivery mode for final survey

The primary aim of the experimental evaluation of four questionnaire delivery modes, which forms the core of this thesis, was to inform the choice of mode to be used in the final survey of the RDS parent trial held in 2007. Determining the mode most suitable in this context required balancing information from numerous arenas. We assessed response rates and increased prevalence of reported sensitive behaviours. In addition, we assessed a method's feasibility both in terms of participants' ability to use the method and its viability in the specific field environment. Participants' opinions on the acceptability of a mode are also intrinsic to this process.

Table 7-1 below summarizes the advantages and disadvantages of the four questionnaire delivery modes emanating from the results described in detail in the last two chapters. These data strongly suggest the use of self-administered modes that include an audio component and advocates that skip patterns should be avoided when the respondent is responsible for their completion.

After a thorough examination of all the available evidence, we decided to use a combined data collection approach for the final survey. Participants were asked to complete the questionnaire in two consecutive stages. Audio-SAQ was used to collect the data for the majority of questions, particularly data that did not require the use of skip patterns. Audio quality was improved through the use of MP3 players which also allowed for easier movement between questions. In the final survey we included a partner matrix to collect data about concurrency and sexual networks. This matrix included very complex skips which would not have been possible to self administer. The Audio-SAQ questionnaire was followed by a shorter ACASI questionnaire where participants completed questions relating to particularly sensitive data and all questions that required the use of complex skip patterns. A few sexual behaviour questions were included in both modes. By only collecting some of the data using ACASI we were able to administer the final survey using fewer laptops than would have been required if all questions were administered this way. The high initial cost of laptops and software was thereby minimised.

Table 7-1: Summary of advantages and disadvantages of methods evaluated in QDM trial

	Advantages	Disadvantages
SAQ	• No technical expertise required	• Low item response rate • Requires literacy • Complex skip patterns are hard to follow • Subsequent data entry
Audio-SAQ	• Higher rates of reporting sensitive behaviours • Audio assists comprehension and adds to sense to privacy • Reduces level of literacy as audio component improves comprehension	• Buttons on CD player can be confusing • Audio tracks for questions involving skip patterns have to be combined into one track on CD • Complex skip patterns are hard to follow • Low item response rate for questions that belong to a skip pattern • Requires programming experience for working on sound files • Subsequent data entry
ICVI	• Can seek clarification from interviewer • High response rate • Ballot made it easier to report sensitive behaviours • Can be used with non-literate participants	• Low rates of reporting sensitive behaviours • Ballot negates possibility of using skips in sexual behaviour questions • Staff training required to ensure quality interviews • Subsequent data entry
ACASI	• Higher rates of reporting sensitive behaviours • Audio assists comprehension and adds to sense to privacy • Reduces level of literacy required as assisted by audio component and visuals on computer screen • Data entry is automatic	• Maintaining power in non-electrified setting requires additional materials (e.g. solar power or generator) • Requires programming expertise • Initial cost of laptops and software is high

As in previous surveys, biological evidence of sexual activity was collected. All participants were asked to provide a finger-prick blood sample which was tested for HIV and HSV-2 antibody. Women also gave a urine sample for pregnancy testing.

The use of two questionnaire delivery modes by all participants allowed us to conduct additional comparisons between questionnaire delivery mode. In the final survey we were able to compare the following:

- Self reports of selected sexual behaviours between the two questionnaire delivery modes. The QDM trial found that Audio-SAQ and ACASI both produced similarly increased reporting of sexual behaviours. The larger sample size in the final survey allows us to examine this

again and by gender. In addition a higher proportion are likely to infected with HIV, HSV-2 or to be pregnant providing more power to look at association between reported sexual behaviour and presence of biomarkers.

7.2 Questionnaire development for the final survey

7.2.1 Questionnaire adaptation for final survey

The final survey questionnaire was adapted from the one developed for the interim survey (see Chapter 4). Additional cognitive interviewing was conducted to refine certain new questions (including one on anal sex). As before, questions were translated into Shona (indigenous language).

A sexual partner matrix was developed and included in the ACASI component as it required complex skips (copy of the sexual partner matrix in the ACASI questionnaire and the accompanying flow chart available from the author). This required the practice questions in ACASI be revamped substantially to reflect the increased complexity of the sexual partner matrix. Non-sensitive questions around shopping were developed to illustrate to a participant how they could proceed through a cycle and be asked the same questions for different situations (see Appendix N).

7.2.2 Comparisons of sexual behaviour questions

Some key sexual behaviour questions were asked in both Audio-SAQ and ACASI in order to ensure that we had these key endpoint data on all participants in the event of an ACASI failure. Responses to these duplicate questions were compared during analysis (see Table 7-2). Participants were asked about their sexual behaviours including age of sexual debut, condom use at last sex, and numbers of partners in the last 12 months and in their lifetime. Response choices for numbers of partners was presented slightly differently in Audio-SAQ and ACASI. In Audio-SAQ, participants could choose from categorical answers (e.g. 3-4 partners, 5 or more partners), whereas in ACASI, there was a unique response option for choosing partners '1' through '10' with a final categorical response option for '10 or more partners' (see Table 7-2 Q13-14B).

Data on sexual debut, condom use at last sex, and number of lifetime partners and partners in the last 12 months were analysed for those participants who reported ever having had sex. In the Audio-SAQ version of the questionnaire the question on ever having sex was asked only once. In the ACASI version of the questionnaire, participants who initially answered 'no' to the 'ever sex' question were asked the question a second time. We anticipate that this would

increase the proportion who answered 'yes' to this question (in the QDM trial, the proportion of participants answering 'yes' to this question in ACASI rose from 10% the first time it was asked to 16% the second time). In Audio-SAQ, 'ever sex' was defined as an affirmative response to ever having had sex (asked once), whereas in ACASI, 'ever sex' included an affirmative response to either the first (B5) or the second (B6) question asking the participant if they had ever had sex. Data on age of sexual debut was collected immediately after the question on ever having sex, and was analysed assuming the number who reported having had sex in this question formed the denominator. However, data on numbers of sexual partnerships and condom use were collected after the participant had also been asked questions about engaging in forced sex in Audio-SAQ and forced sex and anal sex in ACASI (see Table 7-2). Participants who responded affirmatively in *any* of these questions were included in the denominator for the comparative analysis of sexual partners and condom use.

Participants' responses were examined to see if they had changed their answer to specific sexual behaviour questions between the two questionnaire delivery modes. A positive conversion was a change that resulted in an increase in socially censured reporting (e.g. changing from 'never had sex' to 'ever had sex' or reporting earlier age of sexual debut). A negative conversion was a change that resulted in a decrease in socially censured reporting (e.g. reporting a smaller number of lifetime partners).

7.2.3 Comparison of questionnaire acceptability and reported honesty

In addition, both questionnaires concluded with a series of questions relating to participants' opinions of the method and how they had handled potentially distressing questions. Four questions covered clarity of questions and responses, ease of method operation, and usefulness of the audio component (see Table 7-2, Audio-SAQ Q95-Q98). Both questionnaires culminated with one question which asked participants how honest they had been when completing the questionnaire. The ACASI version included one additional question that asked if participants believed they would have given similar answers to the sexual behaviour questions had they been asked them in Audio-SAQ. This speculation is based on their experience using both modes.

7.2.4 Inconsistent reporting

As the Audio-SAQ and ACASI versions were designed to be run consecutively and very few questions were asked using both modes there were few instances where responses to

different questions could conflict by method. In ACASI, software programming controlled all the skips making it difficult for participants to answer these inconsistently. In Audio-SAQ there were several instances where illogical answers were possible. Immediately after the two questions that defined a participant as having engaged in sex (affirmative answer to 'ever had sex' or 'ever been forced'), there were four questions asking about condom use at first and last sex and number of sexual partners in their lifetime and in the last 12 months. As we did not include any skips in the Audio-SAQ version, these four questions included a response option 'I have never had sex' to cater for those participants who reported never having had consensual or forced sex. Female participants could also respond inconsistently to questions on pregnancy, claiming for example to have never been pregnant in one question and then reporting an abortion in a subsequent question. Finally, in the two questions on experiencing distress during the questionnaire (see Table 7-2, Audio-SAQ Q99-100), participants who reported no distress in the first question were provided with a response option 'I did not have any negative memories.'

7.2.5 Data analysis

Data collected using Audio-SAQ were double-entered onto a Microsoft Access password-protected database; ACASI data was downloaded directly into Access. Range and consistency checks were preformed. Chi-square test was used to assess the association between mode of administration and responses to each of the questions detailed in Table 7-2. McNemar's chi square test was used to assess the effect of answering these sensitive questions using an alternative method. Biological samples for the final survey were collected and analysed in the same manner as described in Chapters 3 and 4. A biological marker of sexual activity was defined as testing positive for HIV or HSV-2 or being currently pregnant as defined by a positive pregnancy test (females only).

Response options for these sexual behaviour questions were converted into binary categories. Age of sexual debut was categorized as 17 years or less (socially censured) versus 18 years and above (socially approved). Number of sexual partners were categorized as having one partner (socially approved) versus two or more (socially censured). Condom use was categorized as ever use (socially approved) versus no use (socially censured).

Table 7-2: Questions compared in Audio-SAQ and ACASI in RDS Final Survey

Audio-SAQ			ACASI		
Q. No	**Question**	**Response Options**	**Q. No**	**Question**	**Responses Options *(Conditional skips)***
Sexual Behaviours					
77	Have you ever had vaginal sex with a girl or a woman / a boy or a man (that is to say when the penis was in the vagina) with you consenting to it or without you consenting to it?	•Yes •No	B5	Have you ever had vaginal sex with a girl or woman / boy or man (that is to say when the penis was in the vagina) with you consenting to it or without you consenting to it?	•Yes •No *(if 'no', go to B6, If' yes', go to B7)*
			B6	In the last question, you responded that you have not yet had vaginal sex. Since this question is very important in this study/research, we would like to give you a chance to respond to this question again. Please remember that your name will *never* be linked to the information that you give us. Have you ever had vaginal sex with a girl or woman / boy or man (that is to say when the penis was in the vagina) with you consenting to it or without you consenting to it?	•Yes •No *If 'no', go to B8a, If 'yes', go to B7)*
77b	I was ____ years old when I first had vaginal sex	continuous variable	B7	(if yes) how old were you when this happened?	continuous variable (1-25)
78	Have you ever had sex with a boy or man / girl or woman because he /she had used force on you when you did not want to?	•Yes •No	B8a	Have you ever had sex with a boy or man / girl or woman because he /she had used force on you when you did not want to?	•Yes •No

Table 7-2: Questions compared in Audio-SAQ and ACASI in RDS Final Survey

Audio-SAQ			ACASI		
Q. No	**Question**	**Response Options**	**Q. No**	**Question**	**Responses Options *(Conditional skips)***
			B8b	Sometimes, people have sex 'from the back'. It could be because men want to protect a female's virginity or to ensure she doesn't get pregnant or even for some other reason. Have you ever had sex 'from the back'?	•Yes •No
80	How many different boys or men / girls or women have you had sex with in your WHOLE LIFE?	•1 partner •2 partners •3-4 partner •5 or more partners •I have never had sex.	B13	How many people have you had sex with in your whole life?	•1, 2, 3, 4, 5, 6, 7, 8, 9, 10, •More than 10
81	In the LAST 12 MONTHS, how many different boys or men / girls or women have you had sex with?	•I have not had sex in the last 12 months •1 partner •2 partners •3-4 partners •5 or more partners •I have never had sex.	B14B	How many people have you had sex with in the last 12 months?	•1, 2, 3, 4, 5, 6, 7, 8, 9, 10, •More than 10
82	The LAST TIME you had sex with a boy or man // a girl or a woman did you use a condom?	•Yes •No •I don't know •I have never had sex	C9	Did you use a condom then? *(asked within the partner matrix for last sexual encounter with that partner)*	•Yes •No
83	Have you ever been raped?	•Yes •No	B11	Have you ever been raped?	•Yes •No
Ease of Questionnaire Completion					

Table 7-2: Questions compared in Audio-SAQ and ACASI in RDS Final Survey

Audio-SAQ			ACASI		
Q. No	**Question**	**Response Options**	**Q. No**	**Question**	**Responses Options *(Conditional skips)***
95	How easy did you find this questionnaire to understand?	•Easy •Not Easy	E1	How easy did you find the questions on the computer to understand?	•Easy •Not Easy
96	How easy did you find this questionnaire to complete?	•Easy •Not Easy	E2	How easy did you find the questions on the computer to answer?	•Easy •Not Easy
97	Did you find hearing the questions and answers read to you helpful?	•I always found it helpful •I sometimes found it was helpful but I didn't need to hear them every time •I didn't find it helpful •I found it unhelpful (and obstructive).	E3	How did you find the voice on the computer reading questions and answers to you?	•I found it was always useful/helpful to have the voice read out the questions and answers •I found it was sometimes useful but I didn't need to hear the questions and answers every time •I didn't find the voice helpful •I found the voice unhelpful and obstructive.
98	I had never used this kind/type of audio player before and so I found it difficult when answering the questions.	•Strongly Agree •Agree •Disagree •Strongly disagree	E4	I had never used a computer before and so I found it difficult to use when answering the questions.	•Strongly Agree •Agree •Disagree •Strongly disagree

Table 7-2: Questions compared in Audio-SAQ and ACASI in RDS Final Survey

Audio-SAQ			ACASI		
Q. No	**Question**	**Response Options**	**Q. No**	**Question**	**Responses Options *(Conditional skips)***
Experiencing distress during questionnaire administration					
99	Did any of the questions we ask you bring back distressing memories?	•Yes •No	E5	Did any of the questions that we asked you on the computer bring back distressing memories?	•Yes •No *(if 'no', go to E7)*
100	What did you do then?	•I was distracted momentarily while I continued answering questions •I was upset and could not focus for the rest of the questionnaire •I took a small break before continuing •I did not have any negative memories	E6	What did you do then?	•I was distracted momentarily while I continued answering questions •I was upset and could not focus for the rest of the questionnaire •I took a small break before continuing
Self-reported honesty					
102	Overall, please tell us how honest your answers have been?	•Completely honest •Fairly honest •Not very honest	E7	Please tell us how honest your answers have been on the computer?	•Completely honest •Fairly honest •Not very honest
			E8	If you had been asked the questions about your sexual experience using the audio method, do you think you would have given us the same answers as you gave us on the computer?	•I agree •I disagree

7.2.6 Study population for the RDS Final Survey

As outlined in Chapter 3, the RDS parent trial was conducted in 30 communities in seven districts in South-Eastern Zimbabwe. Communities were randomised to early intervention implementation (from 2003) or delayed implementation (from 2007) using restricted randomisation. Intervention impact was assessed after 4 years in 2007. However, during the interim survey described in Chapters 3 through 5, it became clear that there had been considerable out-migration from trial communities (46%). Those who remained were likely to be at lower risk than those who had left (HIV prevalence among remaining cohort was 1.2% (95% CI:0.7-1.9%)).

Therefore, the final survey was designed as an anonymous, house-to-house survey of a representative sample of 18-22 year olds living in the 30 rural study communities in Masvingo, Manicaland and Mashonaland East in Zimbabwe. Six enumeration areas were selected in each trial cluster. Enumeration areas were purposively selected to ensure that sites where intervention activities had taken place were included (clinics, schools, community centres). All 18-22 year olds who lived in the 180 enumeration areas selected were eligible for participation in the final survey of the RDS parent trial.

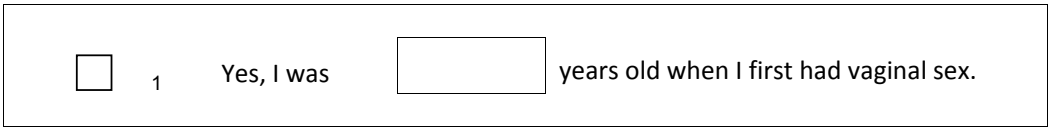
7.3 Results

7.3.1 Demographic Characteristics of Final Survey Respondents

Of the 4822 eligible respondents, 97% participated in the survey (n=4672). Fifty-five percent were females (n=2593) (Cowan et al., 2009). The two trial arms were well balanced (49.6% from early intervention communities). The mean age of respondents was 19.6 years which was similar for males (mean=19.5 years) and females (mean=19.6 years). Overall, 12.9% (605/4672) of respondents had completed primary school or less (males: 10.8%, females 14.7%). There were also lower proportions of respondents who had completed the required four years of secondary school than in the interim survey (61.5% vs. 87%). HIV prevalence was 1.42% (95% CI: 0.94-1.90;) for males and 7.86% (95% CI: 6.45-9.28) for females. HSV-2 prevalence was again lower for males at 1.60% (95% CI: 1.15-2.04) than females at 11.32% (95% CI: 9.63-13.0). Eight percent of females were pregnant on the day of the survey (95% CI: 6.9-9.0).

7.3.2 Comparison of response rates between Audio-SAQ and ACASI

There were low rates of non-item response in both questionnaires, including for sexual behaviour questions. In Audio-SAQ, less than 1% (34/4672) did not answer the question asking if they had ever had sex. There were no missing responses to this question in ACASI. Non-response was greatest in questions in Audio-SAQ where the respondent had to provide a second answer within the first response. For example, as shown below, respondents who reported ever having had sex were asked to fill in their age at first sex within the affirmative response:



In Audio-SAQ 13% (254/1944) of respondents who ticked 'yes' failed to enter their age at sexual debut. There were no differences between genders when it came to missing responses.

7.3.2.1 Inconsistent reporting between questions in the same questionnaire

Inconsistencies in question responses only occurred in Audio-SAQ and varied widely. Of those who reported never having had sex (ticking 'no' to 'ever sex' and 'forced sex'), 24% (625/2617) ticked a response that implied they had had sex in one of the four sexual behaviour questions that followed. However, inconsistency in questions on pregnancy were very small with less than 1% of young women (21/2551) reporting never being pregnant but then claiming they had had an abortion. Similarly, only 2.9% (74/2539) of young women who answered the question asking if they had ever been pregnant provided illogical answers to the following two questions (e.g. either saying they had never been pregnant and then reporting the number of times they had been pregnant or how old they were when they were pregnant). Of the 1288 female respondents who reported they had never had sex, been forced, or raped, 89 (6.9%) reported having been pregnant. This question on pregnancy was found ten questions after the questions on engaging in these three forms of sex.

Inconsistent responses within the distress questions at the end of the questionnaire were also common. In Audio-SAQ one-third (31.4% 492/1568) of the respondents who reported feeling distressed in the first question contradicted themselves in the following question by reporting not having experienced any negative memories. Likewise, of the respondents who reported no distress in the first question, 22.8% (698/3061) of them indicated having 'done something' to counter their distress in the following question. Combined, this results in over one-quarter (27.9% 1190/4629) of Audio-SAQ users not responding 'logically' to the questions about

experiencing a distressing memory. As a result of the computer software enforcing the skip pattern, there were no inconsistencies in ACASI.

7.3.3 Comparison of sexual behaviour questions between Audio-SAQ and ACASI

Of the 4672 respondents, 3.3% (n=154) completed only the Audio-SAQ questionnaire while 96.7% (n=4518) completed both Audio-SAQ and the subsequent ACASI questionnaire. Table 7- shows the rates of self-reported sexual behaviours in both questionnaires. Table 7- shows the proportion of respondents who changed their answers (in either direction) between Audio-SAQ and ACASI. Both tables are broken down by gender of respondent.

Respondents were more likely to report ever having had sex (males Audio-SAQ 36.1%; 95% CI 34.0-38.2; ACASI 42.0%; 95% CI 39.8-44.1; females Audio-SAQ 46.6%; 95% CI 44.6-48.5; ACASI 53.0%; 95% CI 51.0-55.0) and an earlier sexual debut (males who reported sexual debut age <17 years: Audio-SAQ 28.0%; 95% CI 24.8-31.4; ACASI 46.2%; 95% CI 42.8-49.6; females: Audio-SAQ: 27.5%; 95% CI 25.0-30.1; ACASI 44.6%; 95% CI 41.9-47.3) when using ACASI than Audio-SAQ. There was no significant difference between the two delivery modes in terms of reporting condoms at last sex or numbers of sexual partners in their lifetime or in the last 12 months although in almost all cases it appeared that reporting of socially undesirable responses was more common in ACASI.

7.3.3.1 Response Conversions between Audio-SAQ and ACASI

This section examines those participants who changed their response to questions asked first in Audio-SAQ and then in ACASI. Table 7- presents the number of conversions by direction of change between the two questionnaire delivery modes. A total of 4484 respondents answered the questions on ever engaging in sex (consensual and forced) in both questionnaire delivery modes. Of the 11.3% (n=505) that changed their response to these questions between the two methods, 78.4% (95% CI 74.6-81.9%) of them positively converted their answer from 'no' to 'yes'. When asked about their age of sexual debut, 30.2% (95% CI 28.0-32.4%) positively converted, reducing their age of sexual debut on ACASI, compared to 13.9% (95% CI 11.0-17.2%) of respondents who negatively converted increasing their age of sexual debut between Audio-SAQ and ACASI.

Whilst the proportion of respondents changing their answers looks quite different, this falsely assumes that the observations are independent. Statistical comparison of discordant pairs between the two methods using McNemar's test indicated that there was no statistically

Table 7-3: Proportion reporting specified sexual behavioural questions compared by questionnaire delivery modes

	Males				Females			
	Audio-SAQ		ACASI		Audio-SAQ		ACASI	
Sexual Behaviour	**%**	**[95%CI]**	**%**	**[95%CI]**	**%**	**[95%CI]**	**%**	**[95%CI]**
ever sex*	36.1	[34.0-38.2]	42.0	[39.8-44.1]	46.6	[44.6-48.5]	53.0	[51.0-55.0]
all sex **	37.9	[35.8-40.0]	43.7	[41.5-45.8]	48.6	[46.7-50.5]	54.4	[52.4-56.3]
Age at first sex (17 years or less)†	28.0	[24.8-31.4]	46.2	[42.8-49.6]	27.5	[25.0-30.1]	44.6	[41.9-47.3]
No. of sexual partners in lifetime (2+)‡	64.3	[60.8-67.7]	66.1	[62.9-69.2]	20.8	[18.6-23.2]	20.5	[18.4-22.8]
No. of sexual partners in last 12 months (2+)‡	31.8	[28.4-35.1]	47.7	[43.1-52.3]	5.3	[4.1-6.7]	6.8	[5.2-8.6]
Condom use at last sex (no)‡	39.9	[36.4-43.5]	43.6	[40.3-47.0]	81.3	[79.0-83.4]	75.1	[72.7-77.4]

** includes follow-up question in ACASI if said 'no' the first time*

*** includes 'ever sex' + forced sex in AASI and 'ever sex', forced sex, and anal sex in ACASI*

† analysed using 'ever sex' which includes the follow-up question in ACASI

‡ analysed using 'ever sex'+'force' in AASI and 'ever sex'+'force'+'anal' in ACASI

significant evidence of method effect for questions on lifetime number of partners, partners in the last 12 months, and condom use at last sex among females (p=0.4558, 0.1409, 0.0169 respectively). However, for questions on ever sex and age of sexual debut, there was strong evidence (p<0.001) of a difference in the proportion of discordant pairs. The proportion of ACASI users reporting 'ever sex' increased by 6% (males 5.9%; 95% CI 4.3-7.5, females 6.2% 95% CI 5.0-7.4). Likewise, there was a 20% increase in reporting of age of sexual debut (males=20.3%; 95% CI 17.0-23.6; females=19.9%; 95% CI 17.4-22.4). Males also showed strong evidence of a difference in the proportion of discordant pairs (p<0.001) in numbers of partners in the last 12 months and in their lifetime with reporting in ACASI increasing by 5.3% (95% CI 2.5-8.1) for lifetime number of partners and 9.0% (95% CI 4.8-13.2) for partners in the last 12 months.

7.3.3.2 Response conversion within ACASI

There was one instance where participants could change their response within the questionnaire. In ACASI, participants who answered 'no' to the question on ever having sex were immediately asked this question a second time, emphasizing the difficulties in answering this question but reminding participants of its importance. Nine percent (234/2579) of respondents who reported not being sexually active changed their response when asked this question a second time. There were no differences between genders (males 8.6% 95% CI 7.1-10.3; females 9.5% 95% CI 8.0-11.2).

7.3.4 Comparison of biomarkers with self-reported behaviours

There were 608 respondents with a positive biomarker for sexual activity, the majority of whom (90.5%) were females. The proportion of respondents with a positive biomarker for sexual activity who reported never having sex was greater in Audio-SAQ than ACASI (Audio-SAQ 22.3%; 95% CI 18.9-25.8 vs. ACASI 15.7%; 95% CI 12.7-18.7; p<0.001). Despite larger numbers of biomarkers among respondents in the final survey, the proportion of males infected with HIV and/or HSV-2 remained low (9.5%). Therefore while there was a trend towards lower prevalence on ACASI, we were unable to detect a statistically significant difference between biomarker prevalence among males who reported never having had sex on Audio-SAQ (38.1%; 95% CI 25.4-52.3) and ACASI (33.9%; 95% CI 21.8-47.8). By contrast we did find a higher prevalence of biomarkers among young women who reported they had never had sex on Audio-SAQ (20.8%; 95% CI 17.2-24.4) than ACASI (13.8%; 95% CI 11.0-17.1) suggesting that female Audio-SAQ respondents were more likely to under-report that they had had sex.

Table 7-4: Positive and negative conversions from Audio-SAQ to ACASI for sexual behaviour questions

Males sexual behavour	positive conversion (socially approved)	n/N	%	negative conversion (socially disapproved)	n/N	%	p value
ever sex*	from 'no' to 'yes'	183/1279	14.3	from 'yes' to 'no'	66/718	9.2	<0.001
ever sex**	from 'no' to 'yes'	191/1248	15.3	from 'yes' to 'no'	72/759	9.5	<0.001
Age at first sex†	from 18+ to 17 yrs or less	219/698	31.4	from 17yrs or less to 18+	36/203	17.7	<0.001
No. of sexual partners in lifetime‡	from 1 to 2 or more	112/419	26.7	from 2 or more to 1	62/526	11.8	<0.001
No. of sexual partners in last 12 months‡	from 1 to 2 or more	88/368	23.9	from 2 or more to 1	39/175	22.3	<0.001
Condom use at last sex‡	from use to not use	126/599	21.0	from not use to use	82/331	24.8	0.0028

Females sexual behavour	positive conversion (socially approved)	n/N	%	negative conversion (socially disapproved)	n/N	%	p value
ever sex*	from 'no' to 'yes'	213/1340	15.3	from 'yes' to 'no'	43/1147	9.5	<0.001
ever sex**	from 'no' to 'yes'	203/1296	15.7	from 'yes' to 'no'	47/1206	3.9	<0.001
Age at first sex†	from 18+ to 17 yrs or less	307/1046	29.4	from 17yrs or less to 18+	36/314	11.5	<0.001
No. of sexual partners in lifetime‡	from 1 to 2 or more	62/1133	5.5	from 2 or more to 1	53/270	19.6	0.4558
No. of sexual partners in last 12 months‡	from 1 to 2 or more	34/905	3.8	from 2 or more to 1	22/50	44.0	0.1409
Condom use at last sex‡	from use to not use	120/324	37.0	from not use to use	161/1033	15.6	0.0169

** includes follow-up question in ACASI if said 'no' the first time*

*** includes 'ever sex' + forced sex in AASI and 'ever sex', forced sex, and anal sex in ACASI*

† analysed using 'ever sex' which includes the follow-up question in ACASI

‡ analysed using 'ever sex'+'force' in AASI and 'ever sex', forced sex, and anal sex in ACASI

7.3.5 Comparison around ease of questionnaire completion and questionnaire comprehension.

As shown in Table 7-2, there were four questions that addressed ease of comprehension and mode operation for that questionnaire delivery mode. The majority of respondents in both modes reported finding the questions asked of them easy to understand (87.8%; 95% CI 86.8-88.7%) and easy to complete (85.8%; 95% CI 84.8-86.8%). Just under ten percent of respondents reported finding Audio-SAQ was not easy to complete but ACASI easy to complete (8.5%; 95% CI 7.7-9.4%). However, this question may not have been well understood. When asked in a subsequent question if they had "found it difficult to use the audio player/laptop," a greater percentage of respondents reported difficulty using both modes (28.6%; 95% CI 27.3-30.0). Data suggests that if respondents found Audio-SAQ difficult to use, they were more likely to find ACASI challenging. Of the respondents who found Audio-SAQ difficult to use, 79.3% also found ACASI problematic. However, the reverse scenario was not the case; only 56.1% of respondents who found Audio-SAQ easy reported no difficulties with ACASI.

The presence of a voice accompanying the written script seemed beneficial to most. A large proportion of respondents found the voice always assisted in comprehension in both questionnaire delivery modes (Audio-SAQ 87.4%; 95% CI 86.4-88.4); ACASI 88.5%; 95% CI 87.5-89.4. About 8% found it sometimes helpful to have the voice present (Audio-SAQ 8.3%; 95% CI 7.5-9.1; ACASI 9.2%; 95% CI 8.4-10.1). In ACASI, we asked one final additional question as to whether respondents believed they would have answered questions similarly in the Audio-SAQ version (see Table 7-2 QE8) The majority (82.5%) believed they would have. However, just under 11% (401/3703) of them did change their answers in the question on ever having sex.

7.3.6 Reporting honestly

When asked how honest they had been in their self-reports, most respondents stated that they had been completely honest during both questionnaires (85.35%; 95% CI 85.4-86.4%). However, for those respondents who reported that they were not sexually active but who possessed a biomarker for sexual activity, 83.6% (n=107/128) of Audio-SAQ users and 85.9% (n=79/92) of ACASI users reported being 'completely honest' on the questionnaire.

7.4 Summary

In deciding to use two questionnaire delivery modes in the final survey, an opportunity arose to examine some additional mode comparisons. Biomarkers were used in all previous RDS surveys (including the feasibility study) to compare self-reports against biological evidence of sexual activity. Unfortunately, in the QDM trial, the low prevalence of positive biomarkers coupled with the small sample size who completed the questionnaire twice rendered it impossible to compare incongruities between the questionnaire delivery modes. However, in the final survey, the opportunity for this comparison was again possible. Firstly all participants completed both questionnaires which were taken immediately after each other and included a few repeated questions on sexual behaviours. In addition, participants were slightly older which offered the possibility of an increase in exposure to biological evidence.

We continued to find an increase in reporting sexual behaviours in ACASI over Audio-SAQ. The larger sample size allowed us to compare the direction of effect by gender; we found no evidence that males are different from females.

There is a statistically significant difference between the two modes in the proportion of respondents who had a positive biomarker and reported never having sex. The proportion of Audio-SAQ users producing this difference was greater than with ACASI users. In addition, female respondents with evidence of a biomarker for sexual activity were less likely to report not having had sex on ACASI.

Inconsistencies in reporting were still apparent in Audio-SAQ. This was most often seen in questions where additional information was requested. Respondents in Audio-SAQ also struggled with questions where an additional response was created to compensate for not having a skip pattern, creating inconsistencies between the response to the first question and those that followed.

As found in the QDM trial, the addition of an audio component was appreciated by almost all respondents. Levels of self reported honesty were high; however this reporting seems less reliable when the majority of respondents with positive biomarkers for sexual activity who self-reported not being sexually active claim to have been completely honest (83-85%).

The following chapter concludes the research for this thesis by framing the results (the QDM trial, final survey results and findings from the systematic review) within our broader knowledge of the impact of questionnaire delivery mode on sensitive questions in development country settings.

8 DISCUSSION

8.1 Summary of thesis

In this thesis I have explored one central question: does the interview mode affect a participant's ability to respond to sensitive questions, and if so, are we able to shed any light on the determinants of this effect? In particular, I focus on adolescents' reporting of sexual behaviours living in rural Zimbabwe, where conservative cultural mores render it difficult for youth to report engaging in sexual activity. I conducted a randomized control trial to compare four questionnaire delivery modes (ICVI: interviewer administered questionnaire with confidential voting interview, SAQ: self-administered questionnaire using paper and pen, Audio-SAQ: audio self administered questionnaire, and ACASI: audio computer –assisted survey instrument). Referred to here as the QDM trial, I examined item response rates and rates of reporting for sensitive behaviours (seven sexual behaviours were measured *a priori*, six other sensitive topics were measured *post hoc*). I was also able to examine reliability of responses by having some participants take the questionnaire a second time a week later. Biomarkers for sexual activity were collected which assisted in partially establishing the validity of self-reported sexual data. This experimental evaluation was supported by additional quantitative and qualitative data that provided feedback from the participants on the feasibility and acceptability of the different modes. A smaller follow-up piece of research was carried out comparing similar questions in the two modes used during the final survey of the parent trial.

Research on comparative methodology from North America and Western Europe coupled with what limited information was available on comparing methods in resource-poor settings was used to inform the design of this trial. Research for this thesis was conducted at a time when there was an emerging interest in questionnaire delivery modes in developing country settings where the HIV epidemic is at its worst and the burden of new infection remains greatest amongst young people. Not only were delivery modes being improved and developed (Jaya et al., 2008; Gregson et al., 2002b; Hanck et al., 2008), but methods previously ignored were being evaluated in a small number of comparative studies. Upon completion of this trial, I conducted a systematic review of comparative research on questionnaire delivery mode administration in developing countries that reported on sexual behaviours to see how the field had developed over the timeframe of the QDM trial. This research contributes to that expanding body of knowledge.

The pattern of results from this QDM trial strongly suggest that Audio-SAQ and ACASI offer a number of advantages in assisting participants to honestly self-disclose sensitive information. Audio-SAQ was relatively inexpensive and logistically straightforward to use. Audio-SAQ's reporting of sensitive behaviours was similar to that of ACASI, which overall, provided the highest levels of reporting of sensitive behaviours. While SAQ was the least expensive and logistically simplest to administer, it had the worst item and global response rate and the lowest levels of reporting of socially censured behaviours. One particular disadvantage for both SAQ and Audio-SAQ was that when skip patterns were used the item response rate fell for those questions. As the potential for errors are greatest following a manual skip, SAQ and Audio-SAQ provided more opportunity for inconsistency between answers within different parts of the questionnaire. Audio-SAQ's inability to effectively handle skip patterns also hampered its collection of more complex data, something ACASI was able to accomplish with fluency. Software programming in ACASI allowed inconsistent answers to be highlighted to the respondent. ACASI's additional advantage was that data were entered directly into the laptop reducing subsequent data entry and processing time. While using the ballot sheet assisted participants in answering sensitive questions in the interviewer-administered mode, the rates of reporting for many sensitive behaviours using this mode were still lower than those found in the self-administered modes, particularly ACASI. In addition, by using the ballot sheet to increase the respondent's sense of privacy, it simultaneously blinded the interviewer to the participant's responses making it impossible to ensure that questions were answered and also to make use of skip patterns around sexual behaviours.

In addition to the *a priori* analyses on specified sexual behaviours that is the main focus of the thesis I also conducted a post hoc analysis on questions relating to other issues also recognized to be sensitive in nature. As shown in Chapter 5, use of Audio-SAQ and ACASI versions of the questionnaire increased reporting of other sensitive issues including those relating to mental health, poverty, drug and alcohol use and circumcision.

Largely as a result of financial constraints, we used two QDMs for the final survey. We used Audio-SAQ to complete the majority of the questionnaire which did not require skip patterns. Participants then completed a shorter questionnaire on ACASI which was used to collect that data which required complex skips. As would be expected given these two modes had similar rates of reporting sensitive behaviours in the QDM trial, we did not find large differences in reporting of sensitive behaviours between these two modes. However, because of the larger sample size in the final survey and the older age of the survey participants we were able to explore the effect of gender on survey completion using the two methods. In addition we were able to re-explore the relationship between biomarkers, behaviour reporting and

questionnaire delivery mode. We found no gender effect around reporting of sensitive behaviours. However, we did find a statistically significant difference between the two modes for respondents who had a biomarker for sexual activity but reported never having had sex. This inconsistency was lower in ACASI than in Audio-SAQ. Results from the QDM trial and the final survey concur with data from the systematic review, which strongly suggests that ACASI improves the validity of reporting of sexual behaviours in developing country settings

8.2 Validity of self-reported data

Sensitive questions are those that create a feeling of discomfort within the respondent. Despite cultural and individual differences there are certain topics that are universally considered to be sensitive (Tourangeau et al., 2007; Brener et al., 2003). Sexual behaviour is one of these. One mechanism for establishing whether a topic is sensitive or not is to explore whether there are differences in rates of reporting likely due to social desirability bias (Moum, 1998; Klimes-Dougan, 1998). Using these guidelines, this research highlights that other topics such as poverty, psychological wellbeing, and orphaning are also sensitive and prone to similar reactions of discomfort from respondents.

One influential model outlining the survey response process put forth by Tourganeau argues that there are four major components that drive a response (Tourangeau, 1984). The respondent must first understand the question as it was intended by the researcher, retrieve from personal memory the requisite information to answer the question, and finally, integrate this information and report it with minimal distortion. Sensitive questions can impact the respondent in all four of these components which are driven by two major theoretical perspectives that dominate the field of validity measurement: cognitive and situational theories (Brener et al., 2003; Tourangeau et al., 2007; Catania, 1999). Cognition focuses on the intellectual processes that affect the accuracy of self-reported behaviours. These include individual recall or memory and the respondent's ability to correctly follow skip patterns. Situational theory concentrates its attention on the impact that social desirability and interviewing conditions have on the respondent's ability to answer sensitive questions. While these theories are not mutually exclusive, they provide a useful framework in which to analyse the data collected here.

8.3 Cognitive Influences

8.3.1 Recall

The literature is replete with studies demonstrating that recall ability is not consistent over time and that frequency of behaviours is more difficult to recall than the behaviours

themselves. As with other populations, adolescents struggle more with recalling frequency of sexual behaviours rather than the act itself (Catania et al., 1990; McFarlane & St.Lawrence, 1999; Hearn, O'Sullivan, & Dudley, 2003; Rodgers, Billy, & Udry, 1982). Our data were collected from adolescents whose sexual experiences did not occur in the distant past suggesting that information recall was likely to be less of a barrier to accurate responses here. In our qualitative data, participants did not mention struggling to remember their sexual experiences; they instead highlighted how awkward it was to report it and to read or hear the words describing sexual behaviours.

8.3.2 The role of skip patterns:

One major critique of self-administered questionnaires is the difficulty participants have in following skip patterns within a questionnaire (Turner et al., 1995; Al-Tayyib et al., 2002). My research was able to examine the effect of skip patterns in detail in the QDM trial and found that our participants also had trouble following skip instructions in self-administered questions recorded on paper. My analysis suggests that this may be in part due to social desirability bias as skips on less sensitive questions were almost always handled correctly. However, it should be noted that these less sensitive skips were also easier to complete as the skip normally included only one additional follow-up question. In a study from the U.S. among adults (18-45 years), Al Tayyib and colleagues examined the association of literacy on skip errors and logically inconsistent answers (Al-Tayyib et al., 2002). Corroborating the results presented here, skip errors were found to be more common on paper forms. And while literacy was associated with correct skip performance, the complexity of the skip pattern was also influential. The alcohol and sexual behaviour sections of their questionnaire contained the most complicated skip patterns. Among those participants who exhibited high literacy proficiency, 25% of them produced skip errors in the alcohol section and 40% of them generated errors in the sexual behaviour section.

In Zimbabwe, students are exposed to skip patterns early on in their education when they take their final primary school exams at the end of Grade 7 (year 7). Moreover, as outlined in Chapter 4, all the skip patterns were pre-tested and found to be clearly understood during the formative cognitive interview process. However, as found in Al Tayyib's study, our questions on orphaning and sexual behaviour were the most complex and had the highest rates of skip errors. Given that both of these topics are sensitive it is difficult to completely disentangle participants' technical inability to skip correctly from their reluctance to answer the question. Our data showing that adolescents have trouble with manual skips is also supported by data from Palen and her colleagues in South Africa which indicated higher rates of missing data in

SAQ (11.5%) than using PDAs (0.8%) (Palen et al., 2008a). Their data lend credence to the possibility of the error emanating from technical inability. Another possibility is that questions appearing individually on a screen are more difficult to ignore. More research is needed to unravel the unique impact of these determinants. ACASI/PDAs is the one self-administered mode where skips are programmed automatically and are therefore removed from the respondent's control. Not surprisingly, as observed with Palen's data in this mode, skips in the QDM trial were always handled well.

In the final survey, where there were no skips administered during the first Audio-SAQ questionnaire, the inconsistency in reporting was of a different type to that seen in the QDM trial, with participants providing illogical responses in follow-up questions. For example, there were four questions on sexual risk behaviours that followed the two questions on consensual and forced sex. The most 'logical' choice for a participant who had reported never having had either consensual or forced sex was to choose the last response option 'I have never had sex' in the following four questions. However, between 4-9% reported having used a condom at first or last sex or reported at least one lifetime partner or partner in the last 12 months. Similar findings were observed by Plummer among youth in Tanzania where 7% of respondents provided illogical responses in a question set (Plummer et al., 2004b). While this inconsistency is not a result of an incorrect skip, it is not clear if the error is purely cognitive and a result of a lack of understanding or if social desirability bias is also implicated. Again, when follow-up questions were asked in ACASI there were no illogical responses. This was not because the respondent was more capable (they were the same respondents) but because the programme did not allow the respondent to complete that question.

In addition, for those who had initially reported no sexual activity we asked them this question a second time, re-iterating the importance of the data being collected and reminding them that confidentiality was being respected. When offered this second chance, reports of sexual activity increased. However this increase differed by mode ranging from 1.1% in SAQ to 2.7% in Audio-SAQ, and 4.8% in ACASI. Again, it is not completely possible to disentangle the mode effect from the respondent's desire to be perceived to be abiding by the social norm. In SAQ and Audio-SAQ, the second question was found 13 questions and six to seven pages later in the questionnaire booklet. Between 15.9% of SAQ users and 18.2% of Audio-SAQ users who reported no sexual experience in the first questions missed the second question entirely. This large gap between the questions was necessary so as to ensure that those who reported sexual activity in the first question could immediately proceed to the next set of questions related to their sexual experiences. This situation highlights the sometimes difficult choices made by researchers trying to maximise sexual behaviour information in the easiest manner

for different sub-populations when administering questionnaires on paper. In ACASI, however, the skip was pre-programmed and did not engage the respondent's cognitive abilities.

In the final survey, in the ACASI segment of the questionnaire, for those respondents who responded initially that they had never had sex, we also asked them this question a second time. Again, there was an increase in the reporting of this behaviour. However, can we say that this increase makes the data 'unreliable' or just that it emphasises how difficult it is for respondents to report their sexual activity? Certainly the context in which we phrased this second question assumed that social desirability was playing a strong role in hindering participants from answering this question accurately.

8.3.3 Implications of controlling skips in ACASI

It is important to note when skips are controlled, it doesn't make the respondent more reliable, it instead controls for their potential unreliability. That is to say that when we control skip patterns within computer-administered questionnaires we remain ignorant of the cognitive reasons why individuals might report inconsistently because we don't allow it to happen. While pre-programming allows our data and analysis to be 'cleaner' it does not enlighten us as to the determinants of these inconsistencies which we witness in other self-administered modes. Future research could allow ACASI to incur inconsistent reporting, notifying researchers of its occurrence which could then be explored qualitatively. Results of this qualitative analysis would improve our understanding of the reasons underpinning individuals inability to complete skips satisfactorily.

8.3.4 Terminology and use of an audio component

Considerable research has been conducted around what is perceived as appropriate sexual behavioural terminology (Wellings et al., 2001; Elam et al., 2003; Michaud, Narring, & Ferron, 1999; Mavhu et al., 2008; Spencer, Faulkner, & Keegan, 1988; Ponce et al., 2009). What cuts across all the research carried out among varied cultural contexts is that our sexual terminology is limited and very formalized in comparison with the rest of our descriptive vocabulary. In addition, in more conservative cultures these terms are rarely seen in print or spoken aloud (Mavhu et al., 2008; Elam et al., 2003). As seen in Chapter 4, terms for vaginal sex are vague in Shona and require the use of specific anatomical terms to render them explicit. Substantial work was carried out during the course of the research for this thesis to ensure that terminology for sexual behaviours was understandable for this population of young Zimbabweans (Mavhu et al., 2008).

Qualitative data suggest that just as meaningful as correct terminology in improving respondent's cognition is the use of an audio component. Respondents repeatedly reiterated how helpful it was to both hear and see the questions and responses. This was true for all three methods (ICVI, Audio-SAQ, and ACASI) which included an oral component. Moreover, the only difference between SAQ and Audio-SAQ was the audio component and in most cases the rates of reporting for sensitive behaviours were greater among Audio-SAQ users than SAQ users. This sentiment was confirmed in the final survey with over 95% of respondents expressing appreciation for the presence of the voice. These data support information from other studies which emphasize the impact the auditory mechanism has on improving a participant's understanding of little used terms (Elam et al., 2003; Wellings et al., 2001; Pluhar et al., 2007; Boekeloo et al., 1994).

The effect that the gender of the voice has on accuracy of reporting is less certain. In an experimental lab study, Nass provides evidence that the gender of a voice, even computer-generated, carries with it societal gender stereotypes (Nass, Moon, & Green, 1997). In all of the questionnaire surveys described within this thesis (feasibility, baseline, interim and final surveys for the RDS parent trial) we chose to match the gender of the audio component to that of the respondent's. This decision was based on research which suggests that while the evidence is less clear for men, women are more likely to report sensitive information to women (Wellings et al., 2001; Konings et al., 1995). Apart from the fact that participants did not specifically comment on the gender of the voice, our data do not broaden our knowledge on this matter and more research into this area is required. This is particularly relevant in developing country settings where the cultural influence of gender might render existing research from the US less generalizable.

8.3.5 Level of literacy and its impact on ACASI

Data continue to suggest that literacy remains a limiting factor for all self-administered modes (Turner et al., 1995). This includes ACASI where in two studies in India, researchers were concerned that poorer literacy would affect a participant's ability to use ACASI (Jaya et al., 2008; Potdar et al., 2005). In both studies, researchers failed to find uniformly higher reports of reporting for all sensitive sexual behaviours. However, neither study assesses the reasons behind this difference; they are just noted. Moreover, while not uniform, there were a number of important sensitive questions where increased reporting was found. Potdar's conclusion that literacy affects responses is based on their comparison that reporting in college-educated males was uniformly increased whereas a similar consistency was lacking among males living in slum areas. However there is no mention that males living in slums were

unable to use the computers or that their lower reporting of sexual behaviours was due to having a lower literacy. So it is not necessarily literacy that is causing this difference in reporting of sensitive behaviours.

Literacy does not seem to have been a limitation in the QDM trial where adolescents were largely literate. In the interim survey within which the QDM trial was conducted, participants were all members of the main trial cohort which recruited from Form 2 classes (in their ninth year of schooling) at the start of the trial. When they took part in the interim survey in 2006, the majority (86%) were either still in school or had completed the requisite four years of secondary education. Similarly high literacy rates were found during the final survey, where participants were recruited from the community at large which increased the possibility that a larger proportion of survey participants would have been illiterate. However, the proportion of adolescents who had completed Form 2 and more, while considerably less than at the interim survey, remained high (73%). Zimbabwe has traditionally had relatively high rates of secondary school attendance when compared to other countries in Africa (United Nations Children's Educational Fund (UNICEF), 2008).

Another element of literacy is its practical aspect. One feature of this is illustrated in Al-Tayyib's and supported by our research surrounding the inability of highly literate respondents to correctly complete complex skip patterns in paper-based self-administered questionnaires (Al-Tayyib et al., 2002). Practical literacy can also be demonstrated through the competency of questionnaire tools such as audio players (MP3 and CD players) or computers (desktops, laptops, and PDAs). Overall, post-survey data collected during the QDM trial suggest that respondents generally felt capable using these tools with a minority of respondents reporting having some difficulty using either the CD player or the laptop (Audio-SAQ=10%; ACASI=4% (see Table 6-1). In addition, the practicality of Audio-SAQ was improved with the use of MP3 players during administration of the final survey questionnaire. However final survey data also suggests that there were still a considerable minority (28.6%) of respondents who reported difficulties using the two methods. Additional qualitative data would assist in better understanding how to support these respondents.

While post-survey data suggests that most participants did not find using the laptop difficult, given that computers were not so readily available in the study population (as evidenced by the feelings of novelty they expressed qualitatively), it is possible that participants claimed ACASI was easy to use because they thought it would reflect favourably upon them. Other research from populations in the US where social desirability bias may be heightened (i.e. injecting drug users) suggests that these respondents also thought computers were easy to

use, but the potential role of social desirability bias was not examined (NIMH Multisite HIV/STD Prevention Trial for African American Couples Group, 2008; Metzger et al., 2000a). It was also not possible within the confines of this QDM trial to conclusively determine whether social desirability played a role in how respondents chose to answer the questions around ease of use during the qualitative research and in the final survey questionnaire. What we can say is that there were very few instances where the data from ACASI was unusable (six ACASI questionnaires in the QDM trial). Greater clarity around this aspect would be useful if ACASI's use is to be encouraged.

8.4 Situational Influences

Social psychological research argues strongly that individuals tend to present an outward image that equates with their cultural norm (Goffman, 1959). As such, questions about a sensitive topic create discomfort on the part of the respondent. In methodological reviews two reasons dominate the explanations given for decreased reporting of sensitive behaviours: embarrassment from reporting a sensitive behaviour to an interviewer or feeling threatened that its disclosure will induce punishment (Catania, 1999; Brener et al., 2003; Tourangeau et al., 2007). In this study among rural Zimbabwean youth, both embarrassment and the threat of retribution are factors that would make it difficult for youth to report their sexual behaviour. This is particularly true of unmarried adolescent girls/women. All of the respondents for this research came from the same cultural background, and, as rural Shona adolescents, young women were expected to remain virgins until marriage while pre-marital sex was quietly condoned for their male peers. Chiefs in some areas still condone and encourage virginity tests for girls, 'rewarding' young girls who remain virgins in a public manner (e.g. by wearing a specific article or colour of clothing). The repercussions for unmarried adolescents found to be sexually active are severe. Young girls who become pregnant are expelled from school and often chased away from their home and expected to move into the house of their male partner where the welcome is not guaranteed. In addition, research conducted in the US indicates that telling untruths is part of a well practised automatic editing process individuals employ to ensure our presentation of 'self' is consistent and smooth (DePaulo, Kashby, Kirkenol, Wyer, & Epstein, 1996; DePaulo et al., 2003).

Tourangeau and Yin's comprehensive analysis of sensitive questions indicates two main mechanisms for easing a respondent's difficulty in disclosing sensitive information: increasing the privacy of the setting and increasing the privacy of the questionnaire delivery mode (Tourangeau et al., 2007). By increasing a sense of privacy, the researcher in essence is placing more control into the hands of the respondent (Catania, 1999). There are a number of

situational variables that affect the population in this QDM trial's ability to report accurately. Different theories concerning social desirability attribute varying degrees of importance to the four components of a survey response mentioned earlier: comprehension, memory retrieval, data integration and reporting of information requested (Tourangeau, 1984). The theories differ in the main on whether they focus on the 'psychology of the individual' or the 'psychology of the moment.' This first group focuses on the psychological aspects of the individual – how do the characteristics of an individual affect their reporting (e.g. some of us are more affected by social desirability bias than others, some of us are jokesters, some of us have a overly assured sense of self which makes us report with a bias but unintentionally.) Research describing this aspect of reporting bias seem to predominantly be conducted by researchers working out of university laboratory research settings in North America and Europe, where funding has been allocated (Couper, Singer, & Tourangeau, 2003; Holbrook et al., 2003; Crowne & Marlowe, 1964; Paulhus, 2002). To my knowledge, no research of this type has occurred in resource-poor settings where funds are limited and research occurs predominantly in field-based settings. This implies that we are unable to comment on the psychology of the individual as it impacts on respondents' answers to sensitive questions.

In contrast, work surrounding the 'psychology of the moment' focus instead on what researchers can do to control the environment of the respondent *overall*, irrespective of a participant's individual characteristics. It asks, 'how can we improve questionnaires overall so that everyone can have an easier time answering our sensitive questions?" Work from the QDM trial (and the final survey) fits within this arena as field-based research is capable of commenting on the psychology of the moment.

8.4.1 Privacy

Extensive research into social desirability indicates that respondents are more able to acknowledge engaging in socially censured behaviours when their sense of privacy is increased (Catania et al., 1990; Catania et al., 1996; Tourangeau et al., 2007; Boekeloo et al., 1994). Data from this QDM trial indicates that participants appreciated the privacy they were afforded. In this research, privacy was increased in two ways: by maximising privacy within the survey setting and within the mode itself.

8.4.1.1 Privacy: Setting

Despite the assumption that questionnaire administration should take place in private, a substantial number of surveys are not administered in this way. When asked, interviewers taking part in large national American surveys report only between 40-50% of interviews being conducted in complete privacy with only the respondent and the interviewer present

(Gfroerer, Wright, & Kopstein, 1997; Silver, Abramson, & Anderson, 1986). Evidence collected in the US suggests that an adolescent's sense of privacy is harder to establish if the survey is conducted in the home than in a classroom setting (Kann, Brener, Warren, Collins, & Giovino, 2002; Brener et al., 2006). While not perfect, classrooms, which we used in the feasibility and baseline surveys of this trial, seem to offer a more suitable environment for adolescents reporting on sensitive questions than their homes (Tourangeau et al., 2007). However, as reported earlier in Chapter 3, Zimbabwean youth in the feasibility study and in the baseline survey, also found classrooms a difficult environment in which they could feel private. In the QDM trial, alternative community survey sites not linked to schools or homes were used. In rural Zimbabwe it is difficult to find a location where each person can answer their questionnaire in *complete* privacy away from everyone else; there are simply not enough buildings to make this feasible. In the QDM trial, great attention was paid to maximizing privacy within the setting, by having as few people as possible together and asking the respondents to put their backs against the wall of the survey rooms minimizing any opportunity for their responses to be visible to others. Post-survey data from this trial indicates that participants appreciated the privacy they were afforded even if it was not complete. (Note that culturally, it is rare in Zimbabwe for anyone to be 'alone'. Children sleep in rooms with others until they get married, youth herd cattle together, etc).

Moreover, respondents taking part in this research highlighted the importance of privacy in improving their ability to honestly self-disclose sensitive information. Interim survey participants were asked to compare these community-based questionnaire settings against those in baseline (classrooms set up in exam conditions) and were appreciative of the smaller rooms used during the interim survey (a survey feature that was maintained during final survey administration). As shown in Chapter 6, respondents who reported not having as much privacy as they wanted were more likely to have been in survey rooms which included participants of both genders.

Research in the US has shown that privacy can be influenced by the presence of others during survey administration, particularly if the individual exerts power over the respondent's life (such as a parent) (Aquilino, Wright, & Supple, 2000). Research in Kenya however, suggests that while a quarter of male youth had a family member present during questionnaire administration, that their responses did not differ significantly from those who were able to complete the questionnaire in private (Mensch et al., 2003).

This bystander effect described by Aquilino and colleagues was evident in the research presented in Chapter 3 leading up to the QDM trial where data from the feasibility study

highlighted that teachers' influence was so strong that even without being present they affected how student's responded. In addition, despite being widely spaced throughout the classroom so that each respondent completed their questionnaire in 'private', pupils repeatedly attributed the presence of other pupils as affecting their ability to accurately report their sexual behaviour during the baseline survey. This supports data from Aquilino's study which indicates that in 80% of instances the bystander did not interfere with the survey, but were just present in the room (Aquilino et al., 2000).

The only bystanders present during the QDM trial (and the final survey of the RDS main trial) were surveyors and a small number of other survey participants. Surveyors were present at the start of questionnaire completion, provided relevant training for each mode and were available nearby throughout questionnaire completion to answer any questions. This was true for all modes (although less relevant for the interviewer-administered mode).

Surveyors trained each participant individually and only let them begin their questionnaire once they felt confident the participant had demonstrated they were capable with their mode. And yet, once started, qualitative data suggest that some would have liked to have had more help but felt unable to raise their hands to seek assistance. This could be related to concerns that seeking assistance would disclose their responses. However, one study conducted in the U.S. which has focussed on the impact of interruption during questionnaire administration found that in their experimental lab setting, interruption didn't impact on a respondent's sense of privacy (Couper et al., 2003). However, in this scenario, unlike our surveyors, the 'intruder' was not part of the study so would not have imparted the same level of threat. Qualitative data also underscores how some participants who failed to grasp how to use a mode expressed distress about this. Research indicates that not understanding the meaning of a question can cause a participant to become distressed (Catania, 1999). However, there is little research into what happens to a participant who doesn't understand how to operate a questionnaire delivery method. We need more research into how to assist participants once they have started and to assess this process better. This information would provide data on the prevalence of its occurrence and allow us to create tools to better handle it when it takes place.

8.4.2 Confidentiality

In conjunction with how privacy is maintained within the setting is how carefully the respondent perceives the data are being guarded. Researchers traditionally offer statements of confidentiality to respondents, guaranteeing that their names will not be linked to their information and that the data will not be made available to others. The effectiveness of the

researcher's statement is wholly reliant on the trust it has inspired in the respondent. A respondent's ability to believe confidentiality has been maintained is based not only on the researcher's actions but also on the cultural context in which the survey is taking place.

In this study, confidentiality was promised to the RDS cohort in the baseline and interim survey and anonymity pledged to final survey participants. Study ID labels were used during survey administration to create distance between the respondent's name and their data. Qualitative data suggests that this was perceived by respondents as only partially reassuring and somewhat trustworthy. However this seemed to have less to do with the rigour of the study.

Despite the extensive efforts made by the survey team to ensure that school and/or community members were not present during survey questionnaire administration, young people still expressed difficulty believing that the data would remain solely in the hands of the research team. This was in large part due to the lack of a cultural reference for respecting young people's confidentiality. Zimbabwe's sense of community is so strong that it (unintentionally) overrides an individual's right to privacy over the greater community good. This strong sense of community is inculcated into the most fundamental structures where daily greetings require reciprocity (the response to 'how are you' is 'I am fine if you are fine') and the congratulatory message at the birth of a child assumes that the celebration belongs to the community). But it also conveys a message that means that privacy and confidentiality are less respected, least so for youth who hold the most junior position in society.

We altered our interview setting in both interim and final surveys to make them smaller and more private. While this shift proved beneficial, its impact was not as significant as might be found in cultural contexts where a youth's privacy is more respected. Yet questionnaire delivery modes *did* impact on their sense of confidentiality. Qualitatively, those that used ACASI expressed greater confidence that their answers would be kept 'secret'. Study ID labels were present on all paperwork for SAQ, Audio-SAQ and ICVI as well as ACASI. And the respondent's study ID was entered into the laptop by the surveyor. Yet, ACASI was perceived as being better able to maintain confidentiality than the other modes where data was recorded on paper. This may be because the study ID was less visible and, once clicked, answers also disappeared from the screen. Zimbabwean youth have a good deal of experience with confidentiality of information provided on paper (a letter to a girlfriend or boyfriend, exam papers) not being respected. The recent political climate where electoral votes have taken place in public or sealed ballot boxes have been opened support youths' distrust. This would make it harder for them to believe that booklets, even when sealed in envelopes and

placed in locked trunks, might not find their way back to those with authority in their community.

What *did* emerge was an equally important aspect which is that even in an overarching environment lacking in trust, when researchers are true to their word and respect the communities in which they work, participants can gain trust over time. Gregson *et al.* attributes part of the smaller differences found between IVCI and FTFI in their second round of surveying to the fact that participants trusted the research process more (Gregson et al., 2004). Similarly, in the QDM trial, participants partially attributed their increased sense of trust to the fact that baseline survey results had remained confidential and had not been disclosed to anyone in the community.

8.4.2.1 Privacy: Impact of mode

8.4.2.1.1 Interviewer-administered versus self-administered modes

Beyond the setting itself, questionnaire delivery mode can affect a sense of privacy. At the most basic level, interviewer-administered questionnaires do not afford the same level of privacy that self-administered questionnaires do. In a review of US studies comparing the measurement of self-reported illicit drug use, all nine studies found higher rates of reporting with self-administered modes than with interviewer-administered ones (Tourangeau et al., 2000). Our data suggest that those who were interviewed were less likely to report risky sexual behaviours, as well as poverty, psychological ill-health, and alcohol and drug use. When examining interviewer-administered questionnaires, Catania believes this is due in part to the premise of reciprocity that is inherent in self-disclosure which is not adhered to in the interview setting (Catania, 1999). In the traditional dynamic of an interviewer-administered questionnaire, while the interviewer is expected to make the respondent comfortable they are not expected to disclose their own sexual behaviour in order to extract similar information from the respondent. Instead, this interaction is very uni-directional.

A good deal of research suggests that within an interview setting, it is assumed that the researcher will have ensured that interviewers are fully qualified, well trained, able to put a respondent at ease, and fluent and comfortable in speaking terminology related to sensitive behaviours (sexual, orphaning, poverty). In addition, some research suggests that you can increase a respondent's sense of control and comfort by allowing them to choose their interviewer (Catania et al., 1996). Limitations within the QDM trial did not permit the respondent to choose their interviewer, but we did ensure that they were interviewed by someone of the same gender. As mentioned earlier, research suggests that using the same gender is appreciated, especially by women. We also chose interviewers who were within a

similar age range as the respondents so as to decrease the chance that they would perceive the interviewer as someone who might disapprove of their behaviour. Anecdotal data from the RDS main trial (VCT and youth intervention) suggests that young people appreciate the distance provided by an 'outsider'; all our interviewers were from outside the study communities. Yet, despite maximizing the 'privacy' within the interviewer-administered setting, respondents overall disclosed less sensitive information. Here, it appears that the interpersonal trust and rapport gained in a face-to-face interview is outweighed by the need for privacy and sense of anonymity provided by self-administered modes.

There remains considerable debate around the importance of maintaining the formality of the interviewer-administered questionnaire. Traditionally, research demands a level of standardization which prohibits a conversational interviewer and where emphasis is placed on ensuring that questions are read in a standardized manner to all respondents. However work conducted by Conrad and Schober suggest that a more conversational approach yields an increase in reporting of sensitive behaviours (Conrad & Schober, 2000). This is also supported by research from Africa. Konings' work in Uganda found increased reporting of sexual behaviours during in-depth interviews as did Plummer's work among youth in Tanzania (Konings et al., 1995; Plummer et al., 2004a). Data from Mitchell in the UK alludes to the rationale behind this, as respondents reported feeling more comfortable disclosing information during the in-depth interview than during the questionnaire – mostly because they could place context to their behaviours (admitting they were 'wild back then' or 'that they knew it was risky') (Mitchell et al., 2007).

What emerges from this debate is the continued importance individuals place in being able to provide context to their actions. This returns us to Catania's point (1999) that people need to feel in control of their statements and when they can 'explain' their actions this increases their sense of control over the reporting process. The challenge is for this debate to cross over from the interviewer-administered arena to those working in self-administered modes who should continue to ask, 'are there ways in which we can improve our ability to allow participants to provide context to their statements?'

8.4.2.1.2 Value of earphones

While Audio-SAQ was completed in a booklet form and ACASI included a screen, both modes used earphones to allow the participant to listen to the questions and responses while reading along. By using earphones respondents were, in effect, 'closed off' from the others and placed in their own 'private' world. Qualitative data from these participants stressed that the modes themselves afforded greater privacy over SAQ and ICVI.

8.4.2.1.3 Impact of the screen in ACASI

In ACASI, participants were expected to use the laptop screen to read the questions and choose their answers. At present research provides inconclusive evidence on the effects of the laptop screen in terms of increasing or decreasing a respondent's sense of privacy. In most research, the screen does not seem to hinder a respondent's sense of privacy. In Acquilino's study on bystander influence, they also controlled for questionnaire delivery mode comparing SAQ with computer-administered survey instrument (CASI) on a laptop (no audio component). The use of CASI diminished the bystander interference suggesting that despite having a large screen, respondents felt it afforded them more privacy than SAQ (Aquilino et al., 2000). Results from the research conducted here support the notion that the screen is not a hindrance as long as an overall sense of privacy is maintained. Qualitative data suggested that on the rare occasions when the screen was not appreciated, the respondent's privacy within the setting had been diminished (they were sitting in a space where they felt it was possible for others to see their screen).

8.4.3 Reliability

Reliability of a respondent's responses is an important precursor to establishing the validity of self-reports. Reliability of data can be examined by asking the same question at two points within the same questionnaire (internal comparison) or by asking respondents to retake the question after a short time interval and comparing their responses to these same questions (test-retest). In this study reliability was measured in several ways. During the QDM trial, we asked a random set of participants to complete a shortened version of the questionnaire a second time. We were able to compare responses of the sexual behaviour questions in the same participant completed a week apart. While the majority of respondents re-took the questionnaire using a different mode, there were some who were randomly allocated to re-take the questionnaire using the same mode. This allowed a comparison of the reliability within mode versus between modes. For those who retook the questionnaire using the same mode, responses were highly reliable with 92% providing consistent responses to questions about their sexual activity. High rates of consistency (97%) were also found for those who used a different mode in the second round. However, while there were high rates of consistency overall, where responses *were* changed, questionnaire delivery mode did seem to have an impact. While numbers were small, data here suggests that participants using modes that were considered more private were more likely to change their response from 'never sex' to 'ever sex'. The reverse was also true with participants using modes considered less private being more likely to recant their initial reports of sexual activity.

There is another mechanism that can also be used to look at inconsistency in reporting. While not looking at exactly the same question, it is possible to compare reports of the same topic within a questionnaire. For example, if a participant reports they have never been pregnant, it would be logical for them to also report they had never had an abortion. Likewise, if a participant reports they have never had sex in one question, it would be logical for them to not report being sexually active in another question (in our self-administered questionnaires, there was always a response option, 'I have never had sex' to cater for those who had previously indicated they were not sexually active.) In our data, inconsistent reporting was relatively low. In the final survey, less than 3% of young women inconsistently answered the two questions which followed on from the one asking if they had ever been pregnant. When it occurred it was most often the results of a respondent's failure to complete a tick box and then provide additional information about age or frequency within that same question.

Research into inconsistency in reporting of sexual behaviours has as yet to disentangle the rationale behind the inconsistency. A number of factors, both cognitive and situational, may result in inconsistent reports of sensitive questions including the effects of social desirability bias or technical incompetence. When the time frame between the two questions is over years, then the inconsistency might also be the result of a participant changing their contextual framework moving into a new time period where behaviours previously answered are now more likely to be condoned (say from adolescence into early adulthood).

Higher rates of inconsistency seem to be reported more often when studies compare results collected over longer periods of time (Palen et al., 2008b; Rosenbaum, 2006; Lauritsen & Swicegood, 1997). When Lauritsen and Swicegood compared age of sexual debut in US adolescents and then as adults, seven years later, between 28-32% of these reports were inconsistent. A similar phenomenon was found by Rosenbaum where she examined inconsistency in youth who pledged to remain virgins in two waves of the National Longitudinal Study on Adolescent Health (Rosenbaum, 2006). Those who had started engaging in sex during the period between the two surveys were three times more likely to deny having made a virginity pledge in the first survey. Likewise, 28% of those who took the virginity pledge in the second survey changed their sexual behaviour responses to reflect this new outlook. Closer to home, in Cape Town, South Africa, Palen's recent publication reports that nearly 40% of survey respondents who were school-going adolescents reported being virgins after having reported sexual activity in an earlier assessment (Palen et al., 2008b).

However, it would seem possible (if not highly probable) that context was a dominant contributor to the inconsistencies found in these studies outlined above. Social-psychological

literature emphasizes that individuals change their reference points as they move through time (Goffman, 1959). Numerous studies indicate that reporting a younger age of sexual debut when the respondent is already an adult is less difficult than reporting it while the respondent is still young. However, this difference does not automatically suggest that the original data were 'unreliable'. While Palen's time frame is not as long as that in Lauritsen and Swicegood's study, the survey did take place over a two and half year period. More salient is the fact that youth were surveyed between 8th and 10th grades, a time when adolescents are highly susceptible to peer influences and external messages (Harrison, 2005). It would seem very possible that young people's context around sexual activity changes over this time period. A study by Alexander *et al.* looked at a similar time frame in US adolescents and found greater inconsistency between the 8th and 9th grades than the 9th and 10th grades suggesting the more accommodating culture of these later secondary school years (Alexander, Somerfield, Ensminger, Johnson, & Kim, 1993). All of these data support the social psychological literature that emphasizes the contextual nature of everyday life which people continuously redefine as it changes around them (Goffman, 1959)

In contrast to these comparisons across time where perspectives and context are highly amenable to change, data found in studies where the test-retest is analysed using data from the same questionnaire (Vanable et al., 2009; Rodgers et al., 1982) or from a questionnaire taken within a short time frame are moderately consistent (Brener et al., 2002). In two early US studies, data collected from two rounds of a study found inconsistent responses to the question on sexual intercourse within the questionnaire was 7.8% in the first round and dropped to 4.3% in the second questionnaire administered a year later (Rodgers et al., 1982) (Note that the drop in inconsistencies supports the notion presented above that young people's sexual context changes over time). And in a study where data were collected two weeks apart, Kappa values for questions assessing sexual behaviours ranged from .4 to .9 (Brener et al., 2002). This was supported by more recent data among African American youth in four US cities (questionnaires taken two weeks apart) in which 85% of the sexual behavioural variables showed moderate or high levels of reliability (e.g. three-month recall of vaginal sex kappa=0.72; number of sexual partners intraclass correlation coefficient=0.68) (Vanable et al., 2009). As discussed earlier, frequency of behaviours were less reliable (count of unprotected sex acts intraclass correlation coefficient=0.44) (Vanable et al., 2009). This suggests that for young people, reliability is not as dependent on recall as on social desirability bias.

Test re-test on data from two different modes strengthens this argument. If there is a difference in reporting and the time frame is minimal then it can be more strongly argued that

differences are not due to recall but from social desirability bias something affected by questionnaire delivery mode. Data from the QDM trial supported this.

8.4.3.1 Intentional misreporting

It should also be noted that when researchers such as Tourangeau and Yan talk of deliberate misreporting they do so trying to differentiate cognitive errors from situational ones (Tourangeau et al., 2007). There is another, poorly researched cadre of respondents who deliberately misrepresent themselves not out of embarrassment or because disclosure makes them feel threatened but because they want to misrepresent themselves. Fan and his colleagues conducted a study in which they were able to identify some respondents as 'jokesters', those who misrepresented themselves on items that could be easily verified on visual inspection and where misrepresentation was deemed unrelated to embarrassment and threats. They looked at youth who misreported having an artificial limb, having been adopted, and having been born in the US (Fan et al., 2006). Their study reassuringly notes that that the presence of jokesters were low and that their responses did not significantly alter the response rates of other sensitive data being collected. However, one study cannot reassure us wholly. More recently and within the present context of developing countries and African cultures, Palen's work in South Africa documenting youth who recanted previous reports of sexual activity examined a number of related questions. Those who recanted were more likely to have inconsistently reported their gender, a non-sensitive question (RO-1.4; 95% CI 0.6-3.3%) (Palen et al., 2008b). These individuals would be considered 'jokesters' using the definition laid out by Fan. These data reinforce the notion that despite having minimal statistical impact, care should be taken to define those who could be classified as jokesters and remove them from analysis so as to minimise their possible distortion of the data (Fan et al., 2006). No research has been conducted comparing this effect using different questionnaire delivery modes.

8.4.4 External Assessment of Validity

8.4.4.1 Role of biomarkers

As has been mentioned earlier, most risk behaviours, including sexual behavioural data, cannot be verified independently (Minnis et al., 2007; Catania et al., 1990; Brener et al., 2003). However, as biomarkers can provide a measure of validation, we cross-tabulated sexual behaviour data with biomarker data in both the QDM trial and final surveys (HIV, HSV-2, and current pregnancy in females). As none of these biomarkers have a one-to-one relationship with the self-reported behaviour it is only possible to use them to assess validity in the one direction: while not all of those who are sexually active will have a biomarker detected, none

of those who report 'never having had sex' should have one. There were too few respondents with positive biomarkers for sexual activity enrolled in the QDM trial which limited our ability to statistically compare the data by questionnaire delivery mode. However in the final survey there was a statistically significant difference between Audio-SAQ and ACASI, with respondents with biomarkers less likely to report never having had sex on ACASI.

Our data do suggest that self-reports are influenced by social desirability bias, particularly among young females. During the QDM trial, more than half of the females (15/28) with positive biomarkers for sex reported that they had never had sex. This inconsistency was not apparent in males, although there were far fewer of them who had biomarkers for sex (n=2). Despite larger numbers of biomarkers among respondents in the final survey, the proportion of males infected with HIV and/or HSV-2 remained low (9.5%). As such it was not possible to detect a statistically significant difference between biomarker prevalence among males who said they never had sex on Audio SAQ (38.1%; 95% CI 25.4-52.3) and ACASI (33.9%; 95% CI 21.8-47.8) although there was a trend towards lower prevalence on ACASI. By contrast we did find a higher prevalence of biomarkers among women who reported they had never had sex on Audio SAQ (20.8%; 95% CI 17.2-24.4) than ACASI (13.8%; 95% CI 11.0-17.1) suggesting that female Audio SAQ respondents were more likely to under-report that they had had sex.

When the pregnancy test result is compared against self-reported current pregnancy, the two surveys found varying levels of consistency (interim=50% (8/16); final=77.7% (157/202). This may be due to the fact that these young women were aware that we were running pregnancy tests so felt less able to hide this information. There is evidence that shows that when participants believe their answers can be compared against another indicator, they are less likely to deviate from the truth (Campanelli, Dielman, & Shope, 1987; Werch, Gorman, & Marty, 1987; Tourangeau, Smith, & Raskinski, 1997; Akers, Massey, Clarke, & Lauer, 1983). It is also possible that the pregnancy biomarker can test for pregnancy before a woman will know she is pregnant which would also result in inconsistencies.

8.4.4.2 Self-reported honesty

There are few studies that examine self-reported honesty of questionnaire completion, particularly in adolescents (Newcomer & Udry, 1988; Stone, Shiffman, Schwartz, & Hufford, 2002). In one study from the US, males with discrepant data at two time points admitted to over-reporting their sexual experience in the initial survey (Siegel, Aten, & Roghmannn, 1998). Other evidence contrasts with this. Compliance of diary completion was evaluated using a light sensitive chip that recorded when the diary was opened. Participants were unaware that their diaries were equipped with this feature. The light sensitive chip confirmed that 11% of

participants were compliant and completed their diaries in a timely fashion; however 90% of participants reported being compliant suggesting that 80% were inaccurately reporting their level of compliance (Stone et al., 2002). Both studies cited above were conducted in the US; none of the comparative studies from developing countries reported on self-reported honesty. Our data are similar to that found by Stone and suggest that self-reported honesty is also impacted by social desirability bias. This was evidenced in the following manner: *all* the participants with positive biomarkers for sexual activity who self-reported not being sexually active reported completing the questionnaire honestly, considerably weakening the credibility of these data. We are limited therefore in our ability to understand the underlying significance of our data on self-reported honesty during questionnaire completion. However, it is possible to speculate that honesty is influenced by social desirability.

8.4.5 Summary

Our evidence suggests that while both cognitive and situational aspects were at play, when technical problems (such as skip patterns) were eliminated, situational characteristics (social desirability bias) remained as outlined here. Situational misreporting found in sensitive questions is almost always in one direction, that of increased socially desirable responses. This comparative research supports this theory in two ways. Firstly reporting of sensitive questions was in the one direction, with modes considered (and defined by participants) as less private providing more socially desirable responses and more private modes providing more socially *un*desirable replies. Secondly, although the evidence can only be used in the one direction, irrespective of mode, there remained a difference in the proportion of young girls who did not report sexual activity but who had biomarkers suggesting sexual activity had occurred. Unfortunately, biomarker evidence cannot be used to examine those respondents who reported sexual activity but were not telling the truth. The findings from Palen's study in Cape Town, South Africa showing a substantial proportion of youth recanting earlier sexual activity could be seen as disputing this point. However, the majority of the youth who recanted were males where it is possible that cultural expectations made it very important (e.g. socially desirable) in the earlier surveys to be seen as sexually active. This possibility was not explored in her discussion. In the QDM trial, it seems that cognitive issues did play a role, but not in terms of memory or comprehension, but as a result of inability to follow complex skip patterns.

Secondly, the procedures that seem most effective in reducing a respondent's motivation to misreport seem to affect sensitive questions but not non-sensitive ones. Our data also support this to some extent. What is interesting here is that researchers may have ignored areas that

are more sensitive that previously envisaged. This is true for orphaning and poverty both of which had difference in reporting by mode. Researchers collecting poverty data traditionally use interviewer-administered questionnaires (James Hargreaves 2008, personal communication 4 September). However reports of age, education, and other demographic characteristics remained unaffected by mode.

8.5 Strengths

There are a number of strengths surrounding the data collected for this thesis. Firstly, we tested the hypothesis that questionnaire delivery modes might influence validity of sexual behaviour reporting in a randomized control trial. This remains the strongest manner in which to control for confounders and strengthens the credibility of these results. Secondly, whereas comparisons are more traditionally conducted between two modes, this study compared four modes allowing for comparisons between both interviewer-administered modes and between self-administered modes. In the systematic review presented in Chapter 2, out of 24 studies, only five compared more than two modes (Le et al., 2006; Potdar et al., 2005; Mensch et al., 2003; van Griensven et al., 2006; Lara et al., 2004). Thirdly, the study sample size was also large enough to make comparisons between the four arms of the trial. Despite the out-migration during the interim survey which decreased the number of available participants within survey communities, our sample size was still large enough to have about 85% power to detect a risk ratio of 0.5 (or 2.0) in at least one group. The interim survey had high participation rates for those within the survey area (95%) lowering the influence of non-participants response bias. Fourthly, while sexual behaviour reporting was the focus of our a priori analysis, we were also able to examine a range of specified sensitive topics and found that reporting in these other areas followed a similar trend to that found for reporting of sexual behaviours, where modes with increased privacy produced greater reporting.

In questions on poverty, there was a greater difference between interviewer-administered and self-administered than between any of the three self-administered questionnaire delivery modes. This could be a result of substantial increase in the level of privacy found among all three self-administered modes which outweighed any other specific benefits present within a particular self-administered mode.

The only exception to this trend was around the subject of orphaning where, in our post hoc analysis of other sensitive topics, we found increased reporting in an interviewer-administered setting. These data seem contradictory to some of the qualitative data that suggests participants found providing sensitive information to an individual difficult. However, it is possible that what seems contradictory is in fact a reflection of the myriad of aspects that

affect reporting highlighted throughout this discussion. At the time of the interim survey, rural Zimbabwe was faced with terrible poverty and food distribution was focussed on those identified as vulnerable, a category which included orphans. Participants could have been influenced by these socio-economic circumstances. If participants believed they might benefit from identifying themselves as an orphan, it is possible that their discomfort as outlined in the qualitative data was outweighed by their need to 'tell someone' so as to qualify for assistance. This emphasizes that while social desirability bias continues to play a prominent role, its direction of impact can vary depending on the topic.

Reliability of data is strengthened when data are collected from the same participant twice. Thus, the inclusion of the second round of surveying a random set of participants strengthened the rigour of the interim survey and provided opportunities to examine inconsistencies in reporting. These data are additionally made more rigorous by the inclusion of same mode comparison in Round 2, allowing differences found in same mode reports of 'ever having sex' to be taken into account during the analysis of R1/R2 comparisons.

A final strength was the use of quantitative and qualitative post-survey data from participants which collected information on their impressions of each mode's acceptability. This information reinforced the quantitative data providing context and rationale for the increase in reporting of sensitive topics that were found. Participants highlighted the importance of privacy both in the setting (small rooms with fewer participants) and in the mode as well as the importance of the audio component. Equally important is the point that despite the qualitative data not being extensive, useful information was gathered which provided context to the a priori analysis. This multi-methodological approach is supported by others in the field (Huygens, Kajura, Seeley, & Barton, 1996; Baum, 1995). This is reassuring and should encourage others to use qualitative data wherever possible. Even small amounts collected well and analysed rigorously can add valuable context to quantitative comparative data.

8.6 Limitations

Validity is traditionally measured using an external marker, often defined as the 'gold standard.' When an outcome can be externally validated against an independent standard, this is seen to represent 'truth', and defined as the 'gold standard' (Cowan et al., 2003). In a similar vein, response rates can be measured against themselves with 100% completion considered having reached a 'gold' standard. However, while there are many biological outcome measures they all have limitations, which render them a good proximate but not perfect gold standards. For example, researchers can test for the presence of Y chromosome or PSA antigen and compare the presence of this in female respondents to their responses on

condom use ((Rose et al., 2009; Gallo et al., 2006; Gallo et al., 2007). Where women report recent condom use yet there is presence of the Y chromosome or a PSA antigen, then it is possible to conclude that the self-report is not valid. However, because the biomarker can be detected for a limited period (approx. two weeks), it can only compare those exposed to the Y chromosome against their self-report of *recent* condom use or *recent* sexual experience. In many sexual behavioural surveys, researchers are interested in past sexual experiences that may have affected a person's risk but can not be assessed by this biological marker. Additionally, biomarkers cannot assist with those who have had sex but report not having sex on the questionnaire and don't have a biomarker for sexual activity. In the QDM trial we tested for HIV, HSV-2 and pregnancy in females. Not only is pregnancy more central to young people's concerns but we also ran the tests on-site. So it is possible there were fewer discrepancies in these data compared to HIV and HSV-2 because women were more aware of this test during the survey so felt it was more possible to be 'caught out' (n=7/16 reported never having sex but tested positive for pregnancy).

While response rates can be compared against a gold standard of 100% completion, a limitation of this type of research is that there is rarely a gold standard for reporting of sensitive behaviours with which to compare. So for example, when we witness an increase in reporting of sexual behaviours we are assuming the increase is a reflection of more accurate self-disclosure. However this may be an incorrect assumption particularly with males where exaggerated reporting might be the norm and a decrease in reporting would indicate more accurate self-disclosure (Mensch et al., 2003; Brener et al., 2003). In our final survey data, we were able to examine differences in reporting between males and females on Audio-SAQ and ACASI compared with evidence of a biomarker. A larger proportion of males produced discrepant results between their self report of never having sex and having a biomarker for sexual activity. However, as mentioned earlier, the absolute number of males with biomarkers was small making it difficult to compare.

There were several other limitations to this experimental evaluation.

8.6.1 Generalizability of these results

The research presented here makes a strong case for the use of ACASI (and Audio-SAQ if necessary) in the collection of sensitive information among adolescents in rural developing country settings. It intimates that ACASI not only assists participants in accurately self-disclosing their behaviours but that it is feasible and acceptable within this rural population that has limited computer experience.

However as mentioned earlier, both surveys included participants with high rates of literacy, a product of a highly educated population within the country. This overall high literacy may possibly limit the generalizability of these results to other developing countries with poorer literacy rates. Unfortunately ACASI's use in these settings is still relatively low. The work of Mensch and her colleagues in Kenya and Malawi, both countries with lower literacy rates suggests that literacy per se may not impact ACASI which was used successfully with rural youth (Hewett et al., 2004; Mensch et al., 2008). In addition, Potdar used ACASI (and not SAQ) amongst youth living in slums, where despite differences in reporting compared to their college-educated peers, no mention was made of their inability to use this system. However, evidence from three studies is not sufficient to suggest that low literacy settings should or can use ACASI. More research is required into the feasibility of ACASI in low literate adolescent populations. What is encouraging is the increased use of PDAs, a computer administered programme which continues to simplify the interface between respondents and the machine (Seebregts et al., 2008).

The low prevalence of biomarkers made comparisons between the four arms of the trial difficult. However the data were useful in being able to understand just how difficult it is for young women in particular to accurately disclose their sexual activity. However, due to a larger sample size and a slightly older adolescent population we were able to show a difference between the two questionnaire delivery modes used in final survey. We found less discrepancies among ACASI users.

An on-going discussion surrounds the trade-off between an interviewer's ability to check for errors and improve reliability contrasted with self-administered modes increased ability to maintain privacy but reduced ability to check for errors. There are two alternative viewpoints which should be mentioned here. Firstly, I would argue that as programming techniques improve computer self-administered modes (CASI, ACASI, video-CASI) are equally as able to check data consistency at the time of questionnaire administration. Researchers could take more advantage of the improved interface such that when data are found to be inconsistent an oral or voice component could explain the inconsistency and ask the participant to rectify it.

And yet, the second concern is that as the interface becomes more sophisticated, it is tempting to make computers more 'human'. For example, researchers could take advantage of voice recognition software and use it to help people name their partners in a partner matrix. If desired, ACASI could include a video component which participants could elect to watch if they needed more information about definitions for sexual activity. But given that it is the 'human-ness' within interviews that limits respondents' ability to self-disclose, we should remain wary

of improving computers to the extent that they are anthropomorphised. Unfortunately while this concern exists, little research has been conducted in this area, the majority of it focussed around web-based surveys which are less relevant in developing country settings (Tourangeau et al., 2007). Even less information about the impact of making computers sound more human exists in the development country context.

One additional consideration that should be noted (or at least not ignored) is the possibility that the perceived benefits of ACASI are associated with its novelty in these communities. Computers, and more specifically, laptops, are uncommon in rural Zimbabwe and much of rural developing country settings. In the QDM trial, young people repeatedly attributed the laptop's novelty as part of the reason they liked using them. For example, their belief in its improved ability to maintain confidentiality is in part due to their ignorance of how computer data can be accessed. They reported believing that because you couldn't 'see' the study ID it was more secret than the other two self-administered modes. More recent comparative data from the US and Europe have been less successful in showing the strong differences in reporting of sensitive behaviours between different self-administered modes as was done by Turner and others when computers were first used and less common in those environments (Webb, Zimet, Fortenberry, & Blythe, 1999; Johnson et al., 2001; Davoli, Perucci, Sangalli, Brancato, & Dell'Uomo, 1992). This may be as a result of the fact that computers in these countries permeate most aspects of life and their increased use in research (including web-based research). This saturation could result in computers seeming less novel to participants in these later surveys. In a related situation, Gregson and colleagues report a less pronounced effect using ICVI in their second round of surveying and postulate that it may be that the interview using a confidential voting box is no longer novel (Gregson et al., 2004). So it cannot be overruled that as computers gain more exposure in developing countries their novelty will wear off causing a return to initial suspicions around confidentially and trust. Alternatively, young people in developed countries could now be more adept at reporting sexual activity than their peers in developing country settings.

8.6.2 Need for more research

Despite the recent increase of comparative mode studies in developing countries, there remains much that needs to be explored and more attempts should be made to incorporate comparative work into larger surveys (Becker et al., 1992). Currently, there is concern that including a mode comparison within a survey will affect the rigour of the overall survey analysis. However, if comparisons are conducted rigorously using randomization then the

differences in reporting of sensitive behaviours found by mode should be randomly spread across the survey population.

Another big limitation is the continued reliance researchers working in developing country settings have on US data. This is particularly true for laboratory controlled experiments focussing on psychological differences around reporting of sensitive topics. While comparative studies have increased in developing country settings, they are all field based. This allows us to comment on situational variables but not so cogently on psychological ones. So we remain mute on whether or how psychological factors play a role. In addition, research on sensitive questions in the US has delved largely on drug and alcohol use and less on sexual behaviours (Tourangeau et al., 2007). So the findings from this research conducted in industrialized countries into sensitivity may be less translatable to development country settings where sexual behaviours in adolescence are of primary interest.

8.7 Conclusion

This thesis provides strong evidence that Audio-SAQ and ACASI, two self-administered questionnaire delivery modes comprising an audio component heard privately, increase a respondent's sense of privacy, allowing them to report socially censured behaviours. As the study was conducted in Zimbabwe among rural adolescents, it adds its weight to the growing literature emerging from developing countries that have begun to show that computerized self-administration is feasible and acceptable in resource poor settings. This evidence should encourage researchers to employ ACASI (and its derivatives) in their research.

Catania warns against giving up our time-honoured methods before adequate research comparing the advantages and disadvantages of other methods is exhausted (Catania et al., 1996). We believe the research reported in the QDM trial along with additional data from the final survey, coupled with that from the systematic review, provide sufficient evidence to discourage researchers from using interviewer-administered modes for collection of sensitive behaviour data. There is now good evidence of the superiority of self administered data collection modes – particularly those that take advantage of computer technology.

Yet Catania is correct to warn us not to be complacent – we *do* need to continue to conduct methodological research, comparative ones that will help us to better understand how to assist disclosure of sensitive information, particularly in developing country settings where the cultural context differs from where the majority of research has taken place. This research also highlights a number of areas where additional qualitative data would improve our understanding of the various nuances that occur within questionnaire completion. However,

these concerns should not delay the introduction of new modes as it is only though using them that we will learn more about their strengths and limitations.

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Appendices

APPENDIX A: SEARCH TERM FOR SYSTEMATIC REVIEW

Table 1: Embase Search Terms

1. exp data collection method/
2. exp self report/
3. evaluation/ or evaluation research/
4. exp Health Survey/
5. reproducibility/ or reliability/ or validity/
6. ("randomised response" or "randomized response").mp.
7. "self administered".mp.
8. "face to face".mp.
9. "coital diar$".mp.
10. (ACASI or CAPI or CASI).mp.
11. (respondent or "non respondent").mp.
12. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13. exp Sexual Behavior/
14. ("sexual behavior" or "sexual behaviour").mp.
15. "high risk sex".mp.
16. "coital frequenc$".mp.
17. ("sex behavior" or "sex behaviour").mp.
18. ("sexual behavioral" or "sexual behavioural").mp.
19. ("anal sex" or "oral sex").mp.
20. ("sexual orientation" or "sex orientation").mp.
21. ("unprotected sex" or "protected sex").mp.
22. ("unsafe sex" or "safe sex").mp.
23. "high risk sex".mp.
24. ("sexual intercourse" or "first intercourse").mp.
25. ("sexual partner$" or "multiple partner$").mp.
26. ("extra marital" or extramarital).mp.
27. ("condom use" or "condom usage").mp.
28. "use of condoms".mp.
29. ("reproductive behavior" or "reproductive behaviour").mp.
30. exp contraception/
31. "family planning".mp.
32. contracept$.mp.
33. 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32
34. developing country/
35. exp africa/ or north africa/ or exp asia/ or exp eastern europe/ or exp oceanic regions/ or "south and central america"/ or exp historical geographic names/
36. 34 or 35
37. 12 and 36 and 33
38. 37
39. limit 38 to (human and yr="1980 - 2008")

mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name

Table 2: PsycINFO Search Terms

1. data collection/
2. exp questionnaires/
3. exp surveys/
4. exp Quantitative Methods/
5. exp Interviewing/ or exp Interviews/
6. exp measurement/
7. "self administered".mp.
8. "face to face".mp.
9. "coital diar$".mp.
10. (ACASI or CAPI or CASI).mp.
11. ("respondent" or "non respondent").mp.
12. (" randomised response" or "randomized response").mp.
13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12
14. exp psychosexual behavior/
15. exp Sexual Attitudes/
16. exp PREGNANCY/
17. exp family planning/
18. exp condoms/ or exp contraceptive devices/
19. exp AIDS Prevention/
20. exp Safe Sex/
21. ("sexual behavior" or "sexual behaviour").mp.
22. ("sex behavior" or "sex behaviour").mp.
23. ("sexual behavioral" or "sexual behavioural").mp.
24. ("sexual orientation" or "sex orientation").mp.
25. ("unprotected sex" or "protected sex").mp.
26. ("unsafe sex" or "safe sex").mp.
27. high risk sex.mp.
28. ("extra marital" or extramarital).mp.
29. ("sexual intercourse" or "first intercourse").mp.
30. "coital frequenc$".mp.
31. ("sexual partner$" or "multiple partner$").mp.
32. ("condom use" or "condom usage").mp.
33. "use of condoms".mp.
34. ("reproductive behavior" or "reproductive behaviour").mp.
35. family planning.mp.
36. 35 or 33 or 32 or 21 or 26 or 17 or 22 or 18 or 30 or 23 or 16 or 29 or 25 or 27 or 28 or 14 or 15 or 20 or 34 or 24 or 19 or 31
37. 36 and 13
38. 37
39. limit 38 to (human and yr="1980 - 2008")

mp=title, abstract, heading word, table of contents, key concepts

APPENDIX B: ETHICAL APPROVALS FOR RDS PARENT TRIAL

1. University College London (2 pages)
2. London School of Hygiene and Tropical Medicine (1 page)
3. Medical Research Council of Zimbabwe (1 page)

University College London Hospitals NHS Trust

The Joint UCL/UCLH Committees on the Ethics of Human Research: Committee Alpha

Chairman:
Professor Andre McLean

Please address all correspondence to: Miriam Occasional Research & Development Directorate UCLH NHS Trust
1st Floor, Venue Strang Wing 112 Hampstead Road LONDON NW1
ELT Tel: 020 7380 9379 Fax 020 7380 9937

Our ref: 02AlphaOO3

18 June 2002

Dr F Cowan Senior
Lecturer
Department - of Sexually Transmitted Diseases
Royal Free , and UCLMS

Dear Dr Cowan

Study No: *0210140 (Please quote in any correspondence)*
Title: **Randomised trial of HIVISTI prevention in Zimbabwean youth**

Thank you for your application regarding reproductive health in adolescence in Zimbabwe.

The committee considered this application, which of course has many ethical difficulties. We considered the "non-treatment" of HIV positive children and agreed that since the project is entirely for the benefit of the Zimbabwe population, there seems no alternative to this project and it could be agreed.

The committee asked what procedures you propose to adoptwhere your questionnaire shows abuse by parent or teachers etc.

Do you propose an information and consent sheet for the children? If not, why not? The information sheet that we have seems mainly to be directed at the parent, but in questionnaire 1, line 2 where you ask "what you know about sexual health", do you mean "what your child knows"?

In the questionnaire where the instruction "non-stop reading etc." is given, is that to be spoken by the peer group leaders? We assume that the questionnaire will be translated into local languages.

In the questionnaire p.22 item 75 one committee member suggested it would be encouraging to have an item "when I am married".

look forward to receiving your answers to these questions.

All best wishes.

Yours sincerely

PI

Professor Andre McLean, BM BCh PhD FRC Path
Chairman

University College London Hospitals ~

sTrus.

The Joint UCL/UCLH Committees on the Ethics of Human Research

Committee Alpha Chairman:
Professor Andre McLean

Please address all correspondence to: Marieta Odendaal Research & Development
Directorate UCLH NHS Trust
1st floor, Vezey Strong Wing 112 Hampstead Road, LONDON
NW1 2LT Tel. 02073809579 Fax 020 7380 9937 e-mail: iwona.nowicka@uclh.org

Our ref: 02AlphaO26

28 June 2002

Dr F Cowan
Senior Lecturer
Department of Sexually Transmitted Diseases Royal
Free and UCLMS

Dear Dr Cowan

Study No: ***0210140*** *(Please quote in any correspondence)*
Title: **Randomised trial of HIVISTI prevention in Zimbabwean youth**

Thank you very much for your response to the points raised by the ethics committee and the copies of the pupils consent and information sheet as well as the amended version for the parents sheet. There are no further objections on ethical grounds to this study going ahead.

Please note that it is important that you notify the Committee of any adverse events or changes (name of investigator etc) relating to this project. You should also notify the Committee on completion of the project, or indeed if the project is abandoned. Please remember to quote the above number in any correspondence.

Yours sincerely

Professor Andre McLean, BM BCh PhD FRC Path
Chairman

LONDON SCHOOL OF HYGIENE
& TROPICAL MEDICINE

ETHICS COMMITTEE

APPROVAL FORM
Application number: 891

Name of Principal Investigator	**Professor Richard Hayes**
Department	**Infectious and Tropical Diseases**
Head of Department	**Professor Hazel Dockrell**

Title **Regai dzive shiri – a community randomised trial of a school based adolescent reproductive health intervention in Zimbabwe**

Approval of this study is granted by the Committee.

Chair T.W. Meade
Professor Tom Meade

Date 2.8.02

Approval is dependent on local ethical approval having been received.

Any subsequent changes to the consent form must be re-submitted to the Committee.

RECEIVED TIME 12 AUG 16:22 PRINT TIME 14 AUG 6:27

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazoe Street
P. O. Box CY 573
Causeway
Harare

Telephone: 791792/791193/792747
Telefax: (263) - 4 - 253979
E-mail: mrcz@blair.co.zw

MRCZ APPROVAL LETTER

Ref : MRCZ/A/983 Date 15 July 2002

Prof. M Bassett
The Rockefeller Foundation
P.O. Box MP 172
Mount Pleasant
Harare

RE : **"Randomised Controlled Trial of HIV STD Prevention in Zimbabwean Youth"**

Thank you for the above titled proposal that you submitted to the Medical Research Council of Zimbabwe (MRCZ) for review. Please be advised that the Medical Research Council of Zimbabwe has reviewed and **approved** your application to conduct the above titled study. This approval is based on the review of all the documents that were submitted to the MRCZ for review.

- **APPROVAL NUMBER** :MRCZ/A/983
  This number should be used on all correspondence, consent forms and documents as appropriate.
- **APPROVAL DATE** :15 July 2002
- **EXPIRATION DATE** :This approval expires on 15 July 2003
  After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Offices, should be submitted one month before the expiration date for continuing review.
- **SERIOUS ADVERSE EVENT REPORTING** :All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 10 working days using standard forms obtainable from the MRCZ Offices.
- **MODIFICATIONS** :Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY** : On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices.
- **QUESTIONS** : Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on mrcz@blair.co.zw.

- **Other:**
  Please be reminded to send in copies of your final research results for our records as well as for the Health Research Database.

Kind regards from the MRCZ Secretariat.

FOR CHAIRMAN, MEDICAL RESEARCH COUNCIL OF ZIMBABWE

PROMOTING THE ETHICAL CONDUCT OF RESEARCH
Executive Committee: *Prof. F.W.G. Hill (Chairman) Ms G.N. Mahlangu (Vice Chairperson) Dr. S.K. Chandiwana (Secretary)*

APPENDIX C: INTERIM SURVEY QUESTIONNAIRE & CODE SHEET

The following document consolidates all the variations of the 16 questionnaires that were developed for the RDS QDM Trial conducted during the Interim Survey. The coding scheme is as follows:

- Red codes – Codes to be changed for analysis
- Blue Codes – additional ACASI codes for further questions
- Purple Codes – codes used on FTF ballot sheet to be recoded to red codes
- Blue highlighting – Boys questionnaire
- Pink highlighting – Girls questionnaire
- Green highlighting – Additional or omitted on Audio-SAQ questionnaire
- Grey highlighting – Additional or omitted on ICVI
- Blue boxes – Additional coding instructions not on questionnaires
- Yellow boxes – Shortened questionnaire (with short questionnaire number in blue)
- Red highlighting – Questions where answers posted in ballot box (ICVI only)

Study ID:	Scanned ID					Block Number:	(1-20)
Gender:	Male (0)		Female (1)			Envelope Number:	(1-112)
Questionnaire Method:	SAQ (0)	ICVI (1)	Audio-SAQ (2)	ACASI (3)		Method Code:	(1-20)
						Round:	(1 or 2)

		Data Entry Codes
1.	How long have you lived in this place? (YAS110) (SQ1) *Complete a statement or put an X in one box only*	
	☐ 1 I have always lived here	1
	☐ 2 I have lived here continuously for years	2 + contin.
	☐ 3 I have lived here on and off for years	3+ contin.
	☐ 4 I have lived here for less than one year	4
2.	Who is the head of your household? (YAS101) *Put an X in one box only*	
	☐ 1 I am the head of the household	1
	☐ 2 My wife	2
	☐ 3 My father	3
	☐ 4 My mother	4
	☐ 5 My grandfather (my mother's father or my father's father)	5
	☐ 6 My grandmother (my mother's mother or my father's mother)	6
	☐ 7 My uncle (my mother's brother)	7
	☐ 8 My uncle (my father's elder brother or my father's younger brother)	7
	☐ 9 My aunt (paternal)	8
	☐ 10 My aunt (young sister to the mother or elder sister to the mother)	8
	☐ 11 My husband's parents	11
	☐ 12 My employer	9
	☐ 13 Someone else (please specify)	10 - Code specify
	☐ 88 I don't know	88
3a.	What does the head of household do? *Put an X in one box only*	
	☐ 1 They are formally employed	
	☐ 2 They are informally employed	
	☐ 3 They are unemployed	
	☐ 4 They are a student	
	☐ 88 I don't know	88
3b.	What is the highest level of education the head of household head has achieved? *Put an X in one box only*	
	☐ 1 They had no schooling	1
	☐ 2 They completed some or all of their primary schooling	2
	☐ 3 They completed some or all of their secondary schooling	3
	☐ 4 They have some tertiary education	4
	☐ 88 I don't know	88

4. In the last 12 months with which adults did you live with at home?
Put an X in one box on each line

		Yes	No	
4a.	I lived with my biological father	☐ 1	☐ 0	0/1
4b	I lived with my biological mother	☐ 1	☐ 0	0/1
4c.	I lived with my grandfather	☐ 1	☐ 0	0/1
4d.	I lived with my grandmother	☐ 1	☐ 0	0/1
4e.	I lived with my extended paternal family	☐ 1	☐ 0	0/1
4f.	I lived with my extended maternal family	☐ 1	☐ 0	0/1
4g.	I lived with my stepfather	☐ 1	☐ 0	0/1
4h.	I lived with my stepmother	☐ 1	☐ 0	0/1
4i.	I lived with my elder brother(s)	☐ 1	☐ 0	0/1
4j.	I lived with my elder sister(s)	☐ 1	☐ 0	0/1
4k.	I lived with other relatives	☐ 1	☐ 0	0/1
4l.	I lived with non-relatives	☐ 1	☐ 0	0/1
4m.	I lived with my husband	☐ 1	☐ 0	0/1
4n.	I lived with my husband's relatives	☐ 1	☐ 0	0/1
4o	I did not live with any adults	☐ 1	☐ 0	0/1

5. How many people under the age of 20 live in your household?
Write the number in the line below. If one, write 0
In my household, there are people under the age of 20 living (there). contin.

6. How often in the last five years have you changed households (please do not consider holidays or temporary visits)? (SQ2)
Put an X in one box only

☐ 0	I have not changed households	0
☐ 1	I have changed households once	1
☐ 2	I have changed households twice	2
☐ 3	I have changed households three times	3
☐ 4	I have changed households more than three times	4

7. What is the highest level of school you have completed so far? (SQ3)
Put an X in one box only

☐ 0	Form 2	0
☐ 1	Form 3	1
☐ 2	Form4	2

8. Why did you stop attending school? (YAS108) (SQ4)
Put an X in all that apply

☐ 0/1	I am still in school	0/1
☐ 0/1	I have completed my studies	0/1
☐ 0/1	I am now married	0/1
☐ 0/1	I got someone pregnant / I got pregnant	0/1
☐ 0/1	I had to look after children	0/1
☐ 0/1	I had to care for a sick relative or friend	0/1
☐ 0/1	I was sick	0/1
☐ 0/1	I did not like school	0/1
☐ 0/1	My family could not afford it	0/1
☐ 0/1	I got a job	0/1
☐ 0/1	I am re-sitting my exams	0/1
☐ 0/1	Other (please specify	0/1

9. Who are the 3 people you feel most comfortable talking to about personal issues?

Put an X in THREE boxes

☐ 0/1	Mother	0/1
☐ 0/1	Father	0/1
☐ 0/1	Elder/younger brothers / Elder/younger sisters	0/1
☐ 0/1	Sibling of the opposite sex (sisters / brothers)	0/1
☐ 0/1	Uncle or grandfather (implied paternal or maternal	0/1
☐ 0/1	Grandmother (implied paternal or maternal)	0/1
☐ 0/1	Aunt (paternal)	0/1
☐ 0/1	Other close relatives	0/1
☐ 0/1	Friends your own age	0/1
☐ 0/1	Friends older than you	0/1
☐ 0/1	Your girlfriend or wife / boyfriend or husband	0/1
☐ 0/1	Clinic nurse or other staff at the health clinic	0/1
☐ 0/1	SPW volunteer / Regai Dzive Shiri Staff	0/1
☐ 0/1	Church members	0/1
☐ 0/1	There are no three answers that apply to me	0/1

10. Is your biological father still alive? (SAQ,ICVI,ACASI) (SQ5)

Put an X in one box only

☐ 1	Yes		1
☐ 2	No, he has died	GO TO QUESTION 12	0
☐ 3	I don't know if he is alive or dead	GO TO QUESTION 13	2
☐ 4	I don't know who my biological father is	GO TO QUESTION 14	3

10a. Do you know who your biological father is ? (Audio-SAQ) (SQ5)

Put an X in one box only

☐ 1	Yes		1
☐ 2	No	GO TO QUESTION 14	0
☐ 3	I don't know		2

10b. If you know who your biological father is, is he still alive? (Audio-SAQ) (SQ5)

Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 3	I don't know	2

11. If your father is still alive, Is your father still married to your mother

Put an X in one box only

☐ 3	Yes, they are still married	GO TO QUESTION 13	3
☐ 2	No, he is separated or divorced from her	GO TO QUESTION 13	2
☐ 1	No, they were never married	GO TO QUESTION 13	1
☐ 0	No, my mother has died	GO TO QUESTION 13	0
☐ 99	Not applicable, father is dead/don't know if he is alive		99

12. If your father has died, How old were you when he died?

Put an X in one box only

☐ 0	0-5 years	1
☐ 1	6-10 years	2
☐ 2	11-15 years	3
☐ 3	16-20 years	4
☐ 4	21 years or older	88
☐ 88	I don' know	99
☐ 99	My father is still alive	

13. If your father has died or is still alive, Until what age did you live with him on a regular basis? (YAS 150)

Put an X in one box only

☐ 0	I have never lived with him	0
☐ 1	I have always lived with him	1
☐ 2	I was years old when I stopped living with him	2 + contin.
☐ 88	I don't know	88

SAQ, ICVI, ACASI

If Q10 is 'Yes' (1):
Q11 should be completed
Q12 should be blank
Q13 should be completed

If Q10 is 'No' (2):
Q11 should be blank
Q12 should be completed
Q13 should be completed

If Q10 is 'don't know if alive or dead' (3):
Q11-12 should be blank
Q13 should be completed

If Q10 is 'don't know who he is' (4):
Q11-13 should be blank

Audio-SAQ:

If Q10a is 'Yes' use codes from 10b
If Q10a is 'No' code variable as 4

If Q10a is 'Yes', then questions 10b-13 should be completed
If Q10a is 'No' then questions 10b-13 should be blank

If Q10b is 'Yes' then Q11 should be 0-3 & Q12 should be 99
If Q10b is No' then Q11 should be 99& Q12 should be 0-4 or 88

14. Is your biological mother still alive? (SAQ,ICVI,ACASI) (SQ6)

Put an X in one box only

☐ 1	Yes		1
☐ 2	No, she has died	GO TO QUESTION 16	0
☐ 3	I don't know if she is alive or dead	GO TO QUESTION 17	2
☐ 4	I don't know who my biological mother is	GO TO QUESTION 18	3

14a. Do you know who your biological mother is ? (Audio-SAQ) (SQ5)

Put an X in one box only

☐ 1	Yes		1
☐ 2	No	GO TO QUESTION 18	0
☐ 3	I don't know		2

14b. If you know who your biological mother is, is he still alive? (Audio-SAQ) (SQ5)

Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 3	I don't know	2

15. If your mother is still alive, Is your mother still married to your father

Put an X in one box only

☐ 3	Yes, they are still married	GO TO QUESTION 17	3
☐ 2	No, she is separated or divorced from him	GO TO QUESTION 17	2
☐ 1	No, they were never married	GO TO QUESTION 17	1
☐ 0	No, my father has died	GO TO QUESTION 17	0
☐ 99	Not applicable, mother is dead/don't know if she is alive		99

16. If your mother has died, How old were you when she died?
Put an X in one box only

☐ 0	0-5 years	1
☐ 1	6-10 years	2
☐ 2	11-15 years	3
☐ 3	16-20 years	4
☐ 4	21 years or older	88
☐ 88	I don' know	99
☐ 99	My mother is still alive	

17. If your mother has died or is still alive, Until what age did you live with her on a regular basis? (YAS 150)
Put an X in one box only

☐ 0	I have never lived with her	0
☐ 1	I have always lived with her	1
☐ 2	I was years old when I stopped living with her	2 + contin.
☐ 88	I don't know	88

SAQ, ICVI, ACASI

If Q14 is 'Yes' (1):
Q15 should be completed
Q16 should be blank
Q17 should be completed

If Q14 is 'No' (2):
Q15 should be blank
Q16 should be completed
Q17 should be completed

If Q14 is 'don't know if alive or dead' (3):
Q15-16 should be blank
Q17 should be completed

If Q10 is 'don't know who he is' (4):
Q15-17 should be blank

SAQ, ICVI, ACASI

If Q14a is 'Yes' use codes from 14b
If Q14a is 'No' code variable as 4

If Q14a is 'Yes', then questions 14b-15 should be completed
If Q14a is 'No' then questions 14b-17 should be blank

If Q14b is 'Yes' then Q15 should be 0-3 & Q16 should be 99
If Q14b is No' then Q15 should be 99& Q16 should be 0-4 or 88

18. Think about the primary female caregiver who looked after you and whom you lived with the longest time lived with the most in the last 16 years. (PBI scale) (Text only not question)
Place an X in the box after each statement that most accurately reflects your relationship with this person

18a. She spoke to me with a warm and friendly voice
Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18b. She seemed emotionally cold to me
Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18c. She appeared to understand my problems and worries
Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18d. She enjoyed talking things over with me

Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18e. She could make me feel better when I was upset

Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18f. She did not talk to me when I was upset

Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18g. She liked me to make my own decisions

Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18h. She did not want me to grow up

Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18i. She tried to control everything I did She tended to baby me

Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18j. She tended to baby me

Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18k. She let me decide things for myself

Put an X in one box only

☐ 1	Very likely	4
☐ 2	Moderately likely	3
☐ 3	Moderately unlikely	2
☐ 4	Very unlikely	1

18l. She tried to make me dependant on her

Put an X in one box only

- ☐ 1 Very likely — 4
- ☐ 2 Moderately likely — 3
- ☐ 3 Moderately unlikely — 2
- ☐ 4 Very unlikely — 1

18m. She gave me as much freedom as I wanted

Put an X in one box only

- ☐ 1 Very likely — 4
- ☐ 2 Moderately likely — 3
- ☐ 3 Moderately unlikely — 2
- ☐ 4 Very unlikely — 1

18n. She was overprotective of me

Put an X in one box only

- ☐ 1 Very likely — 4
- ☐ 2 Moderately likely — 3
- ☐ 3 Moderately unlikely — 2
- ☐ 4 Very unlikely — 1

18o. She let me dress in any way I pleased

Put an X in one box only

- ☐ 1 Very likely — 4
- ☐ 2 Moderately likely — 3
- ☐ 3 Moderately unlikely — 2
- ☐ 4 Very unlikely — 1

19. Who is this person that you regard as your primary female caregiver? (SQ7)

Put an X in one box only

- ☐ 1 Mother — 1
- ☐ 2 Stepmother (my father's wife who is not my biological mother) — 2
- ☐ 3 Sister — 3
- ☐ 4 Aunt (paternal) — 4
- ☐ 5 Aunt (maternal) — 4
- ☐ 6 Grandmother — 5
- ☐ 7 Other female relative (please specify) — 6
- ☐ 8 Female non-relative (please specify) — 7

20. How long did you live or have you lived with this person? (SQ8)

Write the number of years in the statement below. If your answer is less than 1 year or no years, then write 0.

I have lived with this person for _____ years

Contin.

21. The next question asks you to think about how you felt in the LAST WEEK
For each statement, put an X in one box only.

		Always	Sometimes	Never	
21a.	There were times in which I was thinking deeply or thinking about many things.	☐ 2	☐ 1	☐ 0	0/1/2
21b.	I found myself sometimes failing to concentrate	☐ 2	☐ 1	☐ 0	0/1/2
21c.	I lost my temper or got annoyed over trivial matters	☐ 2	☐ 1	☐ 0	0/1/2
21d.	I had nightmares or bad dreams	☐ 2	☐ 1	☐ 0	0/1/2
21e.	I sometimes saw or heard things which others could not see or hear	☐ 2	☐ 1	☐ 0	0/1/2
21f.	My stomach was aching	☐ 2	☐ 1	☐ 0	0/1/2
21g.	I was frightened by trivial things	☐ 2	☐ 1	☐ 0	0/1/2
21h.	I sometimes failed to sleep or lost sleep	☐ 2	☐ 1	☐ 0	0/1/2
21i.	There were moments when I felt life was so tough that I cried or wanted to cry	☐ 2	☐ 1	☐ 0	0/1/2
21j.	I felt run down (tired)	☐ 2	☐ 1	☐ 0	0/1/2
21k.	At times I felt like committing suicide	☐ 2	☐ 1	☐ 0	0/1/2
21l.	I was generally unhappy with things that I would be doing each day	☐ 2	☐ 1	☐ 0	0/1/2
21m.	My work was lagging behind	☐ 2	☐ 1	☐ 0	0/1/2
21n.	I felt I had problems in deciding what to do	☐ 2	☐ 1	☐ 0	0/1/2

22. The next two questions ask about how you feel others in your society treat you. (our own stigma and vulnerability Qs)
For each statement, put an X one box only In the PAST MONTH

		Always	Sometimes	Never	
22a.	How often did people refer to you in a negative way, for example using chi-or ka-when talking to you or about you?	☐ 2	☐ 1	☐ 0	0/1/2
22b.	How often did others shun you or refuse to associate with you?	☐ 2	☐ 1	☐ 0	0/1/2

23. The next three questions ask about how you are treated within your immediate household. (our own stigma and vulnerability Qs)
For each statement, put an X in one box only
In the PASTMONTH,

		Always	Sometimes	Never	
23a	How often have you had to do more work than others your own age or those older than you?	☐ 2	☐ 1	☐ 0	0/1/2
23b	How often have you been left out when new clothes or shoes are handed out in your household?	☐ 2	☐ 1	☐ 0	0/1/2
23c	How often have you been given less food than others your own age or those younger than you?	☐ 2	☐ 1	☐ 0	0/1/2

24. Are you currently married? (SQ9)
Put an X in one box only

☐ 3	Yes, I am currently married	3
☐ 2	No, I am divorced or separated	2
☐ 1	No, I lost my wife / husband	1
☐ 0	No, I have never been married	0

GO TO QUESTION 26 (omitted on Audio-SAQ)

25. How old were you when you married? (if you have been married more than once, indicate the first time) (SQ10)

Write the number of years in the line below

I was _____ years old when I got married. 1+contin.

☐ 0 I have never been married. 0

26. Think about yourself and your household now (SQ11)

For each statement below, put an X next to the answer that is most applicable to you.

		Yes	No	
				0/1
26a.	In our household, we can afford to cook with oil at each meal	☐ 1	☐ 0	0/1
26b.	We cannot afford to buy paraffin for lighting the homestead	☐ 1	☐ 0	0/1
26c.	We eat at least 2 meals a day	☐ 1	☐ 0	0/1
26d.	We can afford meat or fish with our meals at least 4 days a week	☐ 1	☐ 0	0/1
26e.	We can afford to drink tea at least once a day	☐ 1	☐ 0	0/1
26f.	Sometimes I go to bed hungry	☐ 1	☐ 0	0/1
26g.	We can afford to use soap to wash our clothes	☐ 1	☐ 0	0/1
26h.	All the members of my household own at least one pair of shoes (implied closed toed, not sandal, not flip flop, and not rubber tyre)	☐ 1	☐ 0	0/1
26i.	If someone in my household is sick we can afford to pay for the clinic fees	☐ 1	☐ 0	0/1
26j.	If someone is my household is sick we can afford to buy medications	☐ 1	☐ 0	0/1
26k.	I have been absent from school because there was no money for school fees	☐ 1	☐ 0	0/1

27. What type of toilet do you use in your homestead?

Put an X in one box only

☐ 3 We use a flush toilet 3

☐ 2 We use our own Blair toilet 2

☐ 1 We use our neighbor's Blair toilet 1

☐ 0 We use the bush 0

28. What is the main source of drinking water for members of your household?

Put an X in one box only

☐ 5 Piped water (implied: either piped into your house or into the yard) 5

☐ 4 Protected well at my household 4

☐ 3 Communal borehole water 3

☐ 2 Communal protected well 2

☐ 1 Unprotected well 1

☐ 0 Surface water from a spring or river 0

29. Do you have the following items in your household? (YAS, Sophie)
For each statement below, put an X in one box only

		Yes	No	
29a.	An oxcart/scotch cart	☐ 1	☐ 0	0/1
29b.	A bicycle	☐ 1	☐ 0	0/1
29c.	A motorcycle	☐ 1	☐ 0	0/1
29d.	A car or truck	☐ 1	☐ 0	0/1
29e.	A plough	☐ 1	☐ 0	0/1
29f.	A clock or watch	☐ 1	☐ 0	0/1
29g.	A radio	☐ 1	☐ 0	0/1
29h.	A refrigerator	☐ 1	☐ 0	0/1
29i.	A TV	☐ 1	☐ 0	0/1
29j.	A telephone (landline – implied at home) or cellphone	☐ 1	☐ 0	0/1
29k.	Enough blankets	☐ 1	☐ 0	0/1
29l.	A table	☐ 1	☐ 0	0/1
29m.	Chairs	☐ 1	☐ 0	0/1

30. In the room that has the most people sleeping in it, how many people slept in it last night? (Sophie)
Write the number of people in the sentence below
There were _____ people sleeping in that room last night. Contin.

31. Think about the building in your homestead that is the most appealing. What material is it built of? (Sophie)
Put an X in one box only

☐ 0	Poles and dagga	0
☐ 1	Mud bricks	1
☐ 2	Cement blocks	2
☐ 3	Stones	3

32. What is the roof of that house made of? (Sophie)
Put an X in one box only

☐ 0	Grass	0
☐ 1	Corrugated iron or asbestos	1
☐ 2	Tiles	2

33. Does your kitchen have a cement floor? (Sophie)
Put an X in one box only

☐ 1	Yes	1
☐ 0	No	0

34. Do any other rooms in your household have a cement floor? (Sophie)
Put an X in one box only

☐ 1	Yes	1
☐ 0	No	0

35. In your household, is there any child who is receiving assistance from the government or any other organization, it could be you or someone else? (UNICEF)
Put an X in one box only

☐ 1	Yes	1
☐ 0	No	0

36. What family name do you use? (UNICEF)
Put an X in one box only

☐ 1	I use my father's family name	1
☐ 2	I use my mother's family name	2
☐ 3	I use my husband's family name	3
☐ 4	I use another family name	4

37. Have you ever registered for a birth certificate? (UNICEF)
Put an X in one box only

☐ 1	Yes	1
☐ 0	No	0

38. In the last week, has an adult in your house skipped a meal or eaten less in order for there to be enough food for the children? (UNICEF) (SQ12)
Put an X in one box only

☐ 1	Yes	1
☐ 0	No	0

39. In the last week, have you had to go an entire day without eating because there was no food in your household? (UNICEF) (SQ13)
Put an X in one box only

☐ 1	Yes	1
☐ 0	No	0

40. What family name do you use? (YAS112)
Put an X in one box only

☐ 0	I was a student/school child	0
☐ 1	I was at home	1
☐ 2	I worked for pay	2
☐ 3	I was looking for work	3
☐ 4	I was too sick to go to school or work	4
☐ 5	Other (please specify)	5 (code specify)

41. How often are you given money by your family for your own use?
Put an X in one box only

☐ 0	I am not given any money at all	0
☐ 1	Sometimes but not every month	1
☐ 2	Once a month	2
☐ 3	More than once a month	3

42. How often do you engage in some work that brings you money?
Put an X in one box only

☐ 0	Never	GO TO QUESTION 44 (omitted on Audio-SAQ)	0
☐ 1	Sometimes		1
☐ 2	Most of the time		2

43. Who decides what to do with the money you earn? (YAS 118)
Put an X in one box only

☐ 0	I decide	0
☐ 1	Somebody else decides	1
☐ 2	I decide with someone together	2
☐ 99	Not applicable I do not earn any money	99

SAQ, ICVI, ACASI:
If Q42 is 'Never' (0) then Q43 should be blank
Audio-SAQ:
If Q42 is 'Never' (0) then Q43 should be NA (99)

44. How much do you agree or disagree with the following statements? (self esteem from KidsFIRST)
Put an X in one box only

		Agree	Neither agree or disagree	Disagree	
44a.	People do not notice that I am there*	☐ 0	☐ 1	☐ 2	0/1/2
44b.	I am a failure	☐ 0	☐ 1	☐ 2	0/1/2
44c.	I am satisfied with the clothes that I have	☐ 0	☐ 1	☐ 2	0/1/2
44d.	Most of the time I am able to do lots of things well	☐ 0	☐ 1	☐ 2	0/1/2
44e.	At times I wish I could die**	☐ 0	☐ 1	☐ 2	0/1/2

** changed statement to better reflect Shona culture.*
***added to list by team*

45. Have you ever tried any of the following (substances)? (SQ14)
Put an X in one box on each line

		Never tried	Tried once or twice	Use some times	Use regularly// Often (many times)	
45a.	Mbanje	☐ 0	☐ 1	☐ 2	☐ 3	0/1/2/3
45b.	Mukumbi (unodhaka) (Alcohol)	☐ 0	☐ 1	☐ 2	☐ 3	0/1/2/3
45c.	Mudzepete/Zungunde (Alcohol)	☐ 0	☐ 1	☐ 2	☐ 3	0/1/2/3
45d.	Glue	☐ 0	☐ 1	☐ 2	☐ 3	0/1/2/3
45e.	Alcohol (beer)	☐ 0	☐ 1	☐ 2	☐ 3	0/1/2/3
45f.	Wine (not at church)	☐ 0	☐ 1	☐ 2	☐ 3	0/1/2/3
45g.	Tobacco	☐ 0	☐ 1	☐ 2	☐ 3	0/1/2/3
45h.	Other (please specify)	☐ 0	☐ 1	☐ 2	☐ 3	0/1/2/3

The following questions are about your sexual experiences. Some of these questions are very personal and sensitive and require detailed descriptions/definitions. These questions are not meant to make you feel uncomfortable. We are asking about these things so that we can get as much information as possible about the experiences of young people today. We really appreciate you sharing as much information with us as possible. Remember that your name is *never* connected with the information that you give us. (adapted from RHRU)

46. Please think about BOYS / GIRLS that are the same age as you. How many of them do you think have done the following with a girl or woman / boy or a man? (SQ15)
Put an X in one box on each line

		None of them	Some of them	Most of them	All of them	
46a.	Mbanje	☐ 0 A	☐ 1 B	☐ 2 C	☐ 3 D	0/1/2
46b.	Are dating	☐ 0 A	☐ 1 B	☐ 2 C	☐ 3 D	0/1/2
46c.	Been involved in kissing	☐ 0 A	☐ 1 B	☐ 2 C	☐ 3 D	0/1/2
46d.	Been involved in touching / caressing in a sexual way	☐ 0 A	☐ 1 B	☐ 2 C	☐ 3 D	0/1/2
46e.	Had vaginal sex	☐ 0 A	☐ 1 B	☐ 2 C	☐ 3 D	0/1/2

47. Have you ever dated someone? (SQ16)

Put an X in one box only

☐ 1	Yes, I was	years old when I first started dating someone	1+cont.
☐ 0	No		0

48. Have you ever been involved in kissing a girl or a woman / boy or man in a sexual way? (cognitive interviews)? (SQ17)

(phrasing in Shona is more reciprocal and not about the girl initiating it)

Put an X in one box only

☐ 1	Yes, I was	years old when I was first involved in kissing a girl or a woman / boy or man	1+cont.
☐ 0	No		0

49. Have you ever been involved in touching or caressing a girl or a woman / boy or man in a sexual way *(RHRU, phrasing in Shona is similar to 42c)* (SQ18)

Put an X in one box only

☐ 1	Yes, I was	years old when I was first involved in touching or carressing a girl or a woman / boy or man	1+cont.
☐ 0	No		0

50. Have you ever had vaginal sex with a girl or woman / boy or man (that is to say when the penis was in the vagina) with you consenting to it or without you consenting to it? (RHRU, SHAZ) (SQ19)

Put an X in one box only

☐ 1	Yes, I was	years old when I first had vaginal sex with a girl or woman / boy or man	1+cont.
☐ 0	No	GO TO QUESTION 63 (omitted on ICVI)	0

Now we would like to learn more about the FIRST time you had sex.

51. How old was the person with whom you FIRST had sex? (SQ20)

Complete the statement below or put an X in a box. If you are not exactly sure please provide us with your best guess.

	She / He was	years older than me	A 2+ contin.
	She / He was	years older than me	B 1+ contin.
☐ 0	She / He was the same age as me		C 0
☐ 88	I don't know		D 88
☐ 99	I have never had sex		E 99

52. Who did you have sex with for the FIRST time? *(RHRU,SAHZ)* (SQ21)

Put an X in one box only

☐ 1	She / He was a stranger	A	1
☐ 2	She / He was a teacher in my school	B	2
☐ 3	She / He was my employer	C	3
☐ 4	She / He was a family member	D	4
☐ 5	She was a sex worker	E	5
☐ 6	She was my girlfriend / He was my boyfriend	F	6
☐ 7	She was my wife / He was my husband	G	7
☐ 8	She / He was someone else (please specify) (older woman with or without a child, housegirl / herdboy, older married man)	H	8 –Code specify
☐ 99	I have never had sex	I	99

53. The FIRST time you had sex why did you do it (SQ22)
(ACASI: most imp't reason)

Put an X in ALL boxes or statements that apply to you

☐ 0/1	To show my partner that I love her / him	(1)	0/1/99
☐ 0/1	I wanted to repay a favour	(2)	0/1/99
☐ 0/1	I was sweet talked by my partner	(3)	0/1/99
☐ 0/1	I was promised marriage	(4)	0/1/99
☐ 0/1	My partner threatened to break off the relationship	(5)	0/1/99
☐ 0/1	My friends convinced my I should	(6)	0/1/99
☐ 0/1	To experience sex	(7)	0/1/99
☐ 0/1	For my own pleasure	(8)	0/1/99
☐ 0/1	I was physically forced	(9)	0/1/99

54. Are you still having sex with the FIRST person with whom you had sex?

Put an X in one box only

☐ 1	Yes	1
☐ 0	No	0
☐ 99	I have never had sex	99

55. When you FIRST had sex, what contraception did you or your partner use to protect you against pregnancy or disease?

Put an X in all the boxes that apply *Skips omitted on audio and ICVI*

☐ 0/1	None		A	0/1
☐ 0/1	I / He pulled my penis out before coming	} GO TO QUESTION 57	B	0/1
☐ 0/1	I / He put a condom on just before coming	} GO TO QUESTION 57	C	0/1
☐ 0/1	I / He used a condom throughout	} GO TO QUESTION 57	D	0/1
☐ 0/1	She / I used a female condom	} GO TO QUESTION 57	E	0/1
☐ 0/1	We used traditional herbs	} GO TO QUESTION 57	F	0/1
☐ 0/1	She / I was on the pill	} GO TO QUESTION 57	G	0/1
☐ 0/1	She / I was on Depo (or an injection like Depo)	} GO TO QUESTION 57	H	0/1
☐ 0/1	I don't know	} GO TO QUESTION 57	I	0/1
☐ 99	I have never had sex	(99 for A-1)	J	99

56. If you and your partner did not use a contraceptive the first time you had sex, What are the main reasons you and your partner did NOT use a method to prevent pregnancy or disease? (YAS414)

Put an X in all the boxes that apply

☐ 0/1	I wasn't expecting to have sex then	A	0/1
☐ 0/1	I did not know about any methods of preventing pregnancy or disease	B	0/1
☐ 0/1	I wanted to have a child	C	0/1
☐ 0/1	I wasn't thinking about it	D	0/1
☐ 0/1	I thought using a contraceptive was bad for my health	E	0/1
☐ 0/1	I didn't know where to get the method that I wanted to use (contraceptive is implied)	F	0/1
☐ 0/1	I thought she / I couldn't get pregnant	G	0/1
☐ 0/1	I thought it was my partner who was supposed to do that (I thought it was my partner's responsibility)	H	0/1
☐ 0/1	My partner didn't want to	I	0/1
☐ 0/1	It was against my religious beliefs	J	0/1
☐ 0/1	I didn't think I was at risk	K	0/1
☐ 0/1	Not applicable we used contraception		0/1
☐ 0/1	I have never had sex	(99 for A-K) L	99

57. Do you have someone whom you really regard as your sexual partner? *(regular sounded too casual in Shona, so used really to emphasise regular)* (SQ23)

Put an X in all the boxes that apply

☐ 1	Yes		1
☐ 0	No	GO TO QUESTION 61 (omitted on ICVI)	0
☐ 99	I have never had sex		99

58. Who is this person whom you really regard as your sexual partner? (YAS RHRU, but wording changed) (SQ24)

Put an X in all the boxes that apply

☐ 1	She is my wife / He is my husband	A	1
☐ 2	She / He is my fiancé	B	2
☐ 3	She is my girlfriend / He is my boyfriend	C	3
☐ 4	Other (please specify) (specify omitted on FTF)	D	4+Code specify
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

59. In the past 12 months, have you used a condom with the person who you really regard as your sexual partner? (SQ25)

Put an X in all the boxes that apply

☐ 3	Yes, I used a condom all the time	A	3
☐ 2	Yes, I used a condom most of the time	B	2
☐ 1	Yes, I used a condom a few times	C	1
☐ 0	No, I never used a condom	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60. Please think about the person who you really regard as your sexual partner and answer each statement as it is most true for you (Dunkel/Jewkes scale)

For each statement below, please put an X in one box only

60a. I like my partner to be at home when I come to check her, it bothers me if she is not there / My partner expects me to be at home when he comes home to check on me

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60b. I become jealous when my partner wears things that make her look too beautiful. / My partner becomes jealous when I wear things that make me look too beautiful.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60c. I have more to say than my partner does about important decisions that affect us. / My partner has more to say than I do about important decisions that affect us.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60d. I like to do what I want, even if my partner doesn't want me to. / My partner does what he wants, even if I don't want him to.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60e. When my partner and I disagree, I get my way most of the time. / he gets his way most of the time.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60f. I like to know where my partner is most of the time. / My partner always wants to know where I am (all the time).

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60g. I expect my partner to do things for me like my ironing and cooking. / My partner expects me to do everything for him.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60h. Because I buy my partner things I expect her to please me. / My partner expects me to please him because he buys me things.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60i. I let my partner know that she is not the only girlfriend I have or could have. / My partner lets me know I am not his only girlfriend.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

60j. When I want my partner to sleep over I expect her to agree. / My partner expects me to sleep over whenever he chooses.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0
☐ 99	I do not have a regular partner	E	99
☐ 99	I have never had sex	F	99

The following questions are about ANY of your sexual partners

61. How many people have you ever had sex with in your whole life? (SQ26)

Write the number of people in the statement below

I have had sex with _____ person/people Contin.

☐ 99 I have never had sex 0

62. How many people have you ever had sex with in your whole life? (SQ27)

Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88
☐ 99	I have never had sex	99

NOW PLEASE GO TO QUESTION 64

63. In the last question you answered, you responded that you have not yet had vaginal sex. Since this question is very important in this study/research, we would like to give you a chance to respond to this question again. Remember that everything that you tell us today will be kept confidential. Have you ever had vaginal sex with a girl or woman / boy or man (that is to say when the penis was in the vagina) with you consenting to it or without you consenting to it? (SQ28)

Put an X in one box only *(This question is omitted on IVCI)*

☐ 1	Yes, I was _____ years old when I first had vaginal sex with a girl or woman / boy or man	GO BACK TO Q 51 AND CONTINUE THROUGH (omitted on Audio-SAQ)	1+cont.
☐ 0	No	GO TO QUESTION 64)	0

SAQ, ACASI:
If Q50 (SQ19) OR Q63 (SQ28) is 'Yes' (1):
Questions 51 (SQ20) to 62 (SQ27) should be completed
Questions 58 (SQ24) to 60 (SQ25) should only be blank if Q57 (SQ23) is 'No'
If Q50 (SQ19) AND Q63 (SQ28) are 'No' (0):
Questions 51 (SQ20) to 62 (SQ27) should be blank
If Q50 (SQ19) is 'Yes' (1) then Q63 (SQ28) should be blank
ICVI:
All questions 50 to 62 (SQ19-27) should be completed
There is no question 63 (SQ28)
If Q50 (SQ19) is 'No' (0):
Questions 50 to 62 (SQ19-27) should be 'I have never had sex' (99)
If Q55 contraception used is 'None' then Q56 should be 'NA' (99) (NA to short questionnaire)
If Q57 (SQ23) is 'No' then Q58-60a-j (SQ24-25) should be 'I do not have a regular partner' (99)
Audio-SAQ:
If Q50 (SQ19) is 'Yes' (1):
Questions 51 to 62 (SQ20-27) should be completed
Questions 58 to 60 (SQ24-25) should only be blank if Q57 (SQ23) is 'No'
Question 63 (SQ28) should be blank
If Q50 (SQ19) is 'No' (0)
Q 51-62 (SQ20-27) should be blank even if Q63 (SQ28) is 'Yes' (1)

64a. Have you ever physically forced a girl or a woman to have sex / Did a boy or man ever physically force you to have sex when you didn't want to? (SQ29)

Put an X in one box only

☐ 1 Yes — 1
☐ 0 No — 0

64b. Have you ever persuaded a girl or a woman to have sex with you when she was too drunk to stop you / Did a boy or man ever persuade you to have sex when you were too drunk to say no?

Put an X in one box only

☐ 1 Yes — 1
☐ 0 No — 0

65. Have you ever been raped? (SQ30)

Put an X in one box only

☐ 1 Yes, I was _____ years old when I was first raped. — 1+cont.
☐ 0 No — 0

66. Now we would like to ask your opinion on some statements on relations between men and women. Please tell us if you strongly agree, agree, disagree or strongly disagree with each of the following statements: (Dunkle/Jewkes scale)

For each statement below put an X in one box only

66a. A woman should listen to her husband.

Put an X in one box only

☐ 3 Strongly Agree A — 3
☐ 2 Agree B — 2
☐ 1 Disagree C — 1
☐ 0 Strongly Disagree D — 0

66b. A woman should choose her own friends even if her boyfriend or husband disapproves.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

66c. Men should share the work around the home such as doing the dishes or cleaning or cooking

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

66d. Sometimes a man may have a good reason to hit his girlfriend or wife

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

66e. A woman can refuse to have sex with her husband if she does not want it for any reason.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

66f. If a wife does something wrong she should expect her husband to punish her.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

66g. A man cannot control himself when he gets sexually aroused.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

66h. A woman should expect to be taught how to behave by her husband

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

66i. A woman should not expect the fathers of her children to give her money.

Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

66j. If a woman drinks alcohol and wears miniskirts she is asking for trouble.
Put an X in one box only

☐ 3	Strongly Agree	A	3
☐ 2	Agree	B	2
☐ 1	Disagree	C	1
☐ 0	Strongly Disagree	D	0

67. If you knew that a shopkeeper or food seller had HIV, would you buy food from them? (YAS/UNICEF)
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

68. If a teacher has the AIDS virus but is not ill, should that person be allowed to continue teaching in school? (YAS/UNICEF)
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

69. If a member of your family became ill with the AIDS virus, would you be willing to care for that person in your household? (YAS/UNICEF)
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

70. If a member of your family became infected with the AIDS virus, would you want it to remain a secret? (YAS/UNICEF)
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

71. If your friend asked for advice on where to go to seek treatment for a sexually transmitted disease (STD) where would you advise that person to go? (YAS)
Put an X in one box only

☐ 1	To go to a rural health clinic	1
☐ 2	To see a traditional healer (spiritual healer)	2
☐ 3	To go to a district hospital	3
☐ 4	To self treat (to treat him or herself)	4

72. Have you been to your nearest rural health clinic in the last12 months?
Put an X in one box only

☐ 1	Yes	GO TO QUESTION 74 (omitted on audio)	1
☐ 2	No		0

73. Why have you NOT been to your nearest rural health clinic in the last 12 months?
Put an X in one box only

☐ 0	There was no reason for me to go to the clinic	0
☐ 1	There is no rural health clinic near my house (too far away)	1
☐ 2	The clinic staff are rude	2
☐ 3	I chose to treat myself	3
☐ 4	Other (please specify)	4+code specifiy
☐ 99	I have been to the clinic in the last 12 months	99

SAQ,ACASI,ICVI:
If Q72 is 'Yes' (1) then Q73 should be blank
Audio-SAQ:
If Q72 is 'Yes' (1) then Q73 should be NA (99)

74. The last time you went to the clinic, how were you treated by the health worker who assisted you?
Put an X in one box only

- ☐ 0 Poor — 0
- ☐ 1 Good — 1
- ☐ 2 Excellent — 2

75. What do you think are your chances of getting HIV? (RHRU) (SQ31)
Put an X in one box only

- ☐ 0 No risk at all — A — 0
- ☐ 1 Small or moderate — B — 1
- ☐ 2 Great — C — 2
- ☐ 3 Already know my status — D — 3

76. Since you have heard of HIV/AIDS, have you done any of the following? (YAS/RHRU) (SQ32)
Put an X in one box, for each line (statement)

		Yes	No	
				0/1
76a.	Used condoms	☐ 1	☐ 0	0/1
76b.	Reduced number of partners	☐ 1	☐ 0	0/1
76c.	Abstained or stopped having sex with a girl or a woman / boy or man.	☐ 1	☐ 0	0/1
76d.	Delayed having sex with a girl or woman / boy or man for the first time	☐ 1	☐ 0	0/1
76e.	Talked to your friend about sex, relationships or risk of HIV	☐ 1	☐ 0	0/1
76f.	Talked to your partner about sex, relationships or risk of HIV	☐ 1	☐ 0	0/1
76g.	Talked to your relatives about sex, relationships or risk of HIV	☐ 1	☐ 0	0/1
76h.	Have not shared (sewing) needles or razor blades (YAS)	☐ 1	☐ 0	0/1
76i.	Chosen only healthy looking individuals as your sexual partners. (Sophie's phrasing)	☐ 1	☐ 0	0/1
76j.	Have been faithful to one partner (YAS)	☐ 1	☐ 0	0/1
76k.	Had an HIV test	☐ 1	☐ 0	0/1
76l.	Other (please specify) Code specify (not on ICVI)	☐ 1	☐ 0	0/1

77. Where you live, is it easy or difficult for unmarried young men to get contraceptives? (YAS 416 – but it was one question in YAS, and we split it)
Put an X in one box only

- ☐ 1 It is easy — A — 1
- ☐ 2 It is difficult / not easy — B — 2
- ☐ 88 I don't know — C — 88

78. Where you live, is it easy or difficult for unmarried young women to get contraceptives? (YAS 416 – but it was one in YAS, we split)
Put an X in one box only

- ☐ 1 It is easy — A — 1
- ☐ 2 It is difficult / not easy — B — 2
- ☐ 88 I don't know — C — 88

79. Have you ever had the following symptoms? (YAS 603) (SQ33)
Put an X in one box on each line /statement

		Yes	No	
				0/1
79a.	Penal discharge / Vaginal discharge with a bad smell	☐ 1	☐ 0	0/1
79b.	Pain when urinating	☐ 1	☐ 0	0/1
79c.	Sore or ulcer on penis / vagina or vulva	☐ 1	☐ 0	0/1
79d.	Wart in anus / anus or vulva	☐ 1	☐ 0	0/1
79e.	Itching, burning on penis / in genital area	☐ 1	☐ 0	0/1
79f.	Swelling in the genital area	☐ 1	☐ 0	0/1

If you have ticked NO in ALL of the boxes above, please go to QUESTION 86.
Skip to Question 85 in audio if 'No' to all symptoms
Skip is omitted on ICVI
If you have ticked any YES in the boxes above, go to the next question.

80. The last time you had any of these symptoms did you seek treatment? (YAS 605)
Put an X in one box only

☐ 1	Yes	GO TO QUESTION 82 (omitted in audio & FTF)	1
☐ 0	No		0
☐ 99	I have never had these symptoms		99

81. What was the main reason you did NOT seek treatment? (YAS 610)
Put an X in one box only

☐ 0	I did seek treatment		0
☐ 1	I thought the nurses would disapprove	A	1
☐ 2	The services are too far away	B	2
☐ 3	I cannot afford the services	C	3
☐ 4	I don't know where to go for services	D	4
☐ 5	I was afraid of knowing my results/my diagnosis	E	5
☐ 6	I did not think it was a sexually transmitted disease	F	6
☐ 7	The symptoms disappeared	G	7
☐ 8	Drugs were not available	H	8
☐ 9	Other (please specify) (no specify on ICVI/ACASI)	I	9+code specify
☐ 99	I have never had these symptoms	J	99

Now GO TO QUESTION 85 (omitted on ICVI)

82. Where did you first seek treatment the last time you had any of these symptoms?
Put an X in one box only

☐ 1	Hospital	} GO TO QUESTION 83	A	1
☐ 2	Rural health centre	} GO TO QUESTION 83	B	2
☐ 3	Traditional healer	} GO TO QUESTION 83	C	3
☐ 4	Family member	} GO TO QUESTION 85	D	4
☐ 5	Self treatment	} GO TO QUESTION 85	E	5
☐ 6	Other (please specify)	} GO TO QUESTION 85	F	6+Code specify
	(no specify on ICVI)	Skips omitted in audio and ICVI		
☐ 99	I have never had these symptoms		G	7

83. Did the health worker or traditional healer that you saw talk to you about how to prevent HIV? (YAS 608)
Put an X in one box only

☐ 1	Yes	A	1
☐ 2	No	B	0
☐ 88	I don't know	C	88
☐ 99	NA I was not treated by a health worker or traditional healer	D	99
☐ 99	I have never had these symptoms	E	99

84. Were you instructed about condoms or given condoms at that time? (YAS 609)

Put an X in one box only

☐ 1	Yes	A	1
☐ 2	No	B	0
☐ 88	I don't know	C	88
☐ 99	NA I was not treated by a health worker or traditional healer	D	99
☐ 99	I have never had these symptoms	E	99

85. Did you tell your partner that you had these symptoms? (YAS 611) (SQ34)

Put an X in one box only

☐ 1	Yes, I told her / him	A	1
☐ 2	No, I didn't tell her / him	B	0
☐ 3	I don't have a sexual partner	C	2
☐ 4	I have never had sex	D	3
☐ 99	Not applicable, I have never had any symptoms	E	99

SAQ,ACASI:

If ALL symptoms in Q79 (SQ33) are 'No' (0):
Q80-85 (SQ34) should be blank
If ANY symptoms in Q79 (SQ33) are 'Yes' (1):
Q80 and 85 (SQ34) should be completed
If Q80 is 'No' (0):
Q81 should be completed
Q82-84 should be blank
If Q80 is 'Yes' (1):
Q81 should be blank
Q82 should be completed
If Q82 said visited Hospital (1), RHC (2), or Trad. Healer (3)
Q83-84 should be completed
If Q82 said visited Family (4), self-treatment (5) or other (6):
Q83-84 should be blank

ICVI:

If ALL symptoms in Q79 (SQ33) are 'No' (0):
Q80-85 (SQ34) should be 'I have never had symptoms' (99)
If Q80 is 'Yes', Q81 should be 'I did seek treatment' (0)
If Q82 said visited Hospital (1), RHC (2), or Trad. Healer (3):
Q83-84 should be completed
If Q82 said visited Family (4), self-treatment (5) or other (6):
Q83-84 should be NA (99)

Audio-SAQ:

If ALL symptoms in Q79 (SQ33) are 'No' (0):
Q80-84 should be blank
Q85 (SQ34) should be completed but NA (99)
If ANY symptoms in Q79 (SQ33) are 'Yes' (1):
Q80 to 85 (SQ34) should be completed
If Q80 is 'No' (0):
Q81 should be completed andQ82-84 should be blank
If Q80 is 'Yes' (1):
Q81 should be completed but should be sought treatment (1)
Q82 should be completed
If Q82 said visited Hospital (1), RHC (2), or Trad. Healer (3):
Q83-84 should be completed
If Q82 said visited Family (4), self-treatment (5) or other (6):
Q83-84 should be NA (99)

86. Have you ever had any injections or procedures that involve the skin being cut, either at a clinic or by a traditional healer?
Put an X in one box only

☐ 1	Yes	1
☐ 0	No	0

87. Have you ever made someone pregnant / have you ever been pregnant? (SQ35)
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

88. This question does not apply to me//there is no question here. Are you currently pregnant? (SQ36 Girls)
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

89. Sometimes a girl becomes pregnant and decides to abort or stop the pregnancy. Has a girl or woman you made pregnant ever aborted or stopped a pregnancy? / Have you ever aborted or stopped a pregnancy? (SQ36 Boys & SQ37 Girls)
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

90. This question does not apply to girls//there is no question here. Is your penis circumcised that is, has the foreskin on your penis been removed?? (SQ37 Boys)
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0

Now we would like to know your opinion about issues including health and having sexual intercourse.

91. It is possible for a girl to become pregnant the first time she has sex.
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

92. There are diseases caused by having sex that can cause a person to be unable to give birth to children.
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

93. A girl will not become pregnant if she has sex standing up.
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

94. All diseases caught from having sex can be cured with medical treatment (note: this does not include treatment from traditional healers).
Put an X in one box only

☐ 1	Yes	1
☐ 2	No	0
☐ 88	I don't know	88

Now we would like to know whether you agree or disagree with the following statements.

95. It is easy for me to get condoms if I need them.
Put an X in one box only

☐ 1	I agree	1
☐ 2	I disagree	0
☐ 88	I don't know	88

96. When a girl receives a gift from a boy she must agree to have sex.
Put an X in one box only

☐ 1	I agree	1
☐ 2	I disagree	0
☐ 88	I don't know	88

97. It is okay to force a person to have sex if they don't want to.
Put an X in one box only

☐ 1	I agree	1
☐ 2	I disagree	0
☐ 88	I don't know	88

98. I will feel extremely shy to tell my partner to use condoms.
Put an X in one box only

☐ 1	I agree	1
☐ 2	I disagree	0
☐ 88	I don't know	88

Now, we would like to ask you some more questions about your household and activities that you may have attended within your community.

99. In the last 12 months, has anyone in the household been too ill to work or perform their normal duties for three consecutive months or more? (YAS 901)
Put an X in one box only

☐ 1	Yes		1
☐ 2	No	GO TO QUESTION 102	0
☐ 88	I don't know	GO TO QUESTION 102	88

100. Did you help to take care of this person on a daily basis? (YAS 904)
Put an X in one box only

☐ 1	Yes		1
☐ 0	No	GO TO QUESTION 102	0

101. In what ways were you involved? (YAS905)
Put an X in one box on each line

		Yes	No	
101a.	Bathing (implied: cleaning)	☐ 1	☐ 0	0/1
101b.	Cooking food	☐ 1	☐ 0	0/1
101c.	Feeding	☐ 1	☐ 0	0/1
101d.	Giving medicines	☐ 1	☐ 0	0/1
101e.	Taking the person to the health clinic	☐ 1	☐ 0	0/1
101f.	Comforting the person when they are upset	☐ 1	☐ 0	0/1
101g.	Other (please specify)	☐ 1	☐ 0	0/1-Code Specify

If Q99 is 'Yes' (1) then Q100-101 should be completed.
If Q99 is 'No' (2) or 'I don't know' (88) then Q100-101 should be blank

102. In the past 5 years, have you had a death in your household? (YAS919)
Put an X in one box only

☐ 1 Yes — 1
☐ 0 No — GO TO QUESTION 104 — 0

103. What was the person's (or people's) relationship to you? (YAS 921)
Put an X in one box on each line

☐ 0/1	My mother	0/1
☐ 0/1	My father	0/1
☐ 0/1	My wife / My husband	0/1
☐ 0/1	My child	0/1
☐ 0/1	My sister/brother	0/1
☐ 0/1	My mother-in-law/my father-in-law	0/1
☐ 0/1	My grandmother	0/1
☐ 0/1	My grandfather	0/1
☐ 0/1	My other relative	0/1
☐ 0/1	Our employee	0/1
☐ 0/1	My employer	0/1
☐ 0/1	Other non-relative	0/1

If Q102 is 'Yes' (1) then Q103 should be completed.
If Q102 is 'No' (0) then Q103 should be blank

104. How many Regai Dzive Shiri meetings have you attended?
Complete the statement or put an X in the box

☐ 0 None — 0
☐ 1 I have attended _____ meetings — 1+ contin

105. When you were at school, how often did you attend lessons held by an RDS/SPW teacher?
Put an X in one box only

☐ 0 We did not have RDS/SPW teachers — GO TO QUESTION 109 — 0
☐ 1 We had RDS/SPW teachers, but I never attended their lessons — 1
☐ 2 We had RDS/SPW teachers, and I sometimes attended their lessons — 2
☐ 3 We had RDS/SPW teachers, and I always attended their lessons — 3

106. When you were not at school, how approachable were your RDS/SPW teachers?
Put an X in one box only

☐ 2 Very approachable — 2
☐ 1 Quite approachable — 1
☐ 0 Not approachable — 0

107. How helpful did you find the RDS/SPW teacher in your community?
Put an X in one box only

☐ 2 Very helpful — 2
☐ 1 Helpful — 1
☐ 0 Unhelpful — 0

108. How much did you like the RDS/SPW teachers?
Circle the face that applies to your answer

☺$_2$ I liked them a lot ☹$_1$ I like them ☹$_0$ I didn't like them — 0/1/2

If Q105 is 'We do not have RDS teachers' (0) Q106 to 108 should be blank

109. Please tell us how honest your answers have been (SQ38)

Put an X in one box only

☐ 4	Completely honest		4
☐ 3	Very honest		3
☐ 2	Fairly honest		2
☐ 1	Not very honest		1
☐ 0	Not honest at all		0

109a. Please tell us how honest your answers have been overall (SQ38)

Put an X in one box only

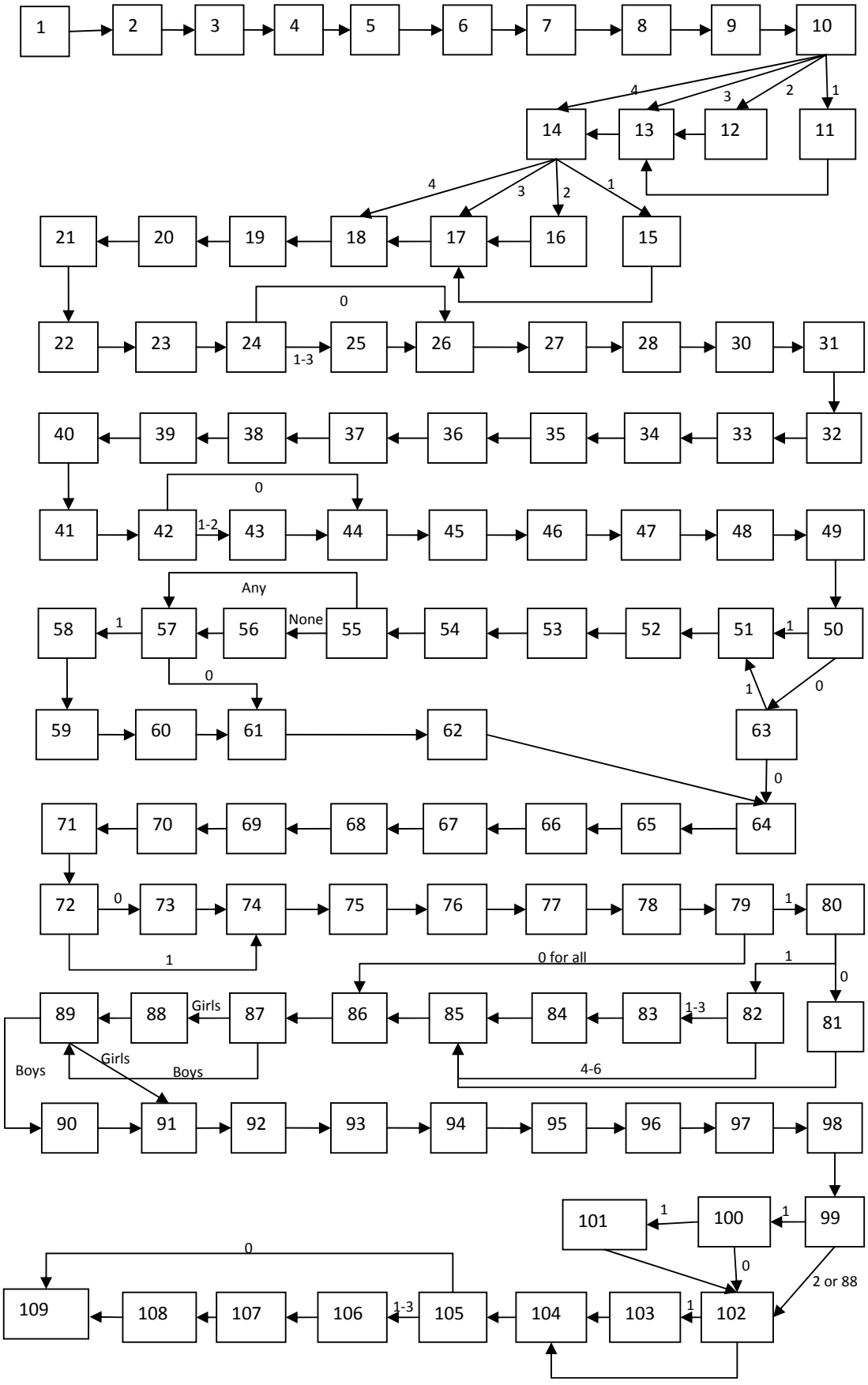
☐ 4	Completely honest	A	4
☐ 3	Very honest	B	3
☐ 2	Fairly honest	C	2
☐ 1	Not very honest	D	1
☐ 0	Not honest at all	E	0

109b. How honest have been the answers that you posted in the ballot box? (SQ38)

Put an X in one box only

☐ 4	Completely honest	A	4
☐ 3	Very honest	B	3
☐ 2	Fairly honest	C	2
☐ 1	Not very honest	D	1
☐ 0	Not honest at all	E	0

APPENDIX D: FLOW CHART FOR RDS INTERIM SURVEY QUESTIONNAIRE



APPENDIX E: BALLOT SHEETS FOR ICVI INTERIM SURVEY (QDM TRIAL) QUESTIONNAIRE-

The following two pages is a sample of the ballot sheet from Round 1 that was given to respondents who used the Informal Confidential Voting Instrument (ICVI). Trained interviewers read out the questions and the respondent marked their answers on the sheet. At the conclusion, the respondent folded the sheet and placed it in a locked ballot box.

These versions are in English – respondents' copies were in Shona.

Place RDS ID label here

Round 1

Interview – Private Ballot Sheet – Males

Q 46 a	☐	Q 46 b	☐	Q 46 c	☐	Q 46 d	☐
Q. 47	Yes ☐ No ☐	_____					
Q. 48	Yes ☐ No ☐	_____					
Q. 49	Yes ☐ No ☐	_____					
Q. 50	Yes ☐ No ☐	_____					
Q. 51	☐	_____					
Q 52	☐						
Q 53 A	Yes ☐ No ☐ I have never had sex ☐			Q 53 B	Yes ☐ No ☐ I have never had sex ☐		
Q 53 C	Yes ☐ No ☐ I have never had sex ☐			Q 53 D	Yes ☐ No ☐ I have never had sex ☐		
Q 53 E	Yes ☐ No ☐ I have never had sex ☐			Q 53 F	Yes ☐ No ☐ I have never had sex ☐		
Q 53 G	Yes ☐ No ☐ I have never had sex ☐			Q 53 H	Yes ☐ No ☐ I have never had sex ☐		
Q 53 I	Yes ☐ No ☐ I have never had sex ☐						
Q 54	Yes ☐ No ☐ I have never had sex ☐						
Q 55	☐ ☐ ☐ ☐ ☐ ☐						
Q 56	☐ ☐ ☐ ☐ ☐ ☐						
Q 57	Yes ☐ No ☐ I have never had sex ☐						
Q 58	☐		Q 59	☐			

Q 60 a	☐	Q 60 b	☐	Q 60 c	☐	Q 60 d	☐	Q 60 e	☐		
Q 60 f	☐	Q 60 g	☐	Q 60 h	☐	Q 60 i	☐	Q 60 j	☐		
Q 61	☐										
Q 62	☐										
Q 63	There is no question 63// does not apply to you										
Q 64 a	Yes ☐ No ☐				Q 64 b		Yes ☐ No ☐				
Q 65	Yes ☐ No ☐		_____								
BALLOT SET 2											
Q 75	☐										
Q 76 a	Hongu ☐ Kwete ☐		Q 76 b	Hongu ☐ Kwete ☐		Q 76 c	Hongu ☐ Kwete ☐				
Q 76 d	Hongu ☐ Kwete ☐		Q 76 e	Hongu ☐ Kwete ☐		Q 76 f	Hongu ☐ Kwete ☐				
Q 76 g	Hongu ☐ Kwete ☐		Q 76 h	Hongu ☐ Kwete ☐		Q 76 i	Hongu ☐ Kwete ☐				
Q 76 j	Hongu ☐ Kwete ☐		Q 76 k	Hongu ☐ Kwete ☐		Q 76 l	Hongu ☐ Kwete ☐				
Q 77	☐		Q 78	☐							
Q 79 a	Hongu ☐ Kwete ☐		Q 79 b	Hongu ☐ Kwete ☐		Q 79 c	Hongu ☐ Kwete ☐				
Q 79 d	Hongu ☐ Kwete ☐		Q 79 e	Hongu ☐ Kwete ☐		Q 79 f	Hongu ☐ Kwete ☐				
Q 80	Hongu ☐	Kwete ☐	I have never had sex ☐								
Q 81	☐	Q 82	☐	Q 83	☐	Q 84	☐				
Q 85	☐			Q 86	Hongu ☐	Kwete ☐					
Q 87	Hongu ☐	Kwete ☐	Handizivi ☐								
Q 88	Does not apply to you										
Q 89	Hongu ☐	Kwete ☐	Handizivi ☐								
Q 90	Hongu ☐	Kwete ☐									
BALLOT BOX SET 3											
Q 109 a	☐	Q 109 b	☐								

APPENDIX F: RDS INTERIM SURVEY-WELCOME AND PRACTICE INSTRUCTIONS

Welcome text: This was printed in the front of the booklet for SAQ and Audio-SAQ. In Audio-SAQ and ACASI, the text was also recorded. Interviewers read this out to respondents using ICVI.

Thank you for coming today. As you remember from the last time you took part in the Regai Dzive Shiri Survey, we are here because we want to try and improve the health status of youths/young people in Zimbabwe. To help us do that, we need to understand what young people are doing and thinking. We will be running this survey in twelve communities and all the young people who live in those communities and took part in the previous survey will be asked to take part again. We are inviting 2700 young people to take part, all of them will be asked to answer the same questions that you are answering today.

The questions in the questionnaire ask about a number of aspects of your life including some private aspects such as your friendships and relationships. It is important for us to have accurate information so that programmes for young people can be properly designed to meet their needs. We understand we are asking you to give answers to difficult questions but promise to keep your answers safe and private. No-one else will ever know what answers you give. Parents and teachers will not see them.

You all completed a similar questionnaire two years ago. Some of you told us that you were worried that we would tell people in your community about your answers. But, as you know, we didn't do this. The information you gave was kept completely confidential. We will do the same again this time. No-one else will ever know what answers you give when you complete this questionnaire .

Some of you were worried that we have a record of your name and that it is connected to your study number. This is true. However, we never connect your name to your study number when we look at these answers. We only use your name when we want to invite you to take part in additional research (like this survey). Please do your best to answer the questions truthfully and honestly. It is in this way that you can help to fight HIV and AIDS in Zimbabwe.

Before you begin, here are some simple instructions on how to answer the questions in the questionnaire. For each question, read the question and all the possible answers. Then follow the instructions which are always printed in italics under the question. (show them flip chart A with an example of italics) In most cases, we want you to choose the one answer which is most truthful to you and place an X in the box following it. (show them flip chart B for them to see how to do this) In some cases, we want you to choose all the answers that are most true for you (show them flip chart C). Always read the instructions which are printed in italics under each question, so that you know what to do.

Welcome continued from previous page

[Surveyor stops and goes through practice instruction charts which are shown below]

Remember this is NOT an exam. All answers are correct if they are truthful.

Your truthful answer is the most important thing to us. For you to answer truthfully, you need to understand the questions and the possible answers. If you do not understand a question or any of the answers, you can raise your hand and one of the project team will come and help you. Remember that they are interested in helping you, not in knowing your answer to the question. If it helps, please use a sheet to cover your existing answers on that page. And mark the answer after the project team member has left your side.

Thank you again for taking the time to help us better understand your lives.

Specific Instructions for ICVI:

Before we begin, I just want to let you know how we will proceed together. I have a small book in front of me that has the questions in it. I will ask you questions from this small booklet and you will tell me your response that is most true for you. In some places where there are many answers, I will give you a card with the answers on it to help you remember your choices.

A few times during this exercise I will let you mark your own answers on a sheet of paper which I will give you to then. At the end of this exercise you will place this paper with your private answers in the ballot box here in front of us. I will never look at the answers that you place on that sheet.

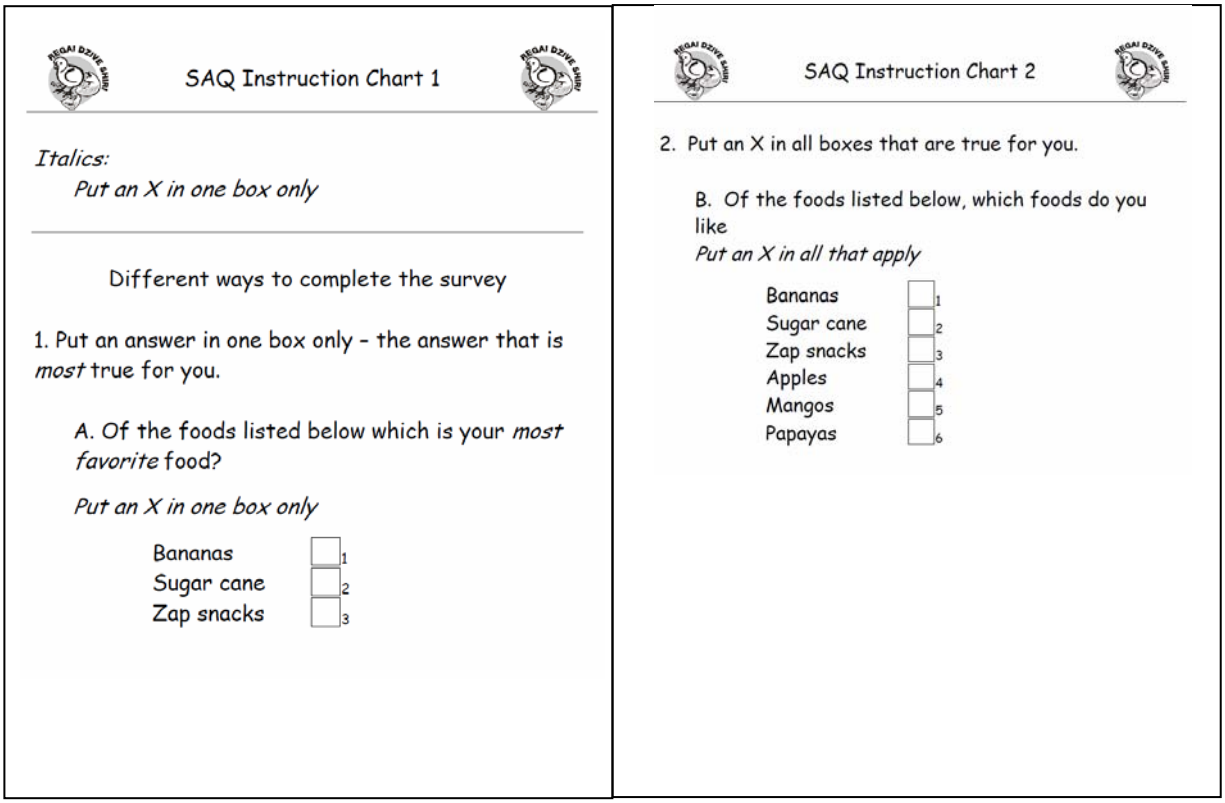
Remember this is NOT an exam. All answers are correct if they are truthful.

Your truthful answer is the *most* important thing to us. For you to answer truthfully, you need to understand the questions and the possible answers. If you do not understand a question or any of the answers, please let me know so that I can help clarify.

Thank you again for taking the time to help us better understand your lives.

Are there any questions?

Sample of the Instruction Charts for SAQ (Audio-SAQ was similar)



SAQ Instruction Chart 1

Italics:
Put an X in one box only

Different ways to complete the survey

1. Put an answer in one box only – the answer that is *most* true for you.

A. Of the foods listed below which is your *most favorite* food?

Put an X in one box only

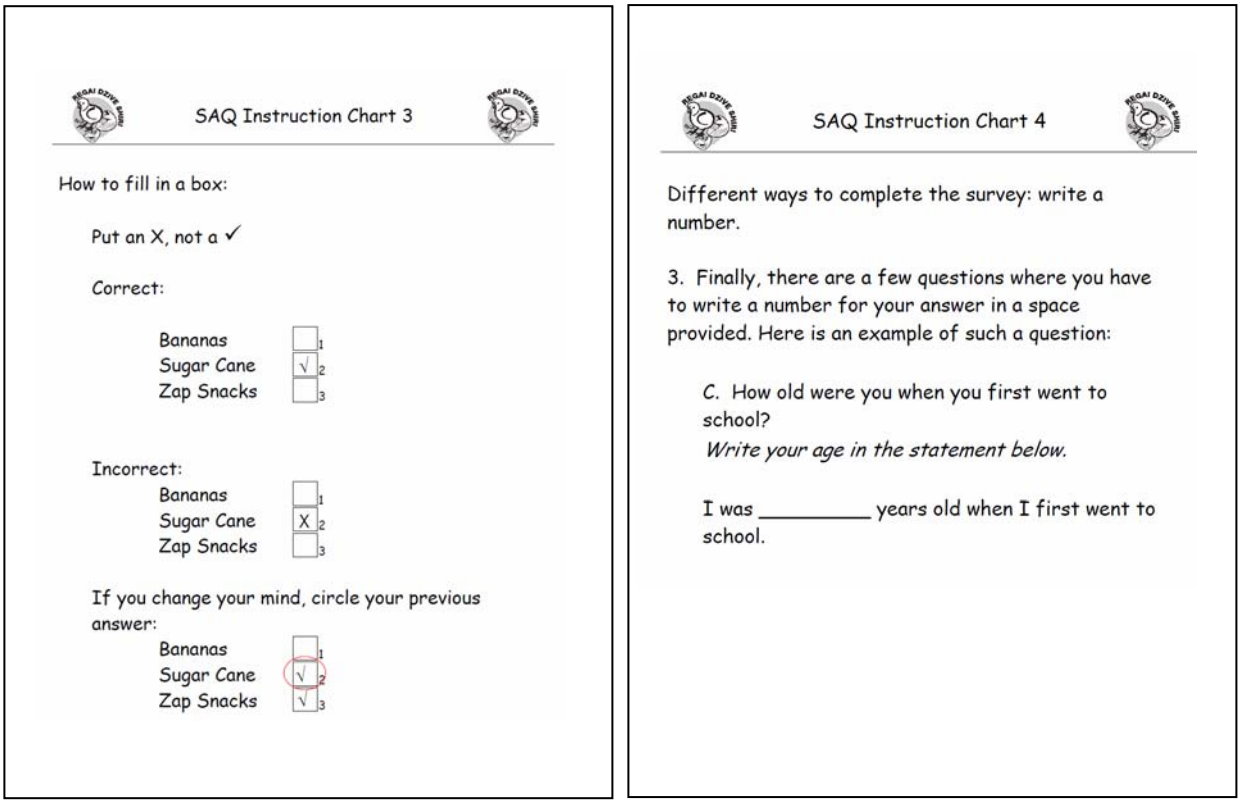
Bananas	☐ 1
Sugar cane	☐ 2
Zap snacks	☐ 3

SAQ Instruction Chart 2

2. Put an X in all boxes that are true for you.

B. Of the foods listed below, which foods do you like
Put an X in all that apply

Bananas	☐ 1
Sugar cane	☐ 2
Zap snacks	☐ 3
Apples	☐ 4
Mangos	☐ 5
Papayas	☐ 6



SAQ Instruction Chart 3

How to fill in a box:

Put an X, not a ✓

Correct:

Bananas	☐ 1
Sugar Cane	√ 2
Zap Snacks	☐ 3

Incorrect:

Bananas	☐ 1
Sugar Cane	X 2
Zap Snacks	☐ 3

If you change your mind, circle your previous answer:

Bananas	☐ 1
Sugar Cane	√ 2
Zap Snacks	√ 3

SAQ Instruction Chart 4

Different ways to complete the survey: write a number.

3. Finally, there are a few questions where you have to write a number for your answer in a space provided. Here is an example of such a question:

C. How old were you when you first went to school?
Write your age in the statement below.

I was _____ years old when I first went to school.

SAQ Instruction Chart 5

Different ways to complete the survey: skip pattern

4. Here is an example of such a question.

A. Did you ever travel to Nigeria in the last year?
Put an X in one box only

Yes ☐ 1
No ☐ 0 →→GO TO QUESTION C

B. In the last year, how many times did you travel to Nigeria??
Write your answer in the statement below.
I went to Nigeria ___ times in the last year.

C. How many spoons of sugar do you put in your tea?

Specific Instructions for ACASI:

For each question, read the question and all the possible answers. Then follow the instructions which are always printed in italics under the question. Italics are words that are printed at an angle, they are slanted, *like this.* All the instructions in this questionnaire are printed in italics and look like this:

Please press on one box only.

In most cases, we want you to choose the *one* answer which is *most* truthful to you and use the mouse to click the box that answer.

Here is an example of this.

Of the foods listed below which is your *most favorite* food?
Please press on one box only

- Bananas
- Sugar cane
- Zap snaks

Use the mouse to click the box which has your answer in it.

In *some* cases, we want you to choose *all* the answers that are most true for you.

Here is an example of this.

Of the foods listed below, which foods do you like?
Please press ALL statements that apply

Bananas	Apples
Sugar cane	Mangos
Zap snaks	Papayas

Use the mouse to click on all the boxes that apply to you
Finally, there are a few questions where you have to write a number for your answer. When we want you to do this, we will put a number pad on the screen. Click the number or numbers that you want to use to answer the question. You will see your answer appear in the box at the bottom.

Here is an example of such a question:

> How old were you when you first went to school?
> *Please use the number pad on the screen to enter how old you were when this happened. If you are uncertain, enter your best guess.*

If you want assistance, all you have to do is raise your hand and one of the project team will come and help you. Remember that the team is interested in helping you, *not* in knowing your answer to the question. If it helps, mark the answer after the RDS team member has left your side.

On each screen you will notice that there are three buttons to the far right. The first one says "previous question". Click on this button if you want to go to the previous question. The second one says "next question". Most of the time you will not have to click on this button as the computer will move to the next question automatically. However, if the instruction says *Please press ALL statements that apply"* you will have to click *"Next Question'* after you have finished answering.

The third one says "repeat the question". Click this button whenever you want the same question to be re-read to you.

On *some* screens, you will see a button that reads, 'Don't know". Click this button if your answer is "I don't know".

Remember this is NOT an exam. All answers are correct if they are truthful.

Your truthful answer is the *most* important thing to us. For you to answer truthfully, you need to understand the questions and the possible answers. If you do not understand a question or any of the answers, you can raise your hand and one of the project team will come and help you. Thank you again for taking the time to help us better understand your lives.

APPENDIX G: SAMPLE INVITATION LETTER TO RDS INTERIM SURVEY PARTICIPANTS

This is a sample of the personalized invitation letter sent to each member of the cohort in the 12 communities that participated in the RDS Interim Survey.

The second page is a sample of what appeared on the back of the letter, indicating survey dates and locations within each community.

Department of
Community Medicine,
University of Zimbabwe

112 Second Street
Mutare
Tel: +263 (0)20 66276,
Fax: +263 (0) 20 66276
Cellphone: 011 231 925

University College London,
London School of Hygiene &
Tropical Medicine
Zimbabwe-CDC AIDS Project

FIRSTNAME LASTNAME
VILLAGENAME
DISTRICT

Dear FIRSTNAME LASTNAME,

COME JOIN US FOR A DAY OF LEARNING AND FUN!

We are inviting you to come and participate in a fun day of learning with the Regai Dzive Shiri interim survey team which will be happening in *your* community **week of 3 April** 2006. This is a follow-up to the survey that you took part in at the beginning of 2003.

In addition to participating in the survey, you will have a chance to meet your friends, play games and win prizes.

The exact date of the survey will be advertised in your community two weeks before our arrival so look for posters in your community closer to the month of **April 2006**. RDS community members listed below will also know more specific information about the survey.

On the day of the survey, please remember to bring with you some legal form of identification. This could be any of the following:

- your national ID card,
- your original birth certificate, or
- a certified copy of your birth certificate or national ID card.

Also, don't forget to bring along *this* invitation letter as you will have a chance to win a prize.

We look forward to seeing you very soon.

Many thanks,

Lisa Langhaug – Amai Gomo Guru.
RDS Evaluation Manager

RDS Community Members

First name	Last name	RDS community position	Village

(What was on the back of each letter)

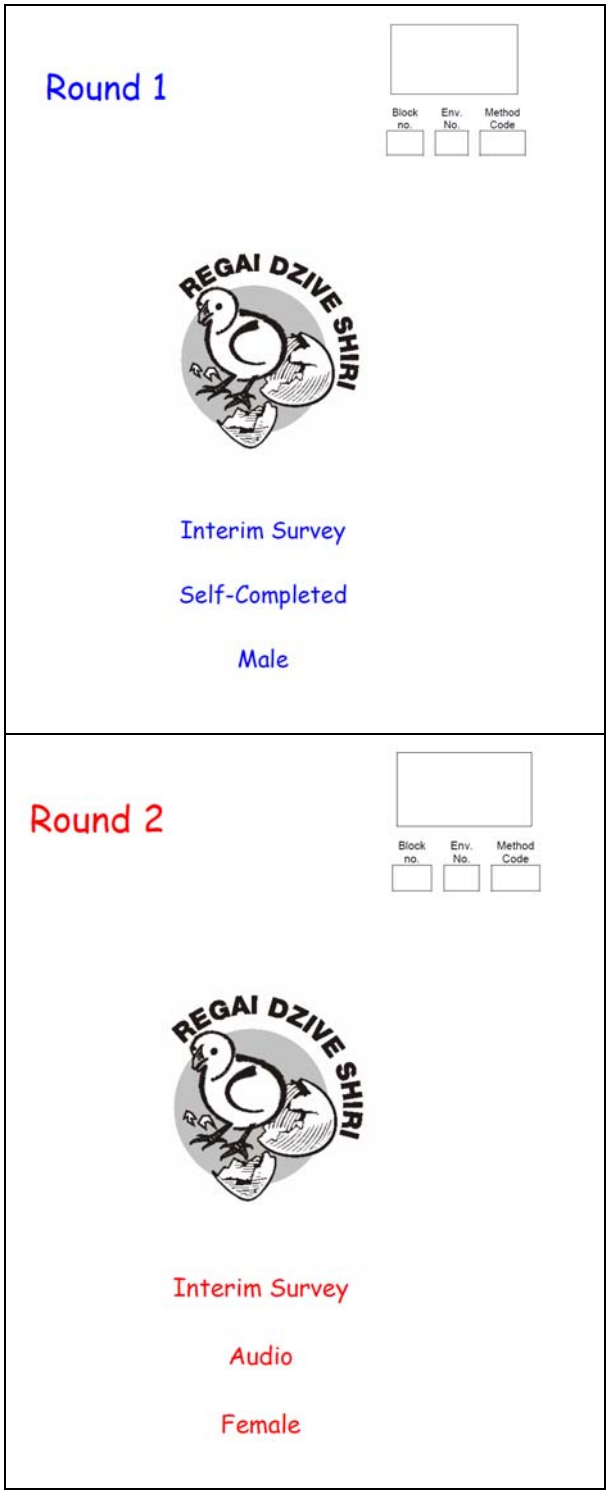
Here are the community venues we are going to visit as well as the dates and times of the visits

Monday 3 April 2006	9 a.m. to 3 p.m.	Maoresa Business Centre
Tuesday 4 April 2006	9 a.m. to 3 p.m.	Mukamba Clinic
Wednesday 5 April 2006	9 a.m. to 3 p.m.	Chipunza Business Centre

We mean young women who participated in the Regai Dzive Shiri survey in 2003. Young mothers with babies please feel free to come.

APPENDIX H: SAMPLE OF THE BOOKLET COVERS FOR THE RDS INTERIM QUESTIONNAIRES

Below are two sample booklet covers. The first if for SAQ males, in Round 1, the second is for Audio-SAQ females in Round 2.



APPENDIX I: RDS INTERIM SURVEY INFORMATION SHEET AND CONSENT FORM

The following documents are the information sheet and consent form used during the Interim Survey (QDM Trial).

These version are in English; respondents received these in Shona.

1. Information Sheet (2 pages)
2. Consent form (1 page)

DEPARTMENT OF COMMUNITY MEDICINE

P.O. Box A 178
Avondale
Harare, Zimbabwe

Telephone : 791631
Telex : 26580 UNIVZ ZW
Telegrams : UNIVERSITY
Fax No: (263) (4) 724912

FACULTY OF MEDICINE

UNIVERSITY OF ZIMBABWE

Researcher: Dr. Godfrey Woelk

CONFIDENTIAL

Information sheet

Regai Dzive Shiri - a study for improving adolescent reproductive health in Zimbabwe

We are carrying out a health research study in in 30 communities in Zimbabwe. The study is examining whether programmes which are designed to help young people learn about health and reproduction actually reduce their risk of developing sexually transmitted diseases and HIV.

In 2003 you and your parents/guardian agreed for you to take part.As we are about to conduct the middle survey we would like to invite you to consent again to taking part in our study.

1. **Questions**

What does the research involve?

You are being asked to fill in several questionnaires over a four year period (2003-2007). These questionnaires will ask you questions about you, what you know about reproductive health, how HIV and STDs are spread and your life experiences.

2. **Finger prick blood specimen**

We will also ask you to give us a small specimen of blood, which will be collected by pricking your finger. This small specimen of blood will be collected onto special absorbent paper. We would need to collect these specimens on 3 occasions, when the study starts and after 30 months and again after 4 years. The specimen will not be marked with your name or other identifying information. We would like to test this specimen **confidentially** for antibodies to HIV and herpes virus in order to understand the overall level of infection in the community. We will **not** be able to give you or your parents or anyone else in your community your results of these tests because YOUR name will not be on the specimen. If at any time you would like to have an HIV test and want to get the result, you can arrange to get one at your local health clinic through our project nurse.

3. **Urine Specimens** (for girls only)
We will also ask you to provide a small specimen of urine, when the study starts and after 30 months and again after 4 years. The specimen will not be marked with your name or other identifying information. We would like to test this specimen **confidentially** for pregnancy in order to understand the overall level of pregnancy in young people in the community. We will **not** be able to give you, your parents, or anyone else in your community, the results of this test because YOUR name will not be on the specimen.

Confidentiality

Because we need to be able to collect information from you over a four year period we have had to collect your name, date of birth, and information about how best to reach you over that time. However, this information is kept completely confidentially. Only specified members of the research team have access to the information collected using the questionnaires and blood and urine samples. The information will not be available to anyone outside the research team. Importantly no members of the community will have access to any information on the questionnaires or to the results of your blood sample or urine tests. The information collected by questionnaire and the laboratory results will be stored on computer but without any information that could identify an individual. The information collected by this study will be kept securely for 10 years after the study has been completed.

The information will be used to see if reproductive health education can improve the reproductive health of young Zimbabweans.

We are glad you agreed to take part in this study in 2003 and hope you will agree to continue taking part in the study. We hope this will help us to improve the health of all young people in Zimbabwe. If you agree to do so please sign the form on the other side.

You do not have to continue to take part in this study if you do not want to. If you decide to take part but then change your mind you may withdraw at any time without having to give a reason. Your decision whether to take part or not will not affect your schooling or health care in any way.

If you do not wish to take part please sign the form on the other side.

An ethics committee reviews all proposals for research using human subjects before they can proceed. The Medical Research Council of Zimbabwe, the Joint UCL/UCLH Committees on Ethics of Human Research and the Ethics Committee of the London School of Hygiene and Tropical Medicine reviewed this proposal.

If you have any questions or want to know any more about the research please contact Dr Frances Cowan at University of Zimbabwe (Tel number:263 (0)20 66276)

Place ID label here

P.O. Box A 178
Avondale
Harare, Zimbabwe

DEPARTMENT OF COMMUNITY MEDICINE

Telephone : 791631
Telex : 26580 UNIVZ ZW
Telegrams : UNIVERSITY
Fax No: (263) (4) 724912

FACULTY OF MEDICINE

UNIVERSITY OF ZIMBABWE

Researcher: Dr. Godfrey Woelk

CONFIDENTIAL **School ID:** ☐ ☐

Consent form - STUDENT

Regai Dzive Shiri - a study for improving adolescent reproductive health in Zimbabwe

Have you read the information sheet about this study?	Yes ☐	No ☐
Have you had an opportunity to ask questions and discuss this study?	Yes ☐	No ☐
Have you received satisfactory answers to all your questions?	Yes ☐	No ☐
Have you received enough information about this study?	Yes ☐	No ☐
Do you understand that you are free to withdraw from this study: * At any time * Without giving a reason for withdrawing * Without affecting your future medical care	Yes ☐	No ☐
Do you agree to take part in this study?	Yes ☐	No ☐

I agree / disagree to take part in the questionnaire survey and to provide a finger prick blood sample (and urine sample - girls only) specimen.

Signature: .....
Signature RDS Cohort Member

Print Name: ……..
Name of RDS Cohort Member

Witness : …… Print: ……..
Signature of RDS Staff member Name of RDS Staff member

Date: ……. / ……./ 2006

APPENDIX J: RDS INTERIM SURVEY – QUESTIONNAIRE METHOD CODES

Code		1st Method		2nd Method	No. of labels left**
1		Self Completed (SAQ)		-	5
2		Interview (ICVI)		-	4
3		Audio (Audio-SAQ)		-	5
4		ACASI		-	5
5		Self Completed (SAQ)		Self Completed (SAQ)	3
6		Interview (ICVI)		Self Completed (SAQ)	2
7		Audio (Audio-SAQ)		Self Completed (SAQ)	3
8		ACASI		Self Completed (SAQ)	3
9		Self Completed (SAQ)		Interview (ICVI)	2
10		Interview (ICVI)		Interview (ICVI)	1
11		Audio (Audio-SAQ)		Interview (ICVI)	2
12		ACASI		Interview (ICVI)	2
13		Self Completed (SAQ)		Audio (Audio-SAQ)	3
14		Interview (ICVI)		Audio (Audio-SAQ)	2
15		Audio (Audio-SAQ)		Audio (Audio-SAQ)	3
16		ACASI		Audio (Audio-SAQ)	3
17		Self Completed (SAQ)		ACASI	3
18		Interview (ICVI)		ACASI	2
19		Audio (Audio-SAQ)		ACASI	3
20		ACASI		ACASI	3

** if the number of labels left at the end of the survey does not match with the number in the column above, please make a note of why this is.

APPENDIX K: INTERIM SURVEY POST SURVEY ANONYMOUS QUESTIONNAIRE (LIKERT SCALE) CODING SHEET

Coding:

SAQ ICVI Audio-SAQ ACASI

Red codes – Codes to be entered into the database
Green Codes – Codes to be changed for analysis
Blue boxes are those questions that were phrased negatively (so coding is in opposite direction

---

RDS Interim Survey staff to complete the information below:

Community name: ☐ Cmty ID: ☐☐ Gender: ☐ Female ☐ Male

Dear RDS Study Participant,
Please take a few moments to tell us about your experience answering the questions. We want to be able to find out which method of questionnaire completion people felt most comfortable with.

Section A: Please tick one box only.

1.	I completed the questionnaire	
	in a room on my own./ under a tree	☐ 0
	a room with other male study participants/ in a tent	☐ 1
	in a room with other female study participants/ in a room with just me and my interviewer	☐ 2
	in a room with both male and female study participants together/ in a room with other interviewers and their study participants	☐ 3

Section B: Please read the following statements and put an X in one box only that contains your answer. Do not put an X in more than 1 box for each statement.
Please note

- Q1-13 are same for all 4 methods;
- ICVI, Audio-SAQ, ACASI have additional questions 14-17.

1. The RDS staff made me feel relaxed and able to answer honestly.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

2. I was able to ask questions if I needed to.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

3. I felt like other people who were answering questions on the questionnaire could see my answers.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(1)	(2)	(3)	(4)	(5)
(-2)	(-1)	(0)	(1)	(2)

4. Some of the questions made me feel embarrassed.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(1)	(2)	(3)	(4)	(5)
(-2)	(-1)	(0)	(1)	(2)

5. If I did not understand a question I felt able to ask for help.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

6. I do not believe[1] the RDS staff when they say that the responses that I give are kept secret.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(1)	(2)	(3)	(4)	(5)
(-2)	(-1)	(0)	(1)	(2)

7. The survey environment did not allow me to answer questions honestly.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

8. I didn't raise my hand even though I had a question to ask.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

9. I felt I had enough privacy while I was completing the questionnaire.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

10. The RDS staff helping us with the questionnaire were welcoming and looking after my needs

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

11. There were too many questions and I became bored part way through.

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(1)	(2)	(3)	(4)	(5)
(-2)	(-1)	(0)	(1)	(2)

12. I felt like the survey team could see my answers

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(1)	(2)	(3)	(4)	(5)
(-2)	(-1)	(0)	(1)	(2)

[1] The word 'believe' is a very strong word usually reserved for conversations connected to faith. So the team suggested we use the word 'agree' instead.

13. I believe that my answers from the baseline survey were kept secret

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

14. I could hear the person who read out the questionnaire clearly (ICVI/Audio-SAQ/ACASI).

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

15. I did not understand how to use the ballot sheet/ CD player/ computer. (ICVI/Audio-SAQ/ACSI)

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(1)	(2)	(3)	(4)	(5)
(-2)	(-1)	(0)	(1)	(2)

16. Even though I was giving my answers privately / Even though I had on earphones, I was still embarrassed to hear the sensitive questions read out loud. (ICVI/Audio-SAQ/ACASI)

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

17. I found it useful to have the answer cards when I was choosing my answer (ICVI)

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(5)	(4)	(3)	(2)	(1)
(2)	(1)	(0)	(-1)	(-2)

17.I had never used a CD player/ computer before and so I found it difficult when answering the questions. (Audio-SAQ/ACASI)

Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
(1)	(2)	(3)	(4)	(5)
(-2)	(-1)	(0)	(1)	(2)

Section C: Please tick one box only.

1. In the baseline survey in 2003, did you answer your questionnaire using a tape recorder?
   - Yes ☐ 1
   - No ☐ 0

2. Was it easier to answer questions honestly in 2003 (baseline survey) or today?
   - 2003 ☐ 0
   - today ☐ 1
   - there was no difference between the survey in 2003 and the one ☐ 2

APPENDIX L: GUIDE FOR HOW TO RUN DISCUSSION TO ASSESS DIFFERENCES BETWEEN 4 METHODS OF INTERIM SURVEY QUESTIONNAIRE.

Starting this with Shumba and Nharira communities. Week beginning 13 Feb 2006.

Goal: The purpose of these discussions is to broaden our understanding in a qualitative manner around whether there was a perceived difference by the participants in terms of privacy, confidentiality, and ease of answering socially sensitive questions among the different methods.

Procedure:
After participants have completed the survey (questionnaire and biological specimen collection) ask them if they would mind talking to you for a few minutes as you are interested in their opinion or ideas about the process of the questionnaire.

Notes,

1. Never interview a participant that you have interviewed in ICVI.
2. There is no need for these interviews to be gender specific
3. Only interview participants who are taking round 1 only questionnaires. You will want to talk to participants involved in R2 next week.
4. This discussion should not take more than 10 minutes. The participant is tired, hungry and wants to go home. Use your tape recorder if possible and also take notes during and immediately after the interview.

Introduction: Introduce the purpose of the discussion broadly:

"As you know we are comparing four different methods. We are interested in your opinion and experience with the method you have just used. We are *not* interested in your answers, but want to ask you about the process of taking that questionnaire."

Generally/overall-:

1) What did you enjoy most about this survey? (Rank three)
2) What things did you not enjoy about this survey? (Rank three)
3) What could we have done better?

Ask the participant to describe their experience of completing the questionnaire. Introduce this section of the discussion by explaining that you are interested in learning more about their experience with the questionnaire in terms of privacy as it impacted on their ability to answer questions honestly. Begin by acknowledging that you understand that some of the questions were of a very private nature. You are here to understand how that method performed in terms of making it easier for people like them to answer the difficult private questions in a way that made them feel secure.

SAQ:

- Tell me about your overall experience completing the questionnaire on your own
  - Did you like it? Why or why not?
  - Get them to describe or list what they liked about the method. And what they didn't like.
- "There were a number of skip patterns. Some times the skip pattern skipped more questions than others.
  - How did they find the skip patterns generally?
    - Were they understandable?

        - Were they confused at any point on how far to go ahead with the skip? What did the SA do that was helpful in getting them to understand the different ways that questions could be answered (probe for use and comprehension of instructions)?
        - Now that they have gone through the questionnaire are there things that we could explain more clearly in terms of how to handle the skip patterns?
- Have them describe their seating pattern (what was salient to them should emerge from their description)
    - Did they feel they could answer the questions privately?
    - Did the seating arrangement that we created give them enough privacy?
        - How so (or not?)
    - When they were taking the questionnaire did they feel that they had privacy? The whole time?
        - And if yes, what made them feel private?
        - If no, what was it that made them feel it wasn't private.
- What other aspects helped them to feel they were answering questions in a private setting? What made them feel that way?
    - If they can list other items that helped them feel that they were able to give information in private, see if they can rank them (which was the most important to them, etc)
- Do they think there are some questions that might be difficult for some people to understand? If so, find out which ones and why?
- What did they do if they didn't understand something (probe to see if they felt able to raise their hand and seek assistance from a survey assistant).
- If someone had had sex do you think they would be able to tell us in this type of questionnaire? What makes them think they way they do?
- Compare with baseline – see notes at the end.

Audio-SAQ:

- Tell me about your overall experience using the CD player to complete the questionnaire.
    - Did you like it? Why or why not?
    - Get them to describe or list what they liked about the method. And what they didn't like.
    - "There were a number of skip patterns. Sometimes the skip pattern skipped more questions than others."
        - How did they find the skip patterns generally?
        - Were they understandable?
        - Were they confused at any point on how far to go ahead with the skip?
        - What did the SA do that was helpful in getting them to understand the different ways that questions could be answered (probe for use and comprehension of instructions)?
        - Now that they have gone through the questionnaire are there things that we could explain more clearly in terms of how to handle the skip patterns?
- Find out if they found the CD boring or too slow and what they did about this (did they just skip the tape and start completing it as an SAQ?).
- Do they think there are some questions that might be difficult for some people to understand? If so, find out which ones and why?
- What did they do if they didn't understand something (probe to see if they felt able to raise their hand and seek assistance from a survey assistant).
- Where did they listen to the questionnaire? (Can they describe their room? How many others were in the room, etc) Were their others around them? How did that impact on their writing down their answers privately.

- What other aspects helped them feel private? Did they feel that they could answer the questions in a private manner? What made them feel that way?
- Were there things that the interim survey team did that made the space feel less private? Have them list other items that helped them feel that they were able to give information in private, see if they can rank them.
- Are their other steps we could have taken to make it feel more private?
- If someone had had sex do you think they would be able to tell us in this type of questionnaire? What makes them think the way they do?
- Compare with baseline – see notes at the end.

ACASI:

- Tell me about your overall experience completing the questionnaire using the computer
  - Did you like it? Why or why not?
  - Get them to describe or list what they liked about the method. And what they didn't like. (probe re use of mouse, and voice, and screen, etc)
- How did your practice session go before they started? Get them to describe it and comment on it.
- How did it feel to answer the sensitive questions? Did using the computer help them feel they could answer the questions more privately?
- Have them describe their seating arrangement. Did the seating arrangement that we created give them enough privacy? How so (or not?)
- What other things helped them feel private? Did they feel that they could answer the questions in a private manner? What made them feel that way?
  - Were there things that we did that made the space less private?
- If they can list other items that helped them feel that they were able to give information in private, see if they can rank them.
- Do they think there are some questions that might be difficult for some people to understand? If so, find out which ones and why?
- What did they do if they didn't understand something (probe to see if they felt able to raise their hand and seek assistance from a survey assistant).
- If someone had had sex do you think they would be able to tell us in this type of questionnaire? What makes them think the way they do?
- Compare with baseline – see notes at the end.

ICVI:

- Tell me about your overall experience completing the questionnaire using a face to face interview and the ballot box. Describe what you liked and didn't like. Probe setting and level of comfort.
- How was the ballot box introduced to you? Describe it and comment on it.
- How did it feel to answer the sensitive questions using a private ballot sheet? Did it feel private enough? If yes, how? If no, why? What other things helped them feel private?// were there other things that helped them feel their answers were private? What made them feel that way?
- Were there things that we did that made the space less private?
- If they can list other items that helped them feel that they were able to give information in private, see if they can rank them.
- Do they think there are some questions that might be difficult for some people to understand? If so, find out which ones and why?
- How did they think the interviewer handled the sensitive questions. (did they giggle or stumble?) Were the questions asked of you in a way that made

you feel that all answers were okay? What did the survey assistant do to put you at ease? Can you think of other things they could have done to help you feel more at ease?

- What did they do if they didn't understand something (probe to see if they felt able to raise their hand and seek assistance from a survey assistant).
- If someone had had sex do you think they would be able to tell us in this type of questionnaire? What makes them think the way they do?
- Compare with baseline – see notes at the end.

Other questions

- Do they think others using this method will answer sensitive questions honestly? why or why not? // What makes them believe that?
- Why do they think some people answer sensitive questions dishonestly?

- Have them describe to you what they think will happen to the responses they gave in their questionnaire. And what do they think about this/how did it influence them while they were answering questions. How do they think others will have answered the questionnaire if they believed like they did?

Comparison with baseline:

- What do they remember about the baseline survey. If they were to compare these two surveys, could they list what they like better now and what they appreciated about the baseline?

- After the baseline, many participants told us that they were worried that their responses would be exposed to the community. Do they think that happened?
  - If yes, then ask them to tell you about that experience.
  - If no, how did that impact on their experience during the interim?
- Did they worry about their name being linked with their study number? How so? What exactly was their concern?

Round 2

- Target: to reach everyone who completes a Round 2 questionnaire.
- Discussion not to exceed 15 minutes.
- Trick is to get them to think beyond the time it took to complete round 1 versus round 2 and to focus on the method itself. This may require you to acknowledge on several occasions that you realize that the second questionnaire was shorter.

1) ask them to describe both methods
2) ask them to compare both methods:
   a) what did they like about each one
   b) what did they consider inconveniences or barriers about each one?
   c) Were there any questions that were easier to remember using one method over another (remind them that you are not interested in *how* they answered their questionnaire, but in the *process*.)
   d) compare ease of use (understanding skip patterns, comprehension of questions).
   e) compare sense of privacy during questionnaire completion
   f) compare acceptability of the two methods: which method did they find most acceptable to use? Get them to describe aspects of this.
   g) which method do they think makes it easiest to answer sensitive questions like those about sexual activity? Why do they think this?

APPENDIX M: ADDITIONAL QUALITATIVE DATA FROM INTERVIEWS CONDUCTED WITH PARTICIPANTS AFTER SURVEY COMPLETION IN ROUND 1 AND ROUND 2.

Theme		Quotes
1	Importance of personally being able to control your privacy (note: the baseline survey questions were delivered in a classroom setting where single gender respondents were asked to sit separately from each other and the questionnaire was read aloud by a trained same gender interviewer.)	• The respondent said that people were more likely to tell the truth because there was no likelihood of other respondents 'peeping' at their answers. (field notes, R1, male ACASI • '[with Audio-SAQ]… everything is audible plus you will be doing things on your own. When there are so many of you (as in the baseline survey), someone may feel shy to tell the truth.'(R1, Audio-SAQ, female) • 'Today I was on my own and I was able to answer questions well.' (R1, Audio-SAQ, male) • The [baseline] setting encouraged respondents to give socially correct answers, which is different from SAQ where there is some privacy. (R1, Audio-SAQ, male) • The respondent said that the most outstanding difference was that [at the interim survey] they had been reading and responding to questions on their own, but at baseline it had been embarrassing because people couldn't answer honestly for fear that others could 'peep 'at their answers. (field notes, R1, female, SAQ)
2	Advantages of using a confidential voting box during interviewer administered questionnaire.	• 'When you answer questions by yourself [on the ballot sheet], you answer questions honestly because the interviewer would only be reading to you without writing [answers] on your behalf. Plus I would know that I would insert the ballot slip in the ballot box. It is not easy for the interviewer to know that you have done this and that.' (FGD, female) • 'Being told that 'I should not see your answers' by the [interviewer] makes you provide your whole truth.' (R2, male, ICVI, ICVI)
3	Advantages of ACASI increases sense of trust as it has an added perception that it is impossible to access a respondent's response.	• 'The computer method is fine. When we have finished completing the questionnaire [using booklets], [project staff] come and collect [them] and we do not know where they take them. They may open the questionnaires and look at them but the computer would have erased my responses (sic) and they will not be able to see them.' (FGD, female, ACASI)

Theme		Quotes
4	Difficulties handling skip patterns	• 'That section confused me, instructions were there of course but I still got confused. (R2, female, Audio-SAQ, ACASI) • The respondent preferred ACASI to SAQ because she could not understand the skip patterns in SAQ. She did not realise that ACASI also had some skip patterns (sic). (field notes, R2 female, ACASI, SAQ)
5	Advantages of not having an interviewer • decreased embarrassment	• 'Being interviewed by [Audio-SAQ] is better than by a person because with a person, you may feel embarrassed and so even if you slept with a boy [had sex], it's not easy to say but with [Audio-SAQ], it's possible' (R2 female ACASI, Audio-SAQ) • I felt embarrassed when asked [about sex] because I have never had sex before…[ACASI] increases your chances of telling the truth because there is non one physically present who might embarrass you.' (R1, female, ACASI) • 'For instance when I am asked if I had smoked dagga, can I say 'yes'? I can't do that. But if I am alone, I can admit [to this].' (FGD) • '[ICVI] does not give you time to think but when you are alone you can have time to think.' (FGD)
	• lack of trust when using an interviewer	• 'No one else will be there when you use [Audio-SAQ]. I do not think it can be [easy] for someone else to know [your answers]. But if it is [an interviewer], of course you are told that no one will be able to know but these are somebody's words. Maybe that is not true.' (R2, male, Audio-SAQ, ICVI) • 'I really understood that I had to answer sensitive questions on my own and that the ballot box would be opened [elsewhere]. However, it is just difficult to tell the truth in front of someone. I just had a feeling that the interviewer would be able to know my responses' (R1, ICVI, female). • 'I was telling the truth [with ACASI] because no one was ever going to know what I had written or said.' (R2, male, Audio-SAQ, ICVI)
6	Advantages of the interviewer in seeking clarification around meaning of questions	• The respondent insisted that she would prefer [ICVI] because it gave her an opportunity to get clarification from the interviewer promptly. [She] added that there are times when she was forced to give incorrect answers [with ACASI] because she was embarrassed to raise her hand even though the survey assistant had told her to do so. (field notes, female, R2, ACASI, ICVI)

Theme		Quotes
7	Sensitive questions not just related to sexual behaviour	• The respondent added that although there is a ballot box, there are still some questions that are not included in the ballot sheet yet they are also sensitive. For example, he mentioned that questions about one's household might be embarrassing. As a result, he thought a respondent might be forced to give socially acceptable answers at the expense of the truth because he would want to impress the interviewer. (R2, male, Audio-SAQ, ICVI) • The respondent also pointed out that questions asking about orphaning are quite sensitive. (field notes, R2, male, Audio-SAQ, ACASI)
8	Advantage of working with a cohort where trust can be built up over time	• 'I thought that it was confidential because we have never heard [our previous responses] being talked about.' (R1, female, ACASI) • 'I have never heard anyone saying anything about the results [from the baseline survey].' (R1, male, Audio-SAQ) • 'I have so much trust in [this organization] because ever since [the beginning] I have not heard anything about anyone … so that testifies that [the organization] keeps to its word, is trustworthy and keeps our information safe.' (R1, female, ICVI)

APPENDIX N: PRACTICE INSTRUCTIONS FOR ACASI FINAL SURVEY

These are the practice instructions for the final survey for ACASI that incorporate the concept of a repeated matrix. Simple questions about shopping in a town were used to demonstrate this.

Regai Dzive Shiri – Final Survey
Instruction on how to complete the practice questions for ACASI

It is essential that participants feel comfortable not only using the laptop but understanding the different types of questions and how to move through the computer. The practice questions are designed to address this but require the survey team member to fully understand how the practice questions work.

After you have completed the practice questions, a participant should feel competent in the following:

- ✓Able to use the mouse to click their answers;

Understand that the functions of the three buttons on the side and how to use them (Previous Question, Repeat the Question, Next Question)

- ✓Understand the meaning of date responses such as “before January 2005”;
- ✓Understand the concept of the skip pattern;
- ✓Understand why a warning dialogue box comes up and how to handle it.
- ✓Understands the function of the “clear” button.
- ✓Understand that they can call on a survey assistant at any time if they need assistance.

Use the practice questions to accomplish the competency outlined above.

Be sure to let them use the mouse as much as possible during the practice. Even if you use the mouse to show them something, make sure you give it back to them or go back to that question so that they can try it themselves.

Before you begin:
Explain that just as in the last questionnaire (AASI), the question, the instruction, and the answers will be on the screen. The difference is that now they will use the mouse to click on the box that represents what is true for them.
Explain that there are 4 ways to answer the questions and that just as before, we want them to choose the answer or answers that are most true for them.

Type in the practice number and go to question 1:

Screen No	Question	Instruction	Response(s)	Comments/Guidelines on how to proceed
1	Of the foods listed below which is your most favorite food?	*Please press on box only*	Bananas Sugar Cane Zap Snacks	Use this question to: ✓Highlight that as each response is read out, it gets highlighted in blue. ✓Highlight that when you answer these types of questions the computer automatically takes you to the next question. You can point out that the "next question" button is greyed out and can't be used. Point out the three buttons on the side Have them choose an answer to this question and proceed to question 2.
2	Of the foods listed below, which food so you like?	*Please press ALL statements that apply*	Bananas Sugar Cane Zap Snacks Apples Mangos Papayas	Use this question to ✓Highlight the instruction is different – it says pick all that are true for you. ✓Highlight what happens when you pick a response – a tick appears in the response button. ✓Highlight how to undo a response: click it again and the tick goes away. ✓Highlight that you have to click "Mubvunzo unotevera" in order to proceed to the next question as the computer does not know how many responses you are picking.
3	How many months are there in a year?	*Please press the number pad.*	Number pad[1]	Use this question to: ✓Highlight that you have to click the numbers, ✓Highlight that your answer appears in the bottom right hand screen. ✓If the number there is not want you intended, click clear and it will erase the numbers in the box and you can start again. Have to click "Mubvunzo unotevera" to take you to the next question.

[1] Note that the number pad looked like a telephone keypad on the screen.

The following set of questions practice the concept of cycling through. It also gives them a chance to practice thinking about dates and different time frames.

- ✓Explain to the participant that the reason we are using the laptop is that it can help take participants to different questions depending on their life story. You are now going to show them a simple example of this, by asking them about their experience traveling to a big town.
- ✓Tell the participant that you are going to take them through a pretend practice session and then have them do it again on their own.

Screen No	Question	Instruction	Response(s)	Comments/Guidelines on how to proceed
4	How many times have you traveled to a big town in your whole life?	*Please press on box only*	1 time, 2 times, 3 times, 4 times, 5 times, 6 or more times, never been to a big town	This question asks you to think about your WHOLE LIFE. Ask the participant to pretend that they have traveled to a big town 5 times. Have them figure out what button they would push. Note: when you go through this the second time around, you can also show them at this point that if they press 'never' here, they get taken out of the questions and go straight to the end. They can then 'see' how each person's story gets handled differently by the computer.
5	Have you traveled to a big town since jan 2006?	*Please press on box only*	Yes No	✓Use this question to; ✓Highlight the difference in this question which is that it is asking about a different time frame. See what they understand by 'January 2006 until now' and ensure that you clarify it for them if they have misunderstood the question. ✓For this practice, have them click 'yes'.
6	How many times have you traveled to a big town in the last 12 months (meaning from April 06 to April 07)	*Please press on box only*	1 time, 2 times, 3 times, 4 times, 5 times, 6 or more times	Highlight that there is this is yet another time frame: in the last twelve months. Highlight that we clarify what we mean by 'last 12 months' in the question. Have them pretend they have gone 2 times in the last 12 months and have them choose their answer. Point out that on this question there is no button "never been" because you only get asked this question if you answered that you have been to a town in the very first question.

Screen No	Question	Instruction	Response(s)	Comments/Guidelines on how to proceed
7	When did you last travel to a big town?	*Please press on box only*	April 2007 March 2007 February 2007 January 2007 December 2006 going backwards	Highlight that we want them now to think of the LAST time they traveled to a town. Have them pick a month. You might want to summarize here: ✓You told us that you have been to town 5 times, you have been since Jan 2006 and that you have been 2 times in the last 12 months. ✓Now it is asking you more information about the LAST time you were in town.
8	Did you buy an ice cream then?	*Please press on box only*	Yes No	These are two simple questions about their experience in town on *that* trip. Have them pick an answer for each question.
9	Did you buy some shoes then?	*Please press on box only*	Yes No	
10	When did you last travel to a big town before the time you just told us about?	*Please press on box only*	April 2007 March 2007 February 2007 January 2007 December 2006 going backwards	Use this question to: ✓Highlight that this question is slightly different from the one before as we now want to know about the time they traveled to a big town just before the one they have just told us about. It will now take them back to the ice cream and shoes questions but for *this* trip to town. It is important that they understand that they are answering the **same** questions but for a new and **different** time frame.
11	Now we want to ask you about the first time you traveled to a big town.	*Please press the 'next question' button.*		✓This screen asks about their FIRST experience traveling to a town. Remind them that we pretended they had been to a town 5 times and they had now told us about their last experience and the one before that. Now we are **skipping** right to the VERY FIRST time. ✓Show them that there is no answer to be given here, and that the instruction tells them to click "Mubvunzo unotevera" to get to the next screen.

12	How old were you when you first travelled to a big town?	*Please use the number pad on the screen to enter how old you were when this happened. If you are uncertain, enter your best guess*	Number pad (warning example pad)	✓This is a chance for them to practice using the number pad again. ✓Highlight that the instruction says "if not sure, guess" which might be true if they were quite young. ✓Also show them that if they answer a number larger than 25 the computer knows that this is impossible since they are not that old even now. So it will give them an error message that says try again. They will need to click "ok" on the warning box, then click "clear", and then click the number they want to put in.
13	Thank you. This is the end.			This is the last screen. Have them go back and practice this cycle again using their real life This is when you can show them that if they click 'never been to a town" earlier on (first question in the cycle), they go straight to this screen since none of the questions they were just asked would make any sense.

Have them go through this cycle once with you "directing them". Then have them try it again on their own. Now that they have seen what happens when you have traveled you can show them what would happen if you click 'never traveled to a big town' or 'just traveled once'. It might be easier to do this by exiting this practice session and then just starting over. Keep emphasizing that they will see questions in this format but about different aspects of their lives in the actual questionnaire.

APPENDIX O: PUBLICATIONS RELATED TO THE RDS PROJECT

1. Copies of papers related to this thesis

2. Summary of papers and presentations made relating to this thesis and to the RDS project as a whole.

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Brief report

Difference in prevalence of common mental disorder as measured using four questionnaire delivery methods among young people in rural Zimbabwe ☆

Lisa F. Langhaug [a,*], Yin Bun Cheung [b], Sophie Pascoe [c], Richard Hayes [c], Frances M. Cowan [a,d]

[a] Royal Free and University College Medical School, London, United Kingdom
[b] Singapore Clinical Research Institute, Singapore
[c] London School of Hygiene & Tropical Medicine, London, United Kingdom
[d] University of Zimbabwe, Zimbabwe

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ABSTRACT

Background: Previous studies have suggested that interviewer-administered questionnaires can under-estimate the prevalence of depression and suicidal ideation when compared with self-administered ones. We report here on differences in prevalence of reporting mental health between four questionnaire delivery modes (QDM).

Methods: Mental health was assessed using the Shona Symptom Questionnaire (SSQ), a locally validated 14-item indigenous measure for common mental affective disorders. A representative sample of 1495 rural Zimbabwean adolescents (median age 18) was randomly allocated to one of four questionnaire delivery modes: self-administered questionnaire (SAQ), SAQ with audio (AASI), interviewer-administered questionnaire (IAQ), and audio computer-assisted survey instrument (ACASI).

Results: Prevalence of common affective disorders varied between QDM (52.3%, 48.6%, 41.5%, and 63.6% for SAQ, AASI, IAQ, and ACASI respectively ($P<0.001$)). Fewer participants failed to complete SSQ using IAQ and ACASI than other methods (1.6% vs. 12.3%; $P<0.001$). Qualitative data suggested that respondents found it difficult answering questions honestly in front of an interviewer.

Limitations: Direction of accuracy cannot be ascertained due to lack of objective or clinical assessments of affective disorders.

Conclusions: Estimates of prevalence of psychosomatic symptoms and suicidal ideation varied according to mode of interview. As each mode's direction of accuracy remains unresolved evaluations of interventions continue to be hampered.

1. Introduction

Measurement of mental health disorders including anxiety, depression and suicidal behaviour, using a variety of scales and instruments, has been shown to be affected by the method used for delivering that scale or instrument (Klimes-Dougan, 1998; Moum, 1998). Research suggests that interviewer-administered instruments often detect lower rates of poor mental health than self-administered instruments (Kendler et al., 1993; Klimes-Dougan, 1998; Moum, 1998). As a result, self-administered questionnaires, predominantly administered using paper and pen, are those most frequently used. The development of computerized questionnaire administration (Audio Computer-Assisted Survey Instrument (ACASI)), where computer software allows the subject to hear questions and responses through earphones while simultaneously reading the questions written on the computer screen, has been found to significantly increase reporting of

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* Corresponding author. 92 Prince Edward Road, Milton Park, Harare, Zimbabwe. Tel.: +263 20 66276, +263 912 551290; fax: +263 20 63056.
E-mail address: lisa.langhaug@gmail.com (L.F. Langhaug).

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drug use, abortion, same-gender sex, and violent behaviour compared with interview-administered and paper-and-pen self-administered questionnaires (Fu et al., 2004; Tourangeau and Smith, 1996; Turner et al., 1998). While ACASI has shown high acceptability and feasibility in assessing quality of life measurements in low literacy populations, (Thumboo et al., 2006) there is little comparative research on the use of ACASI to capture equally sensitive mental health information. Instead, the evaluation of questionnaire administration has focused predominantly on the comparison of self-administered questionnaires, face-to-face interviews and phone interviews (Aziz and Kenford, 2004; Cheung et al., 2006; Hermens et al., 2006; Holbrook et al., 2003; Klimes-Dougan, 1998; Moum, 1998).

The Regai Dzive Shiri Project is a community randomized trial of a multi-component adolescent reproductive health intervention conducted in rural Zimbabwe. In 2006, we nested an experimental evaluation of four questionnaire delivery modes (QDM) into the interim survey, in order to compare prevalence of reporting of various stigmatized behaviours. Mental health was assessed using the Shona Symptom Questionnaire (SSQ), a locally validated, 14 item, indigenous measure of common affective disorders (Patel et al., 1997). The aim of the SSQ is to measure psychiatric morbidity. It was developed and validated among patients attending primary care clinics and traditional medical practitioners in Harare and asks about the presence of various symptoms in the previous week. Using a gold standard defined as diagnosis of a mental disorder by a health care worker *and* scoring 12 or more on the Revised Clinical Interview Schedule, the sensitivity and specificity of the SSQ (using a cut-off of 8 or more out of 14 items) for common affective disorders, were 63% and 83% respectively (Lewis et al., 1992).

We report here on differences in prevalence of reporting of common affective disorders between four questionnaire delivery modes.

Table 1
Percentages of respondents giving affirmative responses to SSQ (boldface type indicates highest percentage for each statement).

SSQ Scores	SAQ %	AASI %	IAQ %	ACASI %	p value
Total number of participants by method	327	331	359	375	
Overall response rate.	88.8	88.0	98.6	**100.0**	0.002
At risk for common affective disorder (scored 8 or more affirmatively)	52.3	48.6	41.5	**63.5**	<0.001
Severely at risk for common affective disorder (scored 11 or more affirmatively)	19.6	23.6	14.2	**36.8**	<0.001
SSQ statements					
There were times in which I was thinking deeply or thinking about many things (thinking too much).	77.7	74.3	70.8	**87.2**	<0.001
I found myself sometimes failing to concentrate	61.2	68.6	54.6	**81.3**	<0.001
I lost my temper or got annoyed over trivial matters	54.1	56.5	59.9	**73.6**	<0.001
I had nightmares or bad dreams	68.2	66.2	66.9	**78.4**	<0.001
I sometimes saw or heard things which others could not see or hear	20.8	26.6	25.1	**31.5**	0.014
My stomach was aching	60.9	56.2	52.9	**69.1**	<0.001
I was frightened by trivial things	44.0	38.1	35.9	**52.0**	<0.001
I sometimes failed to sleep or lost sleep	50.8	51.4	41.8	**59.7**	<0.001
There were moments when I felt life was so tough that I cried or wanted to cry	58.7	61.6	52.4	**72.5**	<0.001
I felt run down (tired)	68.2	61.3	59.1	**77.1**	<0.001
At times I felt like committing suicide	8.3	**13.0**	5.3	12.0	0.001
I was generally unhappy with things that I would be doing each day	48.3	44.1	43.7	**57.3**	<0.001
My work was lagging behind (impairment of functioning)	40.4	47.4	42.3	**53.6**	0.002
I felt I had problems in deciding what to do	52.9	54.1	50.4	**59.7**	0.075

2. Methods

In 2003, the Regai Dzive Shiri baseline survey was conducted in 30 rural communities in three provinces in eastern rural Zimbabwe (Cowan et al., 2008). All Form 2 pupils (in their ninth year of schooling, median age 15 years) attending trial secondary schools ($n=82$) and whose parents/guardians had consented were invited to take part in the baseline survey. Of the 7885 eligible pupils, 6791 (87%) took part. The main reason that young people or their parents declined study participation was due to concerns around blood draw. In 2006, the interim survey, into which the trial reported here was nested, was conducted in 12 of the 30 study communities, selected by restricted randomization to ensure balance between intervention and control arms of the trial and between the three provinces. Young people were eligible to take part in the interim survey if they were cohort members who had previously participated in the baseline survey and were currently residing in these communities. The questionnaire was carefully designed and piloted prior to administration; cognitive interviews with 65 persons were conducted prior to questionnaire administration to check and ensure comprehension (Mavhu et al., 2008) for this age group. Using a random permuted block design, all interim survey participants were randomly allocated to one of four questionnaire delivery modes: i) self-administered questionnaire (SAQ) using paper and pen, ii) audio-assisted survey instrument (AASI), consisting of SAQ accompanied by an audio soundtrack on a CD player; iii) interviewer-administered questionnaire (IAQ) and; iv) audio computer-assisted survey instrument (ACASI). All participants received detailed training of how to use a method before completing their questionnaire. If the survey assistant felt that they were unable to use a method competently after this training then they were assisted to complete the questionnaire — this happened rarely, in only three cases. Analysis was based on mode actually taken. Probable cases of common affective disorders were defined in line with published scale criteria, as participants who answered affirmatively ('always' or 'sometimes') to 8 or more of the 14 statements included in the Shona Symptom Questionnaire (SSQ) (see Table 1 for English phrasing of statements). Probable severe cases were defined as those who scored 11 or more.

Participants with missing values for any of the SSQ items were excluded from analysis. Chi-square tests were used to assess the association of mode of administration with these common affective disorders and with responses to each of the 14 SSQ statements separately. In the event of expected

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frequencies smaller than 5, an extension of the Fisher's exact test was used (Mehta and Patel, 1983). When analyzing the 14 statements separately, a nominal P-value $< 0.05/14 = 0.003$ was considered statistically significant according to the Bonferroni adjustment. Risk ratios (RR) were estimated for probable cases and probable severe cases using SAQ as the reference group.

Participants' perceptions (e.g. ease of completion, sense of privacy during completion, and maintenance of confidentiality) of their questionnaire delivery mode was assessed in three ways. Participants from the last five communities were asked to complete an anonymous post-survey questionnaire that used a five-point Likert Scale to explore their opinions. Qualitative data from two gender-mixed focus group discussions, purposively sampled to reflect all modes and 115 randomly selected study participants described those aspects particular to a mode that enhanced its acceptability. All qualitative data were transcribed electronically and coded for thematic issues using Nvivo 7.0 (QSR, Australia).

3. Results

Of 1557 cohort participants still living in the study communities, 1495 (96%) took part in the interim survey (mean age 18.2 years; range 15–23). Twelve participants were removed from the analysis due to data capture errors. Response rates for completion of the SSQ mental health scale were high; 93.9% of survey participants completed the entire scale. Overall 91 (6.1%) failed to complete one or more SSQ items making it impossible to calculate an SSQ score; this varied by method (SAQ = 41 (11.1%); AASI = 45 (12.0%); IAQ = 5 (1.4%); ACASI = 0 (0.0%); $P = 0.002$). Of note this included 14 participants (1.0%) who failed to complete *any* of the SSQ questions (SAQ = 6, AASI = 8).

As shown in Table 1, the prevalence of common affective disorders as estimated by SAQ, AASI, IAQ, and ACASI were 52.3%, 48.6%, 41.5%, and 63.6% respectively ($P < 0.001$). There was no significant difference in prevalence between AASI and SAQ (RR = 0.93; 95% CI: 0.80 to 1.08), whereas IAQ was associated with a lower prevalence (RR = 0.79; 95% CI: 0.68 to 0.93) and ACASI with a higher prevalence (RR = 1.21; 95% CI: 1.07 to 1.38).

Estimates of prevalence of probable severe cases were 19.6%, 23.6%, 14.2%, and 36.8% for SAQ, AASI, IAQ, and ACASI respectively ($P < 0.001$). Again there was no significant difference between AASI and SAQ (RR = 1.20; 95% CI: 0.90 to 1.61), and as before IAQ gave a lower prevalence (RR = 0.73; 95% CI: 0.52 to 1.02) and ACASI a significantly higher reported prevalence than SAQ (RR = 1.88; 95% CI: 1.45 to 2.43).

Table 1 shows the percentages of affirmative responses for each of the 14 SSQ statements. All but two statements, "I sometimes saw or heard things which others could not see or hear" ($P = 0.014$), and "I felt I had problems in deciding what to do" ($P = 0.075$) showed a significant difference across modes of administration (each P-value being less than the Bonferroni-adjusted P-value cut-off of 0.003), although the non significant direction of effect was the same as for other questions. Out of the 12 statements that were significantly associated with questionnaire delivery mode, nine showed lowest prevalence when assessed by IAQ and 11 showed highest prevalence when assessed by ACASI.

Post survey, quantitative (post survey questionnaires) and qualitative data (exit interviews and focus group discussions) collected information on mode acceptability and feasibility. Of 697 participants from the last five communities, 650 (93%) completed anonymous post-survey questionnaires with equal completion rates between modes. Of 115 qualitative interviews, 61% were with males. Detailed results are presented elsewhere (Langhaug et al., submitted for publication). Emerging themes focussed on the importance of privacy, ease of method use, and interviewer presence, especially in relation to sensitive questions and questionnaire comprehension. Overall participants stressed the importance of being able to complete the questionnaire 'on their own'. IAQ users expressed difficulty answering sensitive questions. While a few highlighted the benefits of seeking instant clarification from the interviewer, IAQ users predominantly reported feeling embarrassed having to respond to sensitive questions in front of someone as illustrated in the following quotes. 'With [AASI], there is [no question] that you can't answer [truthfully] because no one else ….knows what you said. When you do not see any other person there is nothing to be afraid of, as you would be with [an interviewer]'. Another participant explained, 'but with [an interviewer]. I was just thinking that somebody was watching me.' By contrast, participants reported feeling more comfortable using the self-completion methods: 'I was telling the truth [with ACASI] because no one was ever going to know what I had written or said'.

4. Discussion

This is one of the first studies to compare the effect of random assignment of questionnaire delivery modes on reporting of common affective disorders conducted amongst young people in developing countries. We found significant differences in prevalence of reporting of this mental ill-health between modes. The interviewer-administered questionnaire was associated with the lowest prevalence of reporting these common affective disorders and ACASI with the highest prevalence. Item non-response rate, often considered a limitation of self-report, also differed significantly between modes of administration with ACASI and IAQ showing an appreciably lower rate of incomplete response than the other two methods.

The post survey data collected to explore the relative acceptability of the various QDM clearly illustrate that participants who completed their questionnaire through an interviewer felt inhibited by their presence, despite the advantage of feeling able to ask questions for clarification. ACASI users stressed the ease and increased sense of confidentiality they felt completing their questionnaire using a computer. Of note, recent improvement in computer programming now allows ACASI to provide additional clarification (albeit standardized) for those who need it (Macalino et al., 2002). Although initially more expensive than other methods, ACASI does not rely on highly skilled interview staff for successful implementation and data-entry time and errors are reduced. While keeping laptops powered in this non-electrified rural setting proved challenging, we overcame this by using solar panels connected to truck batteries.

Other methodological research examining measurement of the prevalence of psychological morbidity has highlighted the importance of questionnaire delivery modes and has emphasized the benefits of self-administered as opposed to interview-administered questionnaires (Klimes-Dougan,

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1998; Moum, 1998). Three of the four methods compared here were self-administered (SAQ, AASI, and ACASI). AASI and ACASI offer the additional benefit over SAQ of allowing subjects to hear the questions through head phones in addition to reading them, which improves understanding. Traditionally, comparative research has explored the difference between in-person and telephone interviews (Aziz and Kenford, 2004; Hermens et al., 2006; Holbrook et al., 2003). However, while the interviewer is not physically present when using the telephone, a real person is distantly 'in attendance.' Here, the voice for AASI and ACASI, an identical recording for both modes, was even more distant in that it was unable to judge the response that was given.

As shown here, estimates of the prevalence of common affective disorders varies substantially according to mode of data collection. For example, the prevalence of self-reported suicidal ideation more than doubled when it was assessed by ACASI (12.0%) compared to when it was interviewer-administered (5.3%). Such uncertainty hampers informed estimation of the potential impact of clinical and preventive health services. In many studies it is assumed that a higher prevalence of self-reported sensitive data reflects more accurate reporting. While this hypothesis makes intuitive sense, evidence using an objective or clinical assessment continues to be lacking. Further research on clarifying the direction of accuracy or relative bias of these modes is urgently needed.

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Conflict of interest

All authors declare that they have no conflicts of interest.

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Abstracts of papers submitted for publication

Title: How you ask the question really matters: a randomized comparison of four questionnaire delivery modes to assess validity and reliability of self-reported data on sexual behaviour in young people in rural Zimbabwe.

Lisa F. Langhaug (MPH)[1], Yin Bun Cheung (PhD)[2,3], Sophie J. Pascoe (MSc)[2], Petronella Chirawu (BA)[4], Godfrey Woelk (PhD)[4], Richard Hayes (DSc)[2], Frances M. Cowan (MSc)[1].

[1]University College London
[2]London School of Hygiene and Tropical Medicine
[3]Clinical Trials and Epidemiology Research Unit, Singapore
[4]University of Zimbabwe

Abstract: Formatted for British Medical Journal

Objective To compare the reliability and validity of sexual behaviour questions across four questionnaire delivery modes in rural Zimbabwean youth.
Design Randomized control trial
Setting 12 rural communities in South-Eastern Zimbabwe, randomly selected from the 30 communities that comprise the Regai Dzive Shiri trial.
Participants Cohort members of the RDS main trial (827 males and 668 females; mean age 18.2 years, range 15-23) residing in these 12 communities.
Intervention Cohort members were randomly allocated to one of the following: self-administered questionnaire (SAQ=373), SAQ accompanied by an audio soundtrack (Audio-SAQ=376); face-to-face interview using an informal confidential voting box (ballot-sheet-interview=365); and audio computer-assisted survey instrument (ACASI=381).
Main outcome measures Key questions were selected *a priori* to compare item non-response and rates of reporting sensitive behaviours between questionnaire delivery modes. Biomarkers for sexual activity included incident HIV, HSV2 and current pregnancy in females. Additional qualitative and quantitative data were collected on method acceptability.
Results Item non-response was significantly higher with SAQ and Audio-SAQ than with ballot-sheet-interview and ACASI ($p<0.001$). After adjusting for covariates, Audio-SAQ and ACASI users were twice as likely to report sexual activity when compared to SAQ users (Audio-SAQ AOR=2.05 [95%CI: 1.2-3.4]; ACASI AOR=2.0 [95%CI: 1.2-3.2]), with no reporting difference between ballot-sheet-interview and SAQ users (ballot-sheet-interview AOR=1.0 [95%CI: 0.6-1.8). ACASI users reported a lower age at first sex (0.7-1.7 years lower) ($p<0.045$). ACASI users reported increased ability to answer questions honestly ($p=0.004$) and believed their answers would be kept secret. Participants claimed increased comprehension when hearing questions while reading them. Ballot-sheet-interview users expressed difficulty answering sensitive questions, despite understanding that their answers would not be known by the interviewer.
Conclusion ACASI appears to significantly reduce bias, is feasible and acceptable in resource-poor settings with low computer literacy. Its increased use would likely improve the quality of questionnaire data in general and sexual behaviour data specifically.
Trial registration The Regai Dzive Shiri trial has been registered retrospectively and trial number will follow.

Keywords: adolescents, sexual behaviour, survey methodology, Zimbabwe, HIV Seroprevalence, randomized controlled trial

Title: A Systematic Review of Questionnaire Delivery Modes in Developing Countries Which Focuses on How to Improve the Validity of Sexual Behaviour Reporting

Lisa F. Langhaug[1§], Lorraine Sherr[1], Frances M Cowan[1,2]
[1] Centre for Sexual Health & HIV Research, University College London, Mortimer Market Centre, off Capper Street, London, WC1E 6JB
[2] Department of Community Medicine, University of Zimbabwe, Harare, Zimbabwe

Abstract- formatted for AIDS

Background
To systematically review comparative research from developing countries on questionnaire delivery mode effects.
Methods
Three databases (Medline, EMbase, and PsychINFO) and ISSTDR conference proceedings were searched. Randomized-controlled trials and quasi-experimental studies were included if they compared two or more questionnaire delivery modes, were conducted in a developing country, reported on sexual behaviours, and occurred after 1980. Twenty-eight articles reporting on 26 studies met the inclusion criteria.
Main outcome measures:
Item non response rates and rates of reporting sexual behaviours. Heterogeneity of reported trial outcomes between studies made it inappropriate to combine trial outcomes.
Results:
Eighteen studies compared audio computer-assisted survey instruments (ACASI) or its derivatives (PDA or CAPI) against another questionnaire delivery method (self-administered questionnaires, face-to-face interviews, random response technique). Despite wide-variation in geography and populations sampled, there was strong evidence that computer-assisted interviews decreased item-response rates and increased rates of reporting of sensitive behaviours. ACASI also improved data entry quality. A wide range of sexual behaviours were reported including vaginal, oral, anal and/or forced sex, age of sexual debut, condom use at first and/or last sex. Validation of self-reports using biomarkers was rare.
Discussion
These data reaffirm that questionnaire delivery modes do affect self-reported sexual behaviours and that use of ACASI can significantly reduce reporting bias. Its acceptability and feasibility in developing country settings should encourage researchers to consider its use when conducting sexual health research. Triangulation of self-reported data using biomarkers is recommended. Standardising sexual behaviour measures used in comparison would allow for meta-analysis.

Key words: developing country; systematic review, validity, method comparison

1. Papers related to this thesis:

Langhaug LF., Cheung YB, Pascoe SJS., Hayes RJ, CowanFM (2009). Difference in prevalence of common mental disorder as measured using four questionnaire delivery methods among young people in rural Zimbabwe. *Journal of Affective Disorders, (in press)*.

Langhaug LF, Cheung YB, Pascoe SJS, Chirawu P, Woelk G, Hayes RJ. Cowan, FM. (2009). How you ask the question really matters: a randomized comparison of four questionnaire delivery modes to assess validity and reliability of self-reported data on sexual behaviour in young people in rural Zimbabwe. (*submitted for publication*)

Langhaug LF, Sherr L, Cowan, FM. A systematic review of questionnaire delivery modes in developing countries which focuses on how to improve the validity of sexual behaviour reporting. (*submitted for publication*)

Mavhu, W., **Langhaug, L. F.**, Manyonga, B., Power, R., & Cowan, F. M. (2008). What is 'sex' exactly? Using cognitive interviewing to improve validity of sexual behaviour reporting among young people in rural Zimbabwe . *Culture, Health, and Sexuality, 10,* 563-572.

Pascoe, SJS, Langhaug, LF, Hayes, RJ, Cowan FM 'How poor are you?' – A comparison of four questionnaire delivery modes for assessing wealth in rural Zimbabwe (*in preparation*)

2. Oral presentations related to this thesis:

2007 – 17th International Society for Sexually Transmitted Diseases Research (ISSTDR), Seattle, Washington, USA

- Oral: Lisa F Langhaug, Yin Bun Cheung, Sophie Pascoe, Webster Mavhu, Petronella Chirawu, Frances M Cowan. Comparing 4 Questionnaire Delivery Methods for Collection of Self Reported Sexual Behaviour Data in Rural Zimbabwean Youth

3. Papers related to the RDS project in its entirety (ordered chronologically):

Cowan FM, **Langhaug LF**, Mashungupa GP, Nyamurera T, Hargrove J, Jaffar S, Peeling RW, Brown DW, Power R, Johnson AM, Stephenson JM, Bassett MT, Hayes RJ; Regai Dzive Shiri Project. School based HIV prevention in Zimbabwe: feasibility and acceptability of evaluation trials using biological outcomes. *AIDS.* 2002 Aug 16;16(12):1673-8.

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Chirawu, P., **Langhaug, L. F.**, Mavhu, W., Pascoe, S. J. S., Dirawo, J., & Cowan, F. M. (2009). Acceptability and challenges of implementing voluntary counselling and testing (VCT) in rural Zimbabwe: Evidence from the Regai Dzive Shiri Project. *AIDS Care, (in press)*.

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Submitted manuscripts:
Langhaug LF, Pascoe SJS, Mavhu W, Woelk G, Sherr L, Hayes RJ, Cowan FM, High prevalence of mental ill-health among adolescents living in rural Zimbabwe. Submitted to the *International Journal of STIs)*

4. Oral and Poster presentations (first author only):

2007 – 17th International Society for Sexually Transmitted Diseases Research (ISSTDR), Seattle, Washington, USA

- Poster: **Langhaug LF**, Pascoe SJS, Sherr L, Cowan FM. The mental health burden in adolescents may impact on HIV risk in rural Zimbabwe

2007 - South African AIDS Conference, Durban, South Africa

- Poster: **Langhaug LF**, Cheung YB, Pascoe SJS, Hayes RJ, Cowan FM *What really matters? A comparison of 4 different questionnaire delivery methods: a sub study of the Regai Dzive Shiri Project.*
- Poster: **Langhaug LF**, Pascoe SJS, Sherr L, Cowan FM *The mental health burden on adolescents living in high HIV incidence communities in rural Zimbabwe.*

2005 – 16th International Society for Sexually Transmitted Diseases Research (ISSTDR)- Amsterdam

- Oral: **Langhaug LF**, Mutisi M, Gore O, Manyonga B, Mutanga O, Masiyiwa M, Power R, Cowan FM. *Using participatory methods to assess the riskiness of rural communities for adolescents: an analysis of risk maps in the Regai Dzive Shiri Project*
- Poster: **Langhaug LF**, Mutisi MC, Power RM, Cowan FM *Exploring the context of sexual behavior among rural Zimbabwean adolescents*

2005 – 2nd South African AIDS Conference, Durban, South Africa

- Oral: **Langhaug LF**, Mutisi M, Power R, Cowan FM *Using participatory methods to assess the riskiness of rural communities for adolescents: an analysis of risk maps in the Regai Dzive Shiri Project.*
- Poster: **Langhaug LF**, Mutisi M, Gore O, Manyonga B, Masiyiwa M, Mutanga O, Power RM, Cowan FM *Exploring the context of the evolution of sexual behavior among rural Zimbabwean adolescents.*
- Poster: **Langhaug LF**, Mutisi M, Gore O, Manyonga B, Masiyiwa M, Mutanga O, Power RM, Cowan FM *Exploring the context of vulnerability: analysis of a subset of the Regai Dzive Shiri Project cohort.*

2005 - 12th Reproductive Health Priorities Conference, Stellenbocsh, South Africa Priorities

- **Poster: Langhaug LF**, Mavhu W, Cowan FM *Unlocking sensitive questions: using cognitive interviewing to improve the validity of sexual behavoiur measurement in rural Zimbabwe: a sub-study of the Regai Dzive Shiri project.*

2004 – 11th Reproductive Health Priorities Conference, Sun City, South Africa.

- Poster: **Langhaug LF ¸** Power RM, Cowan FM *Assessing the validity of behaviour measurement in rural Zimbabwe: a sub-study of the Regai Dzive Shiri Project.*