

HIV SCREENING PATTERNS IN SUB-SAHARAN AFRICA: EVIDENCE FROM
THE DEMOGRAPHIC AND HEALTH SURVEY DATA 2003-2007

by

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This dissertation is dedicated to
Momo (Vinni), Frana, Uncle David and Aunt Jackie,
and by extension the entire Wright-Worthy family and the Hall family
my rocks of Gibraltar, the shine in my sun,
the fire in my soul,
and the volume in my voice of truth.

Thank you for being a daily blessing.

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LIST OF ACRONYMS

AIDS – Acquired Immune Deficiency Syndrome
ANC –Antenatal Clinics
AZT – Azidothymidine
CDC – Center for Disease Control and Prevention
CMV – Cytomegalovirus Disease
DHS – Demographic and Health Survey
DIFD – United Kingdom Department for International Development
GF/ GFATM/ Global Fund – Global Fund for AIDS Tuberculosis and Malaria
HAART – Highly Active Antiretroviral Treatment
HIV – Human Immunodeficiency Virus
IEC – Information Education Communication
KS – Karposi Sarcoma
MAC – Mycobacterium Avuim Complex
NAC – National HIV and AIDS Council (in some cases Commission may be used)
NAP – National HIV and AIDS Policy (preceded by the first initial of the country)
NASP – National HIV and AIDS Strategic Plan (preceded by the first initial of the country)
NGO – Non-Governmental Organizations
PCP – Pnemocystis Carinii Pneumonia
PEPFAR – US President’s Emergency Plan for AIDS Relief
PITC – Provider Initiated HIV Testing and Counseling
PLWHA – People Living With HIV/AIDS
PMTCT – Prevention of Mother to Child Transmission
PubMed – Journal Search Database from the National Institutes of Health
SAP – Structural Adjustment Programming
STI – Sexual Transmitted Infections
UN – United Nations
UNAIDS – Joint United Nations Program on HIV/AIDS
UNDP – United Nations Development Program
UNFPA – United Nations Fund Population Affairs
UNGASS – United Nations General Assembly Special Session
UNICEF – United Nations
UNESCO – United Nations
VCT – Voluntary Counseling and Testing
WHO – World Health Organization

ABSTRACT

An unknown phenomenon nearly thirty years ago, the Human Immunodeficiency Virus (HIV) and its later stage of Acquired Immunodeficiency Syndrome (AIDS) has caused an estimated 25 million deaths. Current international and national efforts are focused on improving the distribution of life-preserving medications to those infected and supporting ongoing prevention policies and programs. To determine the scope of the resources necessary, and ensure that all those infected are successfully treated, more people need to know their individual HIV status – i.e., more people need to be screened for HIV. International experts demand more details about the provision of care and services and have suggested provider-initiated HIV screening as a method of getting more people screened in a timely manner, particularly in sub-Saharan Africa. However, little has been published on the characteristics of sub-Saharan Africans who use HIV screening, and how they compare to those who do not use such services.

Based on retrospective analyses of nationally-representative population-based Demographic and Health Survey (DHS) data, this dissertation consists of three empirical papers which describe in detail patterns of HIV screening utilization in sub-Saharan Africa. These papers will contribute to the scientific discourse on the extension and expansion of HIV screening services, and the development of comprehensive prevention policies. The first paper is a broad overview of screening patterns of sub-Saharan African women and men from 23 countries. The second paper describes the predicted

probability of being HIV infected among sexually-active Basotho and Swazi men who, according to the DHS surveys, have never been tested for HIV. The third paper, through the lens of the Health Care Utilization Theory, describes the different factors associated with completing the HIV screening process receiving HIV test results among sexually active Zimbabwean men and women.

CHAPTER I

INTRODUCTION

“[Screening] is what public health is all about-identifying the problem before significant harm takes place.”

Dr Tim Crayford, President of the Association of Directors of Public Health, UK

BBC News Story, Nick Triggle, 2008

For more than a century, screening for a potential disease or condition in ostensibly healthy people has been a bedrock of medical practice and public health. The early detection of a disease or condition in asymptomatic people is believed to improve treatment effectiveness and cost efficiency (Snow, 2004). Data from screening informs the public health understanding of prevalence (number of existing cases), incidence (the number of new cases) and the socio-demographic dimensions of a health condition. Thus, screening is useful in developing policies, intervention programs, and behavioral change campaigns geared toward reducing disease transmission. From an individual perspective, those who screen and find they do *not* have a specific disease or condition benefit from knowing they are free from harm. Those who screen and find they do have “it”, a specific disease or condition, can garner the support necessary to reduce debilitating effects of a disease, and maximize long-term benefits of subsequent care.

AIDS, first diagnosed in the early 1980s, was initially detected by the presence of rare cancers and infectious diseases in previously healthy individuals (Ward, 1999).

These first cases baffled medical scientists who believed they had made great strides against communicable diseases with antibiotic medicines (Fox and Fee, 1988), immunizations, and the mass disease screening of ostensibly healthy people (Brandt, 1988). In their search for an origin and common factor linking the cases, epidemiologists recognized that the majority of the earliest diagnosed AIDS cases were among homosexual men (Ward, 1999). Although the number of cases rapidly grew among *non*-homosexuals and the practice of homosexuality had been well documented for years (Ward, 1999), there were those who purported that deviant sexual activities (i.e. homosexual promiscuity) put people at greater risks for infection (Siegal and Seigal, 1983). As an infectious disease which resulted in death, the public's perception about those infected was seen somehow as the "fault" of an individual's inappropriate action (or inaction). Stigmatization and discrimination were often experienced by those who were HIV infected including: the judgment of others about risk-behaviors and life-styles (Csete and Elliot, 2006; Fortenberry, 2002; Schoofs, 1999), the distancing of families, social networks and by extension communities (Cohen, 1999; Brandt, 1988), and violence (Abdale, 1999; Temmerman et al., 1995; Türmen, 2003).

It was not until four years after the first reported AIDS cases (1985), that the first HIV screening test was made available to detect the disease in seemingly healthy people (Klosinski, 2000). But, the obsessive fear of death (from a "new" disease with no known cure) (Chng and Frindinger, 1989) and the ongoing disease-related stigma (linked to homosexuality, drug use, and promiscuity) (Brandt, 1985; Shilts 1988) lead to a breakdown of the public's trust in the medical system (Brandt, 1988). The fears of the disease and diseased extended to HIV screening (Csete and Elliot, 2006). To be screened

was to admit or acknowledge one's own risky behaviors (Csete and Elliot, 2006). As health officials struggled to understand the scope and breadth of the growing pandemic, tension rose between those who advocated for the rights of individuals versus those who endorsed the role of the state to guarantee public welfare (Brandt, 1988; Porter and Porter, 1988).

As a result of the ongoing tension between those advocating for patient's rights and those advocating for the state to increase its protection of the public welfare, patient advocates, care providers, and policy makers fought to integrate two important aspects into the HIV screening process. The first was the concept that the HIV screening procedure be voluntarily decided upon by the patient. Some feared that if the screening was not voluntary, the growing pandemic could go "underground", leading infected individuals who feared discrimination, isolation or quarantine to not cooperate with public health officials (Brandt, 1985; Gostin and Curran, 1987). Others had disconcerting conversations about the ethical boundaries of doctors performing the tests without the knowledge of patients (Porter and Porter, 1988). The second enshrined inclusion in the screening process was the intensive counseling before and after the HIV screening test. This counseling has served (and continues to do so) as a means of explaining the test and associated results, prevention strategies to avoid infection or infecting others, and a patient's rights. But, there have been those who argued that these critical inclusions of the HIV screening process were (and remain) costly and time consuming (Joseph ed., 2007; Campbell et al., 1997); and that not enough of those who are infected voluntarily initiate the screening process - thereby hampering disease control efforts (Hargreaves, 2007; Bayer and Fairchild, 2006; Wynia, 2006; DeCock and Johnson, 1998). In recent

years there has been a resurgent rallying cry for provider-initiated testing particularly in hyper-endemic countries as a way of increasing the number of people screened and reducing any stigma related to screening (Bass, 2006; Klimas et al., 2008; Lifson and Rybicki, 2007; MMWR, 2007).

Since the HIV and AIDS pandemic began, the disease has been documented in more than 65 million people and the cause of 25 million deaths (UNAIDS Epidemic Report, 2008). Although there is still no cure for HIV, today there are well-researched medical treatments available that can extend the life of an HIV infected person, rendering the condition a manageable chronic ailment. Yet the only way to access medical treatment is to first be screened for HIV. Current estimations by international health organizations, predict that as many as 80% worldwide HIV infected people do not know their HIV infection status; and controversies still exist over the best way to increase screening, particularly at the epicenter of the pandemic sub-Saharan Africa. But there are gaps in the scientific evidence about who are the people using HIV screening services in the general public of sub-Saharan Africa. Such information at this time will strengthen the international resolve to guide national HIV screening policies and programs, and allocate resources to where it will do the most good.

This dissertation contributes to the scientific research on HIV-screening patterns. Such increased knowledge about the characteristics of those using (or not using) existing HIV screening services provides a vital understanding that can illuminate the most effective way(s) to allocate limited resources and develop future HIV prevention policies and programs designed to increase HIV screening service utilization, among those affected, which can lead to valuable subsequent medical care and treatment. In this

introduction, I will provide a brief focused background on HIV and HIV screening in sub-Saharan Africa followed by a description of the three empirical papers and a conclusion chapter which discusses common findings across the papers and thoughts on future research in the area of HIV screening utilization.

The HIV and AIDS pandemic remains a global public health problem of unprecedented proportions and is a leading cause of premature death for those ages 15 to 59 (Merson, 2006). In sub-Saharan Africa, life expectancy has dropped by as much as twenty years in countries with large generalized HIV epidemics (greater than 10% of the general population infected), diminishing public health progress made in extending life (UNAIDS, 2008). The first report on AIDS in sub-Saharan African patients occurred two years after the first cases were diagnosed in the US (Clumeck et al, 1983). By 1987, 36 African countries were reporting cases (Sabatier, 1987). HIV was rapidly spreading, posing a major health problem for the continent; and pioneers in the field - Thomas Quinn, Jonathan Mann, James Curran, and Peter Piot stated that the HIV epidemic was emerging as “the most serious epidemic of the past 50 years” (Quinn et al, 1986; Buvé et al, 2002). According to the most recent UNAIDS epidemiological report (2009), the 10 countries with the highest prevalence of HIV infection are all in sub-Saharan Africa, which continues to be the epicenter of the global pandemic and home to 67% of all HIV cases worldwide.

In the mid-1980s with growing public fears of HIV and the emerging theory about Africa being where the disease had originated, there were grave concerns that Africans’ access to other countries would be limited (KS Jayaraman, 1988), and tourism in sub-

Saharan African countries would be curtailed (Sabatier, 1987). Some political leaders believed the ideas of HIV (the disease itself) and the associated theory that Africa (the continent) was the originating source of HIV were forms of imperialist scapegoating by the Europeans and Americans (Chirimuuta and Chirimuuta, 1989). Nonetheless, several sub-Saharan African countries responded to the growing HIV pandemic by establishing programs to screen national blood supplies in 1980s and early 1990s. Screening blood supplies demonstrated that these countries were capable and committed to international efforts to impede the pandemic. In these early years, the United Nation's World Health Organization (WHO) initiated the Global Program on AIDS (GPA) (Patterson, 2006). Members of the GPA at the time developed biomedical standards for diagnosing HIV cases and an international framework for understanding HIV and AIDS. GPA initially received significant international financial and political support. However, by the early 1990s, the US financial commitment had waned, and GPA's "in-house" difficulties hampered the GPA's momentum and effectiveness as an international force against the growing pandemic (Behrman, 2004; Menson, 2006; Patterson, 2006).

At the beginning of the second decade of the pandemic(early 1990s), there was little international groundswell and few shared finances as the United States (US) and Europe as stakeholders and activists were coping with their own epidemics and competing to find a cure and develop a vaccine (Berhman 2004; Patterson, 2006). As time progressed, the awareness and acceptance of AIDS as a serious health threat increased in many resource-constrained nations, so too did the demand for HIV screening of individuals and the creation of independent voluntary screening sites (Barugahore et al, 1992). The US and European scientific community however, contended that the

resources necessary to purchase the screening technology, including laboratory and quality control costs, were prohibitive for many resource-constrained countries (Colebunders and Ndumbe, 1993). Colebunders and Ndumbe recommend in their 1993 Lancet article¹ that HIV screening should be “made more widely available in developing countries...[but not] Until there is an improvement in the [overall] quality of health care...HIV testing [screening] for diagnostic purposes is generally not appropriate.” Four years later (1997) in a Lancet editorial Colebunders and other colleagues stated that before a large scale introduction of HIV testing, the “establishment of a sound program of quality control” should occur. Despite the rhetoric about what was needed to make HIV detection more widely available, the number of HIV and AIDS infections grew exponentially in many sub-Saharan African nations. The burgeoning pandemic was being seen less as a health issue and understood more as a development problem – one that required an international response (Berhman, 2004).

According to Dr. Michael Merson, former executive director of WHO's Global Program on AIDS, at the end of the 1990s and the turn of the 21st century four key events happened in the global fight against the HIV and AIDS pandemic. First, was an increased financial commitment and active lending by the World Bank. The second was an impassioned discussion² about the exceedingly high rates of HIV infections in the region and other events that eventually lead to the Doha Agreement. The third was the endorsement of contraception practices (i.e. promoting condom use) by politically powerful US-based religious group in an effort to reduce the number of children

¹ This was prior to the availability of well researched therapeutic antiretroviral medication and subsequent highly active antiretroviral therapy (HAART).

² This discussion took place at the 13th International AIDS Conference in Durban, South Africa.

orphaned because of the global HIV and AIDS pandemic. The final key development that happened at the turn of the millennium was the rising HIV prevalence rates in Russia, China and India, prompting concerns about global security. Of these four events, two in particular were of great importance to what was happening in sub-Saharan Africa. First was the more active AIDS-related lending and increased commitment from the World Bank (Merson, 2006). It was widely believed that the sub-Saharan African health system were in need of great financial assistance because over the years they had been unduly burdened with exponentially increased rates of HIV and weakened by World Bank Structural Adjustment Program (SAP) (Berhman, 2004; Kim et al., 2000). Many multilateral and bilateral donor organizations followed suit, and resources began to flow in response to the pandemic in Africa. A key development during this time was the creation of the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund). The second was a series of events that led to the World Trade Organization's announcement of the Doha Declaration, which indicated that the Agreement on Trade Related Aspects of Intellectual Property Rights (also known as TRIPS), should not prevent countries from dealing with public health crises. The Doha Declaration allowed resource-constrained countries to purchase and/or manufacture generic HIV antiretroviral medications (Merson, 2006). With the pledging of increased funding and the growing need for antiretroviral medications (to be purchased with the funds), more long-term enhanced and transparency would need to occur to declare any scaling-up of currently existing care, treatment, and prevention services successful.

A key to comprehending the full scope of what is medically and financially necessary to curb the pandemic, a better understanding about the utilization of HIV

screening services by people, particularly those in generalized epidemics, is warranted. A pertinent question for generalized epidemics, like those in sub-Saharan Africa, is who are the people accessing HIV screening and are they accessing these services in a manner commensurate with their individual HIV risks. However, the existing literature on HIV screening has fallen short in addressing this question. Many articles on HIV screening have explored the acceptability of HIV screening in the context of antenatal care (Daniel and Oladapo, 2006; de Paoli et al., 2004; Ekanem and Gbadegesin, 2004; Manzi et al., 2005; Martin-Herz et al., 2006; Worku and Enquselassie, 2007) , workplace programs (Collier et al., 2007; Corbett et al., 2006; Day et al., 2003), mobile clinic screening services (Mbopi-Kéou et al., 2007; Morin et al., 2006), and specific communities or clinical settings within a country (Bwambale et al., 2008; Hutchinson and Mahlalela, 2006; Irungu et al., 2008; Jereni and Muula, 2008; Reilley et al., 2004; Sherr et al., 2007; Wringe et al., 2008). Other articles have focused on HIV screening and tuberculosis (TB) patients (Bwire et al., 2006; Gammino et al., 2008; Kali et al., 2006; DeCock and Odhiambo, 2006). Although these articles offer some descriptive information about participants, most have focused on clinical-based populations and there has been little attempt at direct comparison to those who had not (for whatever reasons) accessed services. In addition, most focused female respondents and with very limited comparisons between the sexes, and few comparisons across countries.

This dissertation adds to the current literature by describing the characteristics of those who have been screened for HIV in direct comparison to those who have not - using nationally-representative population-based samples examining in large measure sex differences in utilization patterns. In this dissertation, I have included three empirical

papers using the first wave of the Demographic and Health Survey (DHS) data that included HIV surveillance as part of the data collection. The first paper is an analysis of the DHS data from 23 sub-Saharan African countries collected between 2003 and 2007, describing the patterns of men's and women's reported receipt of HIV test results predicated on the most basic demographic characteristics (i.e. wealth, age, residence, educational attainment and reported sexual activity). The second paper describes the predicted probability of being HIV infected among sexually-active Basotho and Swazi men who according to the DHS surveys had never been tested for HIV. The third paper, through the use of the Health Care Utilization Theory by Andersen and colleagues, describes the social and behavioral correlates associated with completing the HIV screening process (i.e. receiving HIV test results) among sexually active Zimbabwean men and women, as compared to those who did not report the use of HIV screening services or receipt of HIV test results. The papers are followed by a concluding chapter summing up the key research findings and thoughts about future research in the area of HIV screening utilization.

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CHAPTER II

Patterns in HIV testing and receiving HIV test results among sub-Saharan African women and men: An assessment of Demographic and Health Surveys collected between 2003 and 2007

INTRODUCTION

Nearly thirty years after the Human Immunodeficiency Virus (HIV) was first identified, the World Health Organization (WHO) estimated in 2007 that worldwide as many as 6,800 people were infected with HIV and 5,700 people die of AIDS daily (UNAIDS Epidemic Report, 2007). More than 65 million people have been documented as being infected with the HIV virus which has caused 25 million deaths (UNAIDS Epidemic Report, 2008). HIV and AIDS remain an unprecedented international public health emergency with a particularly decimating effect on sub-Saharan African populations. Sub-Saharan Africa, which is home to just 10% of the world's population, has 67% of the world's HIV cases; it is the epicenter of the global HIV and AIDS pandemic (UNAIDS Epidemic Report, 2009).

Many sub-Saharan nations have generalized epidemics in which the HIV infection is not solely transmitted among distinct sub-populations as it is in the United States and Europe (Wilson, 2006), putting entire nationally-based populations at risk for contracting the disease. Because of AIDS-related deaths, life expectancy has dropped by as much as twenty years in those sub-Saharan African countries with adult HIV prevalence greater than 10%; thereby diminishing laudable public health progress made in the 1970s

(UNAIDS Epidemic Report, 2008). Furthermore, HIV infection remains a leading cause of premature death for sub-Saharan African women and men ages 15 to 59 (Merson, 2006).

Although most people are somewhat knowledgeable about HIV and are aware the virus is a frail, blood-borne pathogen transmitted primarily through sexual intercourse (Anglewicz and Kohler 2009; Klimas et al., 2008; Nahmias and Feinstein, 1990), many people lack sufficient information to appropriately estimate their own personal risk (Adams et al., 2003; Smith and Morrison, 2006). Because of the early asymptomatic nature of the disease (Klimas et al., 2008), people who are unaware of their infection may unintentionally spread the disease, and those who are not infected may inadvertently put themselves at risk of contracting HIV. Since there is no cure for HIV, preventing transmission is paramount to control. HIV prevention strategies over the years have come in many forms: 1) advocating safe sex through the use of a barrier (i.e., condom) or sexual abstinence; 2) discouraging the sharing of drug equipment or breastfeeding newborns by HIV-infected mothers; 3) promoting risk reduction strategies such as limiting sexual partners and/or drug partners and participating in needle exchange programs; and 4) screening for HIV.

HIV can only be accurately identified through screening, so screening is central to prevention. HIV screening is the process of being tested for HIV, counseled on the test and the consequences of the test results, and receiving the test results. For those who test HIV positive, screening is often followed-up by subsequent care and medical treatment. It is widely believed that current therapeutic interventions' effectiveness could be enhanced and present rates of HIV infections and AIDS deaths could be minimized if

more people were screened and diagnosed in the earlier stages of an HIV infection (Helleringer et al, 2009; Kigozi et al., 2009; Nahmias and Feinstein, 1990). In addition, several researchers have reported that those who tested positive for HIV and were informed of their infection were less likely to engage in unprotected sex or other high risk sexual behaviors (Coates, 2000; Denison et al., 2008; Marks 2005) and in some cases expressed feeling responsible to prevent transmission, thereby inclined to practice other prevention strategies and join structural prevention programs (King et al., 2009; Nimmons and Folkman, 1999; O'Dell et al., 2008; Shriver et al., 2000; Wolitski et al., 2003), particularly within discordant couples³ (Higgins et al. 1991; Painter, 2001; Wolitski et al. 1997).

Throughout the pandemic, the fear and stigma often associated with being HIV infected (Cohen 1999; Schoof, 1999) has been linked to being screened and becoming aware of one's infection status (Csete and Elliot, 2006). As a result of the linked fear and stigma concerns, in the early years many advocates vehemently argued to have screening only be initiated voluntarily by patients (Brandt, 1987). Today, however, health care providers and national and international government policymakers have written about and spoken of growing frustration, arguing that HIV screening has not been promoted with requisite urgency and aggressiveness, and that policies have been over-protective of individual rights to volunteer for HIV screening (Bayer and Fairchild, 2006; DeCock and Johnson, 1998; Hargreaves, 2007; Wynia, 2006). In response, a newly approved standard

³ "Discordant couples" refers to those couples in which one partner is HIV positive and the other partner is HIV negative.

of provider-initiated testing and counseling (PITC)⁴ is being promoted by international health organizations and emerging as a central national policy for a growing number of countries (Bass, 2006; Beckwith et al., 2005; Clark, 2006; Csete and Elliot, 2006; MMWR, 2007). The PITC approach to HIV screening is seen as a panacea which will alleviate fear and stigma barriers associated with voluntary HIV screening and a means of improving the timely diagnosis of infections, maximizing the benefits of treatment (Klimas et al, 2008; Lifson and Rybicki, 2007). Other researchers however, have expressed concern that the theoretical practice of routinely offered (PITC) will change HIV testing into the reality of being mandatory (Csete and Elliot, 2006). Also suggested by advocates familiar with sub-Saharan African contexts is the idea that PITC may *not* be advantageous, particularly where there is limited use of hospital/clinical-based care and delicate program initiatives directed to build trust of staff and services (Buor 2004; Asante, 2007).

The WHO estimated that screening in middle- and low-income countries has been limited, which has added fuel to the endorsement of increased PITC. In a recent WHO report on universal access (2008), on average as few as 10.3% of men and 10.9% of women in general populations have ever been screened for HIV and received their test results, and a global median of 20% of the people living with HIV actually know their status. While these estimates are useful in demonstrating that more is needed to curb the pandemic despite commendable national efforts, principle global strategies and substantial financial contributions (over the course of the pandemic), these estimates are not enough; decision-makers and program and policy developers need more detailed

⁴ PITC proponents suggest that in hyper-endemic areas *all clinical* patients be routinely offered an HIV test

information to understand the utilization patterns of national populations and the strengths and weaknesses of existing HIV screening services.

Many articles about HIV in the context of sub-Saharan Africa and its people have been published over the years; yet there is a dearth of scientific literature on patterns and trends concerning the utilization of HIV screening services, particularly at the population level. Many articles on HIV screening have explored the acceptability of HIV screening in the context of antenatal care (Daniel and Oladapo, 2006; de Paoli et al., 2004; Ekanem and Gbadegesin, 2004; Manzi et al., 2005; Martin-Herz et al., 2006; Worku and Enquselassie, 2007), workplace programs (Collier et al., 2007; Corbett et al., 2006; Day et al., 2003), mobile clinic screening services (Mbopi-Kéou et al., 2007; Morin et al., 2006), and specific communities or clinical settings within a country (Bwambale et al., 2008; Hutchinson and Mahlalela, 2006; Irungu et al., 2008; Jereni and Muula, 2008; Reilley et al., 2004; Sherr et al., 2007; Wringe et al., 2008). Other articles have focused on HIV screening and tuberculosis (TB) patients (Bwire et al., 2006; Gammino et al., 2008; Kali et al., 2006; DeCock and Odhiambo, 2006). Most have used clinical-based respondent samples as opposed to population-based respondent samples and limited comparisons to those who have not used HIV related services.

The primary aim of this study is to examine the patterns of HIV screening service utilization by sub-Saharan African women and men and show how these patterns are affected by social demographic characteristics such as wealth, residence, educational attainment, age, and sexual activity. Given the importance of HIV testing as a cornerstone to HIV prevention, care and treatment, this analysis provides vital information necessary for the allocation of scarce resources and the strategic and

programmatic expansion of HIV and AIDS control policies and programs across sub-Saharan Africa.

METHODS

Data Source

Since the 1950s, analyses of national population-based data have been (and continue to be) used to forecast disease effects, shape policy and programmatic responses, and enhance disease interventions and services (Morris, 2000). In 1984, the United States Agency for International Development (USAID) established the Demographic and Health Survey project (Guide to DHS Statistics, 2003) to generate useful, population-based data for national and international decision-makers to develop informed and effective policies, health programs, and accessible services. Over the years, people from more than 130 countries have participated in DHS health interviews, answering questions on maternal and child health, family planning, nutrition, sexually transmitted infections, and other related issues (Mishra et al., 2006). Since 2001, several developing countries which conducted a DHS survey (or similar survey through ORC Macro) also included HIV surveillance as part of the data collection process (Garcia-Calleja et al., 2006; Mishra et al., 2007). Recently in scientific literature on HIV, population-based survey surveillance has been promoted over antenatal surveillance techniques, which were, during the 1980s and 1990s, the primary sources of national HIV surveillance (Boerma et al. 2003; Mishra et al., 2007).

“The added value of population-based surveys is that they provide direct data on the distribution of HIV infection among the general adult population, remote rural populations..., men, young non-pregnant women, and regions or provinces.”

Mishra et al., 2006 p 538.

Between 2003 and 2007, 26 sub-Saharan African countries conducted DHS data collections using the DHS phase-5 model questionnaire. Based on this questionnaire model, the focus of my analysis centered on two questions: “I don’t want to know the results, but *have you ever been tested for HIV?*” and “I don’t want to know the results, but *did you get the results of the test?*” The collective responses to these questions will offer insight into who among the sub-Saharan Africans are using existing services. This information subsequently can be used by decision- makers and health care providers to allocate resources to improve the effectiveness of current service provision. Three sub-Saharan countries (Burkina Faso, Mali and Zambia) had missing data for one or both questions and were not included in the final analyses for this study. Therefore 23 countries⁵ datasets were analyzed for this study.

Fourteen of the 23 countries with DHS, included HIV surveillance testing⁶, where the general DHS survey interviews were conducted before the HIV surveillance tests. Respondents were read a written statement describing the testing and potential risks and benefits (Mishra et al., 2006). Respondents were told they would not get test results and that HIV surveillance data collected was strictly for statistical purposes only. HIV surveillance results were reported from the laboratories to DHS and linked to respondents’ survey answers for the purposes of the analysis while still protecting the anonymity of the respondents. All of the empirical data presented in this study was

⁵ These countries include: Benin, Cameroon, Chad, Congo (Brazzaville), Congo Democratic Republic, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Swaziland, Tanzania, Uganda, and Zimbabwe

⁶ These countries include: Cameroon, Congo Democratic Republic, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Malawi, Niger, Rwanda, Senegal, Swaziland, and Zimbabwe

reported in the aggregate as not to single out or make it possible to identify any of the respondents.

Data Factors

Beyond the focal question to determine the patterns of women's and men's utilization of existing HIV screening services, the present analysis also examined the prior receipt of HIV test results based on wealth, residence, age, reported educational attainment, and reported sexual activity. One of the advantages of using DHS data is that the survey instruments are standardized, thereby making the results comparable across the various countries.

Macro researchers Westoff and Bankole (2001) quoted Measure DHS+ project director Martin Vaessen:

“One of the most significant contributions of the Measure DHS+ program is the creation of an internationally comparable body of data on the demographic and health characteristics of populations in developing countries.”

Martin Vaessen p. v

Although each of the key variables being analyzed for this study are comparable across countries, it was essential to understand how each of these factors were generated and how responses were categorized.

Wealth. In the DHS survey questionnaires, respondents were not directly asked about their income or household expenditures; rather a wealth index was generated based on several DHS survey items regarding the ownership of consumer durables (the type of housing material used, the availability of electricity, type of toilet facility, source of drinking water, the household possession of a television or a bicycle) (Mishra et al.,

2007). This composite measure of cumulative living standards for a household was then used to divide each country's respondent populations into five wealth quintiles: "poorest", "poorer", "middle", "richer" and "richest".

Residence. Characteristic associated with where one lives (residence) can represent adverse and beneficial experiences that can potentially affect health outcomes. Urban areas in developing countries often have more facilities than rural areas (Levesque, 2006) and this could result in limited access to care and a propensity toward self-treatment (Castro-Leal et al., 2000). DHS delineated residence as living in the capital city, a medium or small city or town, or countryside. Respondents were not asked about their residence, but instead residence status was coded by DHS surveyors according to each country's scheme.

Age. The age of an individual is often a factor influencing participation in screening services; an example is cancer screening (Lin, 2008; Odedina et al., 2008; Ruffin et al., 2009). DHS respondents were asked for their date of birth and an age was generated given the date of the survey interview. In the publicly available data sets, the distribution of age for a given population were divided into 5-year age categories ranging from 15-49 for women and 15-54 (or older) for men. For comparative analysis purposes, the graphs describing men's and women's patterns of receiving HIV test results were restricted to 7 age categories: 15-19, 20-24, 25-29, 30-34, 34-39, 40-44 and 45-49. Those (primarily men) over the age of 49 years were restricted from this analysis for comparison purposes.

Educational Attainment. Like age, educational levels of study participants are often considered in the design or analysis of research on factors effecting the usage (or non-usage) of health care services such as screening (Bakeera et al., 2009; Kyomuhendo, 2003). Of the literature on HIV screening in sub-Saharan Africa, one article (Bradley et al., 2006) examined the relationship of educational attainment and HIV status of clients of a volunteer counseling and testing service in Ethiopia. Researchers Bradley and colleagues (2006) concluded that those Ethiopians with greater education were less likely to be HIV infected than those with less education. In the Phase-5 DHS questionnaire, respondents indicated the number of years of formal education they completed. These responses were then re-organized into standardized categories of: “no education”, “incomplete primary”, “completed primary”, “incomplete secondary”, “completed secondary”, “higher education”. Although, the DHS manuals indicated that in several countries the educational systems were not congruent with these categories (The DHS Guideline to Statistics, 2003), for comparative purposes I examined the proportions of men and women who received HIV test results in accordance to their reported educational attainment as demarcated by the DHS standardized categories.

Reported non-sexually active. In the standard DHS questionnaires, respondents were asked: “When was the last time you had sex?” Based on the number of days, months and years of the response, answers to this question were categorized as “never had sexual intercourse”, “sexually active in the last month”, “not sexually active in the last month because of postpartum abstinence” or “not sexually active in the last month not because of postpartum abstinence”. Since sub-Saharan Africans are primarily exposed to HIV through heterosexual intercourse, I decided to explore if those who

reported they had never had sex also reported using HIV screening services. For the purposes of this analysis, I choose only to show the percentages of men and women who reported receiving HIV test results and never having had sexual intercourse.

Analysis

The primary objectives of this study were to describe sub-Saharan African's patterns of being screened for HIV and receiving test results across the demographic factors of wealth, residence, educational attainment, age, and (never) having ever been sexually active. In addition, I reported the percentages of those who were HIV positive and HIV negative (based on DHS surveillance testing) who reported previously receiving HIV test results. As part of the analysis, I used the available sample and HIV sub-sample weights provided for each country. Analyses were performed using SPSS (SPSS for Windows, version 17, Rel 15.01.2009, SPSS, Inc. Chicago IL. USA).

ORC Macro makes most of its DHS data available for secondary analysis through written requests. Identifying information from the 23 datasets was scrambled and recoded in order to protect the anonymity of the respondents. Furthermore, given the organization of the DHS data, I decided to present the analysis findings separately for men and women and separately for each country. The tables and figures provided contain descriptive statistics of reported prior HIV screening and the receipt of HIV test results from that screening based on cross-tabulations with DHS surveillance test results and key demographic factors.

RESULTS

Table 1: National prevalence of HIV infection, the percent of DHS respondents (female, male) who reported prior HIV screening and receiving those screening results, and the

percent screened who reported NOT receiving results, from 23 sub-Saharan Africa countries [Source: DHS surveys from 2003 to 2007]

In Table 1, the 23 countries are organized based on the national HIV prevalence during the year of the DHS data collection. The countries with the highest HIV rates are all in southern sub-Saharan Africa, Swaziland through Tanzania. With the exception of Tanzania, the other countries all have national HIV prevalence over 10%. Three of these countries (Swaziland, Lesotho and Namibia) have small overall populations (fewer than 3 million residents), so while their HIV prevalence rates were high the actual numbers of HIV infected people were lower than in some other countries. In all but one (Mozambique) of the ten countries with the highest HIV prevalence rates (greater than 5%), the percentage of women who reported prior (to DHS) HIV screening and receiving those test results exceeded the WHO average estimate of 10.9%. In those same countries, the percentages of men who reported prior HIV screening and receiving test results exceeded the global estimated average of 10.3% in all but two countries (Lesotho and Mozambique). The reporting of HIV screening and receiving test results was also above the global average estimates among: Nigerian men (13.4%) but not Nigerian women (6.4%); Rwandan women and men (21.4% and 19.2%, respectively); and Beninese women (14.5%) but not Beninese men (10.3%).

In several countries, men and women who reported prior HIV screening, when asked, reported *not* receiving those test results. More than 15% of the women and men of Lesotho (16.9% and 15.8%, respectively) and the women and men of Ghana (24.5% and 17.2%, respectively) who reported prior HIV screening also reported that they did *not* receive those screening test results; this was also true for women from Zimbabwe (15.2%), Liberia (17.8%), and men from Benin (18.5%), Niger (19.6), and Madagascar

(17%). Two of the countries with high rates of HIV screening for both women and men, Namibia and Rwanda, had the lowest percentages of screened women and men who reported *not* receiving HIV test results (5.1% and 6.1% for Namibia, and 3.8% and 6.8% for Rwanda).

Based on the results in Table 1, I decided to examine the proportion of women and men who reported receiving prior HIV test results and the percentages. When I studied the patterns of reported receipt of test results by wealth, residence, age, educational attainment and sexual activity, I grouped some of the analyses according to the national HIV prevalence rates as reported in Table 1.

Figure 1: The proportion of women who reported receiving HIV test results as compare to the proportion of men who reported receiving HIV test results

In 10 of the 23 countries the proportion of women exceeded that of the proportion of men who reported receipt of an HIV test result (See Figure 1). In Swaziland, women were more than twice as likely as men to report previously receiving HIV tests results. In most of the countries where the proportion of women who reported receipt of an HIV test results was higher than men's, the overall HIV prevalence was higher than 5%. On the other end of the spectrum, in Chad, Ethiopia, and Guinea the proportions of women who reported receipt of HIV test results were the lowest in comparison to the men.

Table 2: In the 14 countries that conducted HIV surveillance testing as part of the DHS data collection, the percentages of DHS respondents (female and male) positive and (female and male) HIV negative who reported prior receipt of HIV test results

In 14 of the 23 countries analyzed for this study, there was a subset of respondents who participated in DHS HIV surveillance. Many of these subsets were about ½ of the original survey sample populations and the DHS provides separate HIV surveillance

weights to ensure that the subsamples were representative of each country's population. In Table 2, I reported the percentages of women and men who were found to be HIV positive or HIV negative (through DHS surveillance testing) who reported prior receipt of HIV test results. In 8 of 14 countries, over 10% of the female HIV positive cases found through DHS surveillance reported having received an HIV test result through existing services (See Table 2). In 11 of 14 countries over 10% of the male HIV positive cases found through DHS surveillance reported having received an HIV test result. In Rwanda and Swaziland as many as 40.7% and 43.8% of the HIV positive women and as many as 32.4% and 28.9% of the HIV positive men had previously received HIV test results.

Women who reported prior receipt of an HIV test result represented the smallest percentage of women who tested positive in Senegal (3.8%). Men who reported prior receipt of an HIV test result represented the smallest percentage of men who tested positive in Guinea (6.1%). Overall women and men who reported previously receiving an HIV test result represented the smallest percentages of both women and men who tested both positive and negative were in Ethiopia and Guinea.

Figures 2a and 2b: From the six sub-Saharan African with the overall highest HIV prevalence rates (Swaziland, Lesotho, Zimbabwe Namibia, Malawi, and Mozambique), the range and average percentages of men and women who reported receiving an HIV test result according to the DHS wealth categories

It is clear from Figures 2a and 2b that receiving HIV test results followed the wealth gradient and increased as wealth increased for both men and women. In countries with the highest HIV prevalence rates, the wealthiest women and men represent on average 40% of those who reported having received an HIV test result. The average proportion of women in the lowest wealth categories who reported receiving a test result

was greater than that of men of the same categories but this was not true of the middle and higher wealth categories.

Figures 3a and 3b: From the six sub-Saharan African with the overall highest HIV prevalence rates (Swaziland, Lesotho, Zimbabwe Namibia, Malawi, and Mozambique), the range and average percentages of men and women who received an HIV test result according to their residence status

Figure 3a and 3b shows that in five of six countries with high HIV prevalence rates, nearly ½ of those men and women who reported receiving an HIV test result lived in rural areas (Lesotho only demarcated respondents as living in urban or rural areas). The average percentages of urban women, whether in the large or small cities (or towns), who reported the receipt of a test result were lower than that of men residing in similar areas. However, the average percentage of rural women who reported the receipt of a test result was higher than that of rural men. The highest percentages of the receipt of HIV test results were represented by Mozambican men and women who lived in urban and peri-urban (small city and towns), Swazi and Malawian men and women who lived in rural areas.

Figures 4a and 4b: From the six sub-Saharan African with the overall highest HIV prevalence rates (Swaziland, Lesotho, Zimbabwe Namibia, Malawi, and Mozambique), the range and average percentages of men and women who reported receiving an HIV test result according to their educational attainment status

Figures 4a and 4b shows that those least likely, all near 10 percent or less, to report the receipt of an HIV test result are those men and women at the extremes of the educational attainment spectrum (those with no formal education and those with the most years of formal education). Men and women with an incomplete secondary education represented the highest average percentage of those who received an HIV test result. The

second highest average percentages of those (both men and women) who received an HIV test result were among those with an incomplete primary education.

Figure 5: From 23 sub-Saharan African countries with DHS data collected between 2003 through 2007, the percentages of women and men who reported having received their HIV test results according to the age distribution of respondents from High, Medium, and Low HIV prevalence countries

Figure 5 shows the percentages of women and men who reported having received their HIV test results by age, divided according to their HIV prevalence rates. In countries with high HIV prevalence, there are clear patterns of testing according to age. The largest percentages of women from Swaziland, Lesotho, Zimbabwe, Namibia, Malawi, and Mozambique who reported prior receipt of an HIV test result were between the ages of 20-24. For men in these same countries, the largest percentages of those who reported prior receipt of an HIV test result were between the ages of 25-29. There was a steeper and sharper decline in the percentage of women who received HIV test results in the older age categories than was seen among the men.

In countries with medium HIV prevalence rates (5-10%), it appears that the largest percentages of women who reported receiving an HIV results was among those women who were between the ages 25-29, although this was not as nearly uniformly defined as in the countries with higher HIV prevalence rates. Among men from countries with medium HIV prevalence rates and both women and men from countries with HIV prevalence rates below 5% there is no noticeable difference by age.

Figure 6: From 23 sub-Saharan African countries with DHS data collected between 2003 through 2007, the percentage of reportedly non-sexually who reported previously receiving HIV test results

Sexual intercourse is the primary mode of HIV transmission, particularly in sub-Saharan Africa, so I wanted to know what percentages of men and women who had received an HIV test result reported never having had sex. In Figure 6, I see that in most countries, less than 10% of those who reported previously receiving HIV test results were men and women who also reported not having had sexual intercourse (See Figure 6); however, women from Niger, Rwanda, and Senegal and men from Rwanda and Zimbabwe who reported never having sex represented more than 10% of those who reported receipt of an HIV test result. In Ethiopia, women and men who reported never having sex represented more than 20% (36.4% and 20.9%) of those who reported receiving HIV test results (more than double than in most other countries).

DISCUSSION

Given my findings, it is clear that in most countries with a higher than 10% HIV prevalence rate, more than 10% of men and 11% of women reported the use of existing HIV screening services and getting their test results. However, the higher levels I found in most countries were still not likely high enough to gage the extent of each nation's HIV epidemic, a better understanding of *all* risk possibilities, or a greater comprehension as to why some people make use of screening services and others do not. What was most telling and troubling about the findings was that there were still notable gaps between those who initiated the screening process and those that reported receiving their HIV test results. These gaps may have represented both service problems and individualized issues in getting those results (e.g., cost of service, transportation, fear of wanting to know the final results, etc.). The information on gaps between initiating the HIV screening process and getting the results along with more details on the type of screening services provided

(rapid or same-day testing vs. more traditional testing methods) and the location of care (e.g., mobile units, public vs. private facilities, etc.) would give decision-makers the necessary knowledge to allocate the limited resources to where they will do the most good ensuring more people not only get tested but also know their HIV status.

Since respondents were not asked about the outcome of their previous test results, there is no way of knowing how many people were previously diagnosed as HIV positive or who may have become infected after their reported testing and were found to be positive through their participation in the DHS surveillance. Our findings indicated, nonetheless, that in about half of the countries with HIV surveillance results, many of those who used existing services were those at high risk for getting the disease (because I know that they tested positive), a possible indication that the existing services are working well in identifying cases. However, the majority of those HIV infected (as determined by DHS surveillance) were found primarily among those who had never been tested (or gotten their results) through existing services. This was disconcerting because some people, diagnosed as infected through DHS surveillance, may not have been counseled about their own personal risks or their HIV status; thereby making it possible for them to unknowingly spread the disease to others. Despite the fact that information about HIV screening and in some cases mobile screening services were offered, it is not clear to what extent people were subsequently screened or linked to services (Reiners and Eaton, 2009). Such follow-through is critical both for individuals involved and for national efforts including the allocation of resources. Follow-through would also be useful in understanding how many people were prompted to be HIV screened because of DHS surveillance testing, but also which venue of screening services would be most

likely to be used such as mobile clinics, antenatal care, tuberculosis or sexually transmitted infection clinical services, local or regional facilities, or stand-alone HIV screening (VCT) clinics. There may be some who are concerned that fewer people would participate in DHS surveillance if more vigorous follow-up was conducted, which could in-turn be detrimental to our systematic understanding of prevalence; but this should be reviewed (likely again) against the ethical obligation of know that a person has a contagious disease and not informing him/her thereby allowing for his/her participation in subsequent care and services.

In the majority of countries (7 of 10) where women were overall more likely to test and receive test result than men, HIV prevalence rates were among the highest in the region and the world. The opposite appears to be true for the majority of countries where men were overall more likely to be tested and return for their HIV test results. In countries where women are more likely to get their HIV test results than men, are men unwittingly spreading the disease because they don't know their HIV status? In countries where men are more likely to get their HIV test results, are the estimates of infection low because not enough women have been tested? These are just a couple of questions that merit more in-depth analysis than was possible with the DHS data.

My finding support other reported findings that wealthy people in developing countries are more inclined to use Western-style hospital/clinical-based care as compared to people of lower socioeconomic statuses (Gesler, 1979; Heller et al. 1981). It appears that this is good news because recently researchers have suggested that increased individual wealth is often associated with sexual risk-taking behaviors (Awusabo-Asare and Annim, 2008; Mishra et al, 2007; Shelton, et al., 2005) and thusly increased

possibilities for HIV infection. Nonetheless, the fact that the findings show prior receipt of HIV test results follows the wealth gradient in which half of those who reported previous screened were from the bottom four wealth quintiles combined, warrants concern. It has been reported that in many sub-Saharan African countries people have to pay for health care services (James et al., 2006; Nabyonga et al., 2005; Steinhardt et al., 2009); the cost for the services themselves and associated costs may be a large deterrent to accessing HIV screening services. In addition to the costs associated with being screened, there are potentially larger costs associated with subsequent care for those who are infected. Financial concerns may not only prevent people from being tested but also keep them from getting successful treatment. While I also found that the average percentages of women and men who reported receiving HIV test results were similar in each of the wealth quintiles, more research is necessary to understand how (if at all) wealth could potentially affect access for men and women differently within each country's cultural context.

In Lesotho, Kenya, Malawi, Rwanda, Swaziland and Uganda, where 75% or more of the overall percentages of respondents were classified as rural residents, over half of the women and men who reported receiving HIV test results were rural residents. This appears to be good news, given expectations of less access and fewer opportunities to screen for rural residents across the region. However, in Niger, Ethiopia, Tanzania, and Madagascar, where more than 70% of the DHS respondents were classified as rural, the percentages of rural women and men who reported receiving HIV test results was lower than 40%; in Chad, also 70% or more rural, fewer than 20% of those who received test results were rural residents. Thus, it would appear that in these countries the expansion

of services has not been as successful as in the former six countries. Without more information on the distribution of health care services and the types of HIV screening available in each country, I am limited in my abilities to interpret these findings further or make suggestions for improved distribution of services particularly to rural areas across the region.

While the overall rates of receiving test results may reflect a better distribution of services than expected or other factors (e.g., better transportation, greater use of mobile clinics, etc.), I cannot ignore that some infrastructures may not benefit women in the same fashion as they do men. The extent to which I can explore the affects of residence on differing mobility of men and women is limited given the DHS datasets. Thusly, further research is necessary to understand to what extent rural residents may travel great distances to be tested for HIV or receive subsequent care, more information about residents concerns with using local services for screening services if they are available, and the intricate details of family finances and the allocation of such resources that may be used for HIV screening and subsequent care. If people in the large rural areas of many Africa nations are not adequately accessing clinical services, then provider-initiated testing and counseling is not likely to reach them.

In terms of receiving an HIV test result by age, I saw a tight clustering of percentage for younger men and women in countries with high HIV prevalence. However, as HIV prevalence decreased in a country there was less of a clustered distribution of reported receipt of HIV test results by age; although results were skewed toward those of prime reproductive ages (20-35). These findings in my opinion beg further investigation to understand how HIV testing is marketed to men and women of all

ages in the various countries. Are the men and women of prime reproductive ages (20-35) being more heavily targeted in countries with high HIV prevalence in comparison to their younger and older counterparts? Is the fact that distribution of testing and receiving test results in lower prevalence countries an indication of adequate services or overall low utilization? Findings from such analyses could illuminate the best ways and locations to implement PITC for those who present for hospital/clinical-based care.

The number of uneducated people receiving HIV tests and results may be reflective of how effective media and public messages have been in conveying the importance of HIV screening and related services. As in the case with interpreting the findings from the rural populations, without more evidence on the breadth and depth of public campaigns to encourage HIV screening, it is difficult to interpret these findings. Nonetheless, it seems as though more could be done to make sure more people, particularly the uneducated, are well informed and have adequate access to HIV screening services. The specifics on how to achieve those goals through policies and programs will need to be investigated further on a country by country basis.

It was no surprise that the non-sexually active contributed very little to the percentages of men and women receiving test results. However, the findings from Ethiopia were dramatic; over 36% of the women and 20% of the men who reported previously receiving HIV test results reported never having been sexually active. These findings deserve further investigation to understand this phenomenon which could be explained by social desirable responding, conservative reporting of sexual activity or cultural concepts regarding sexual intercourse. Although at present there is some controversy about the usefulness of HIV screening as a prevention tool for those who find

themselves negative (even for those at high risk), more can and should be done to promote knowing a negative status (and sustaining that status) particularly among those who are not yet at risk but who live in countries with generalized epidemics. Increased participation, long before risky behavior or infection, in the HIV screening process may result in better consumers of screening services, who are well-informed about *all* prevention strategies, where to be tested, and who are aware when the use of HIV screening services is appropriate for their own circumstances.

As with any research, there are limitations. I have to be cognizant of the perennial concerns about the veracity of self-reported data; the number of people who reported prior screening for HIV and receiving those test results may be inflated (due to over-reporting). On the other hand, there may have been underreporting as well because respondents may not have wanted to admit they had previously been screened for HIV. National population-based surveys that collect individual data are reliant on respondent's being honest about their self-reported data and with no other objective measures (i.e., medical records), these data are the best available. While comparisons across countries are possible, one should always be conscious of the limitations of rate information and how in some cases rates can mask the gravity of actual numbers of people infected or who have used existing services. For example, the adult HIV prevalence rate is extraordinarily high in countries like Swaziland and Lesotho, but with less than 2 million inhabitants the number of people infected in these countries has been lower than in other countries such as Ethiopia, which has a low prevalence percentage (2.1%) but a high number of people infected (approximately 980,000). It is therefore important to consider both prevalence rates and the number of infected to maximize effectiveness, appropriate

monitoring, the allocation of funding, and of the rolling-out and scaling-up of services across the region.

These data on HIV screening and receiving HIV test results have provided information on those who use the existing services and limited insight into who is not using services. While there is a paucity of literature on who has (and has not) used existing services, continued research is needed, particularly as I see services being exponentially scaled up, rolled-out and hopefully improved. By monitoring barriers to service utilization, policymakers and program planners can find new ways to creatively improve service delivery for those most in need. If more countries who employ the DHS surveys openly ask people (qualitatively) about why they haven't used or if they intent to use (and when) existing screening services, then perhaps more can be done to improved marketing HIV screening.

There were notable examples, across the region, with as much as 14% or more of men and women reporting the receipt of HIV test results. First were Rwanda and Malawi in which the percentages of women's receipt of HIV test results (21.4% and 14.4%, respectively) were similar to the percentages of their male counterparts (19.2% and 14.9% , respectively). Also, there was Swaziland and Namibia where overall percentages of receiving testing results were high but in particular the percentages for women who reported the receipt of HIV test results (35.8% and 50.9%, respectively) were substantially higher than their male counterparts (17.1% and 32%, respectively). The current analysis may partly explain these findings. In Rwanda, the percentages of men and women who received HIV test results were very similar across the distribution of ages, wealth status, residence, and "never being" sexually active. In Swaziland and

Namibia, women in the “poorest” wealth quintile were nearly twice as likely to report receiving HIV test results than their male counterparts.

While analysis of the DHS data provided some plausible explanations, these explanations are not necessarily enough to fully address specific weaknesses in testing service delivery. Rwanda’s overall HIV prevalence rate has changed less than .5% between the time the DHS data was collected and the current rate (WHO, 2008). Like many other countries Rwanda’s first case of HIV (AIDS) was diagnosed in the mid-1980s resulting in the creation of new governing entities and strategic policies geared toward controlling the pandemic. In addition, according to a 2006 USAID summary report on Rwanda’s assessment for HIV/AIDS services scale-up, donor organizations in the early part of the 21st century pledged \$100 million to scale-up HIV services including volunteer counseling and testing. By 2004, a year before the DHS data was collected, more than 800 medical and lab personnel had been trained to care and support those seeking HIV related services including testing (UNAIDS, 2006) and testing and counseling services were in large measure integrated with other health services in the 402 district health centers, hospitals, and referral hospitals. In addition, the Rwanda government, according to the USAID report had a sound plan for scaling-up *all* services despite the country’s emphasis on preventing vertical transmission and care for people living with HIV and AIDS (PLWHAs).

Publically available information in the case of Namibia indicated that at the turn of the 21st century Bristol-Myers Squibb committed \$100,000,000 for programs to improve research and local outreach targeting women in southern sub-Saharan Africa

including women in Namibia ⁷(James, 1999). In addition, Namibia has a well integrated health care system (McCourt et al., 2007) with an established commitment to prioritizing health promotion, prevention, and primary care and an emphasis on the health of women (Iyambo, 1992).

Many sub-Saharan African countries have established well-documented commitments to curb the HIV pandemic through strategic policies, national level governing bodies, integrated political-will, as well as large sums of funding (including grants and donations) over the course of the pandemic. So what makes some countries more successful than others? And what challenges lie ahead for sub-Saharan Africa in its regional struggle to curb the pandemic? The answers to these specific questions are beyond the scope of this study. However, given our analyses and materials researched for this paper, I believe future research is necessary to illuminate the link between public policies objectives and strategies, actual health care service implementation of those objectives and strategies, and individual level outcomes to provide the necessary detail for ongoing effective and efficient planning.

As stated earlier, because conventional wisdom says that not enough people test for HIV, there is a current push for routinely offered HIV testing. However, these plans of routinely offered HIV testing may be prey of ideology oriented toward expecting the sick to utilize services since treatment is available. To make routinely offered testing an optimal solution, more research, integration, and transparency is needed to clarify what specific weaknesses exist within sub-Saharan African care systems infrastructures and processes. It will be difficult to test more people through medical systems with

⁷ The funds were earmarked for South Africa, Botswana, Namibia, Lesotho, and Swaziland according to the article – Malawi was not included

insufficient number of medical personnel⁸ as well as the poor distribution of that staffing, facilities, and supplies within rural areas (McCourt et al, 2007). In a context riddled with the inheritance of poor medical infrastructures, insufficient staffing and training, parallel care systems, and the ongoing overwhelming burden of diseases, sub-Saharan Africans need health care systems integrated and dedicated to the betterment of their collective health and not just the distribution of medical treatment.

CONCLUSIONS

This study provides a clearer understanding of who among sub-Saharan Africans use HIV screening services. Those at increased risk for infection have been moderately more inclined to use existing service, but still many at-risk have not. It appears that those who are likely to be disenfranchised because of their poor social standing (i.e. the youngest and oldest, the less wealth, and rural residents) are the least likely to have been tested and received such test results. The same can be said for women in many countries, but I see that the international and national prioritization of prevention of vertical transmission (mother-to-child) has lead to increased testing of women, as in the case of Namibia. More concerted efforts are needed to maintain good trends in the use of existing services and improve current systems to extend their outreach.

Evidence of HIV screening service utilization is central to the development of public health policies and programs and the continued allocation of resources for HIV prevention, and treatment efforts. Laudable policies such as provider-initiated testing may not be as effective if there isn't a more in-depth understanding of the current patterns

⁸ It was reported in 2004 that sub-Saharan Africa has as much as 25% of the world's burden of disease but less than 2 of the world's medical staff (Wyss, 2004).

of medical service utilization in general and HIV screening service utilization in particular. Also needed is a more fuller understand how additional personal characteristics and realities shape utilization patterns so that countries can best promote, provide, and maintain HIV screening services for all needing-to-be and seeking-to-be aware of their HIV status.

2-Table 1: National prevalence of HIV infection, the percent of DHS respondents (female, male) who reported prior HIV screening and receiving those screening results, and the percent screened who reported NOT receiving results, from 23 sub-Saharan African countries [Source: Demographic & Health Surveys (DHS) from 2003 to 2007, as noted].

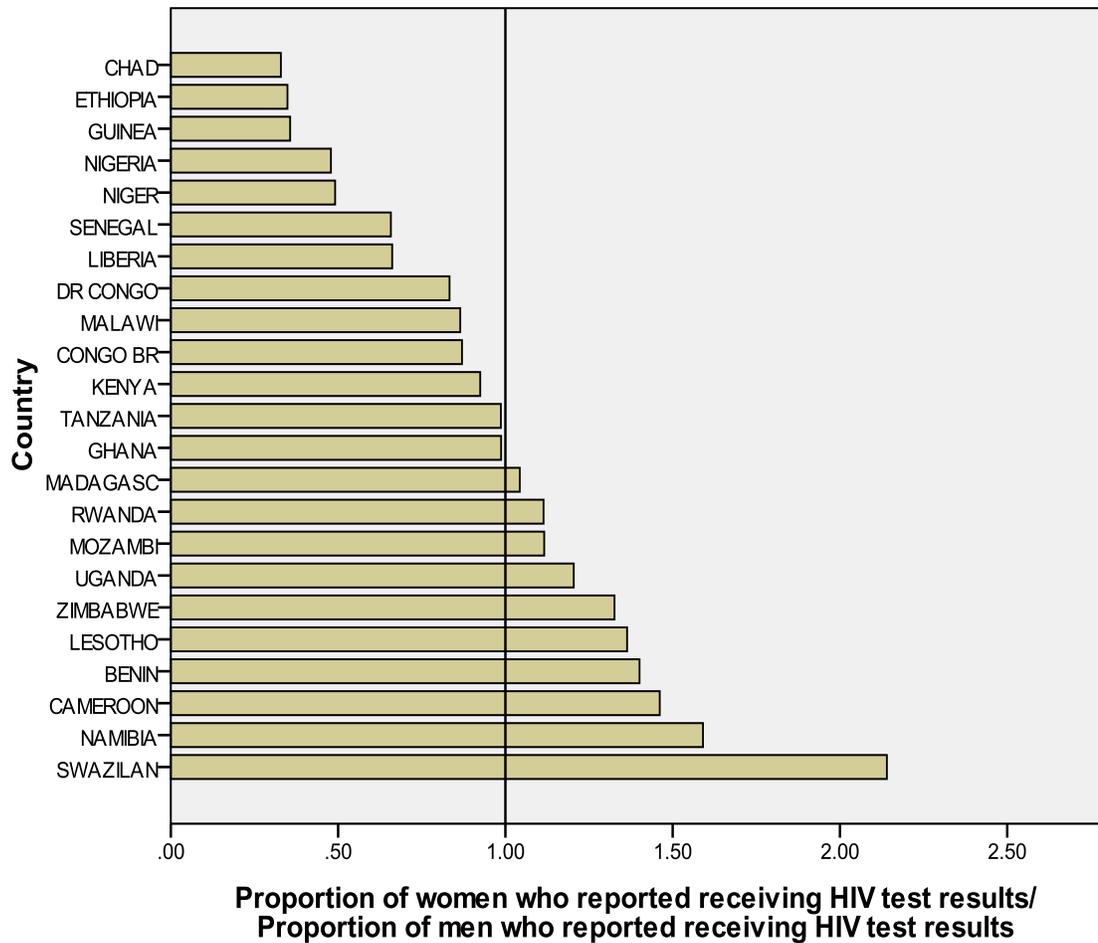
Country (Year of DHS)	National HIV prevalence during year of DHS ^á %	Number of female DHS respondents	Women who reported prior HIV screening %	Women who reported receiving their prior screening results %	Percent of those women screened who reported they did NOT receive their results % [†]	Number of male DHS respondents	Men who reported prior HIV screening %	Men who reported receive their prior screening results %	Percent of those men screened who reported they did NOT receive their results % [†]
Swaziland (2006)	26.2	4987	40.7	35.8	11.1	4156	18.6	17.1	7.2
Lesotho (2004)	23.6	7095	14.5	12.0	16.9	2797	10.6	8.8	15.8
Zimbabwe (2005/06)	17.2	8907	25.8	21.7	15.2	7175	18.6	16.4	11.1
Namibia (2006)	15.2	9804	54.8	50.9	5.1	3915	34.3	32.0	6.1
Malawi (2004)	12.5	11698	15.3	14.4	10.4	3261	16.3	14.9	7.7
Mozambique (2003)	11.5	12418	3.9	3.7	7.5	2900	3.8	3.3	13.5
Tanzania (2004)	6.5	10329	13.7	13.2	8.7	2635	13.6	12.3	8.6
Kenya (2003)	6 -8 [§]	8195	14.7	13.1	8	3578	15.5	14.2	8.3
Uganda (2006)	5.7	8531	29.4	24.8	14	2503	23.1	20.6	10.3
Cameroon (2004)	5.5	10656	21.1	20.7	8.7	5280	16.2	14.2	11.6
Congo (Brazzaville) (2005)	3.7	7051	10.3	9.5	6	3146	12.1	10.9	8.4
Chad (2004)	3.6	6085	2.1	1.1	9.4	1887	3.9	3.5	9.1
Nigeria (2003)	3.2	7620	7.1	6.4	8.1	2346	14.2	13.4	5.6
Rwanda (2005)	3.1	11321	24.0	21.4	3.8	4820	20.9	19.2	6.8
Ghana (2003)	2.2	5691	9.9	7.4	24.5	5015	9.1	7.5	17.2
Ethiopia (2005)	2.1	14070	1.7	1.6	3.4	6033	5.1	4.6	9.0
Liberia (2007)	1.7	7092	4.0	3.2	17.8	6009	5.5	4.9	9.5
Guinea (2005)	1.5	7954	2.5	2.1	5.5	3174	6.6	5.9	9.3
Congo Democratic Republic (2007)	1.2 -1.5 [§]	9995	9.9	8.6	12.8	4757	10.2	8.9	12.6
Benin (2006)	1.2	17794	17.2	14.5	12.4	5321	13.1	10.3	18.5
Niger (2006)	0.8	9223	2.1	2.0	8.7	3549	4.8	3.8	19.6
Senegal (2005)	0.8	14602	5.5	2.8	7	3761	4.7	4.2	8.1
Madagascar (2004)	0.1	7949	1.0	0.9	8.2	2432	1.2	0.9	17.0

^á These data are from WHO/UNAIDS July 2008 Report on the Global AIDS epidemic.

[§] There were no specific HIV prevalence rates for the Democratic Republic of Congo and Kenya reported only ranges of rates which are also reported here.

[†] Percentages presented are reflective of the valid percentages of all who responded to the question "Did you receive your HIV test results?" Therefore these estimates are conservative and the number of people who did not receive their test results in some cases may be higher.

2-Figure 1: The proportion of women who reported receiving HIV test results as compared to the proportion of men who reported receiving HIV test results

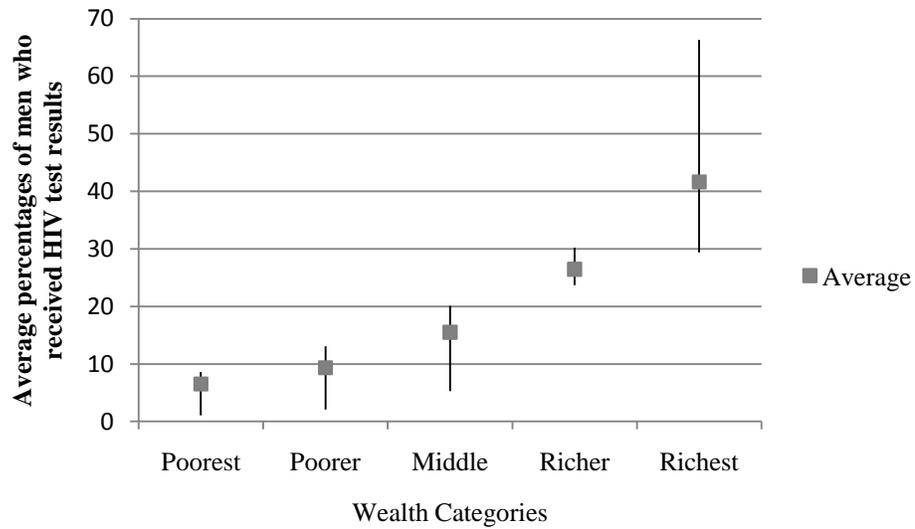


2-Table 2: Among the 14 countries that conducted HIV surveillance testing as part of the DHS data collection, the percentages of DHS respondents (female, male) who tested HIV positive and (female, male) and who tested HIV negative who also reported prior receipt of an HIV test result

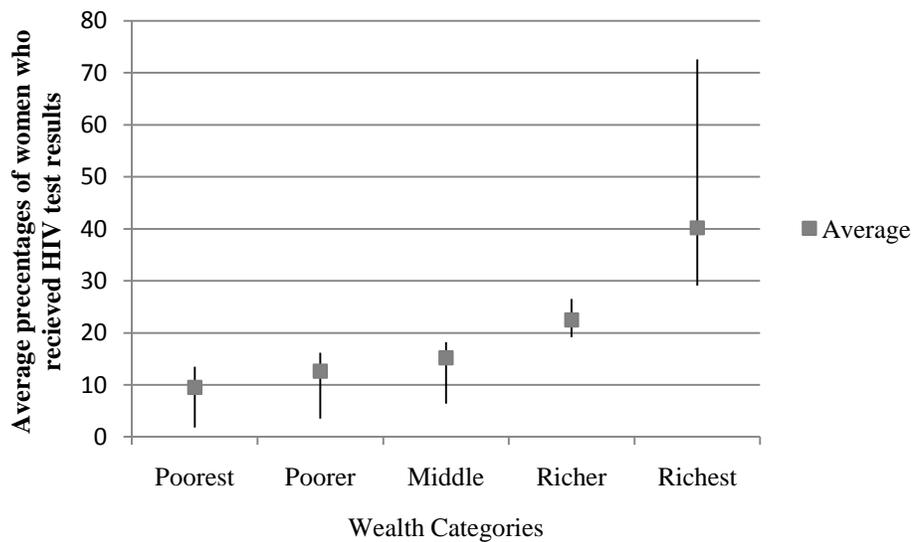
Country (Year of DHS)	Percent of women HIV + who reported previously getting their HIV test results	Percent of women HIV - who reported previously getting their HIV test results	Percent of men HIV + who reported previously getting their HIV test results	Percent of women HIV - who reported previously getting their HIV test results
Cameroon (2004)	28.6	17.8	23.2	13.2
Congo Democratic Republic (2007)	8.6	8.4	16.6	8.3
Ethiopia (2005)	5.5	1.6	6.3	4.4
Ghana (2003)	12.3	7.3	13.2	7.1
Guinea (2005)	5.6	1.7	6.1	5.6
Kenya (2003)	18.5	12.8	22.0	13.7
Lesotho (2004)	16.2	9.8	14.7	6.5
Liberia (2007)	8.0	3.1	11.1	4.6
Malawi (2004)	13.7	11.4	19.3	16.0
Niger (2006)	3.8	1.8	17.4	3.8
Rwanda (2005)	40.7	20.1	32.4	18.7
Senegal(2005)	3.6	2.8	23.1	3.8
Swaziland (2006)	43.8	31.8	28.9	13.2
Zimbabwe (2005/06)	26.3	21.0	19.2	15.2

Figures 2a and 2b: From the six sub-Saharan African with the overall highest HIV prevalence (Swaziland, Lesotho, Zimbabwe Namibia, Malawi, and Mozambique), the range and average percentages of men and women who reported receiving an HIV test result according to the DHS wealth categories

2a – Men

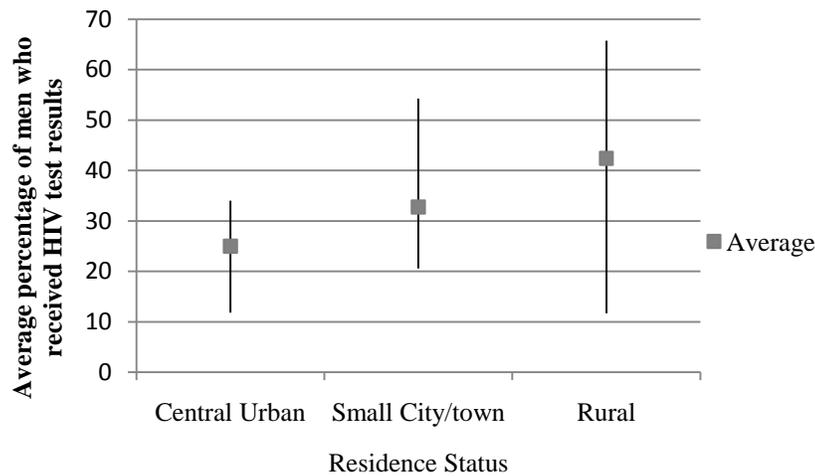


2b – Women

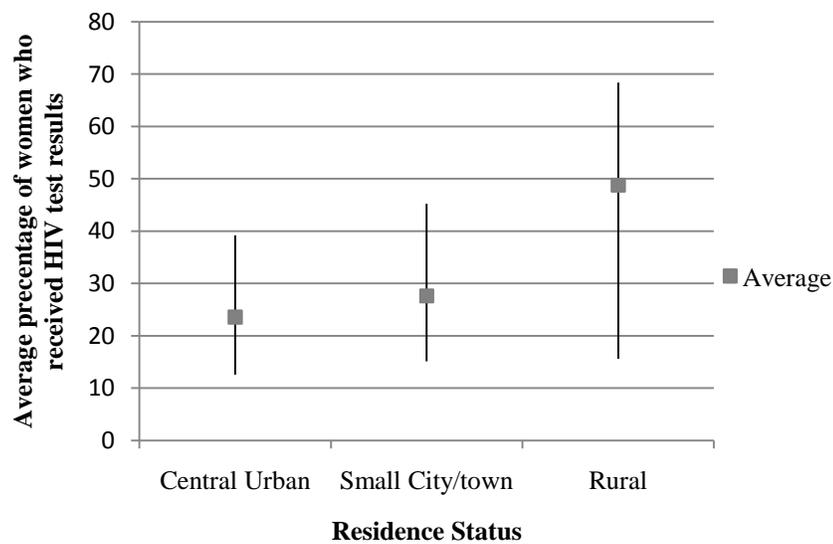


2-Figures 3a and 3b: From the six sub-Saharan African with the overall highest HIV prevalence (Swaziland, Lesotho, Zimbabwe Namibia, Malawi, and Mozambique), the range and average percentages of men and women who received an HIV test result according to their residence status

3a – Men

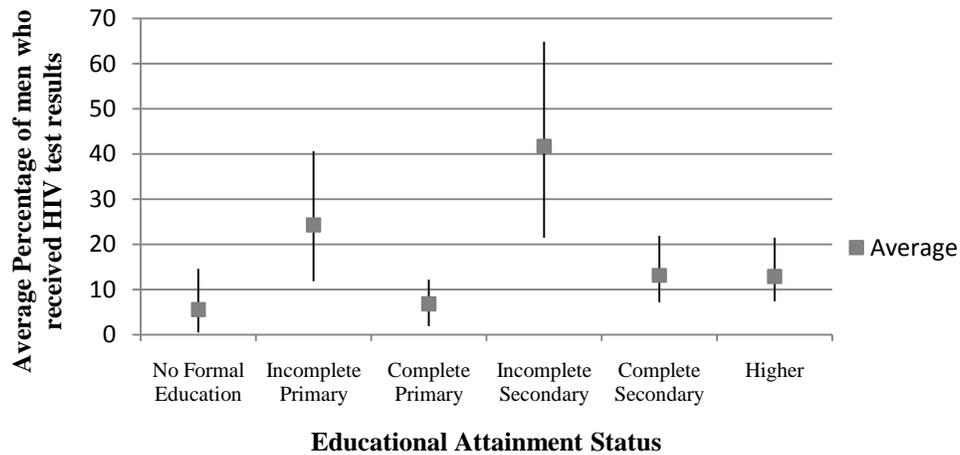


3b – Women

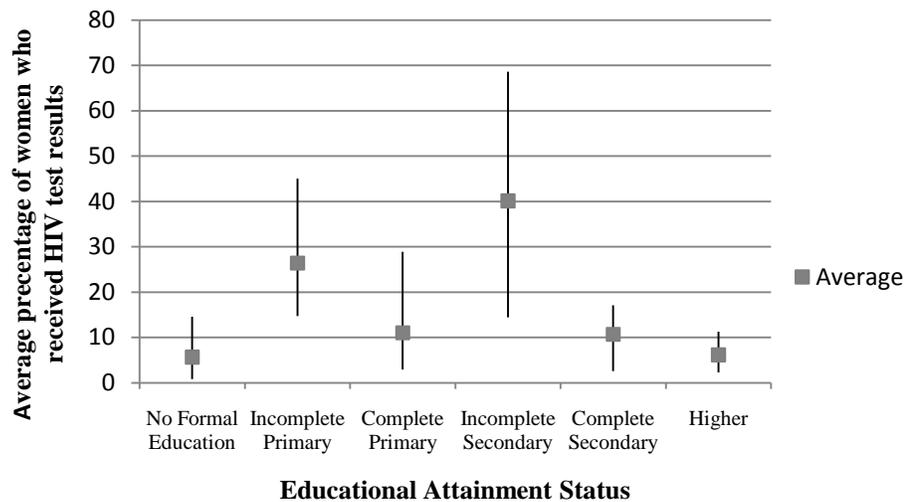


2- Figures 4a and 4b: From the six sub-Saharan African with the overall highest HIV prevalence (Swaziland, Lesotho, Zimbabwe Namibia, Malawi, and Mozambique), the range and average percentages of men and women who reported receiving an HIV test result according to their educational attainment status

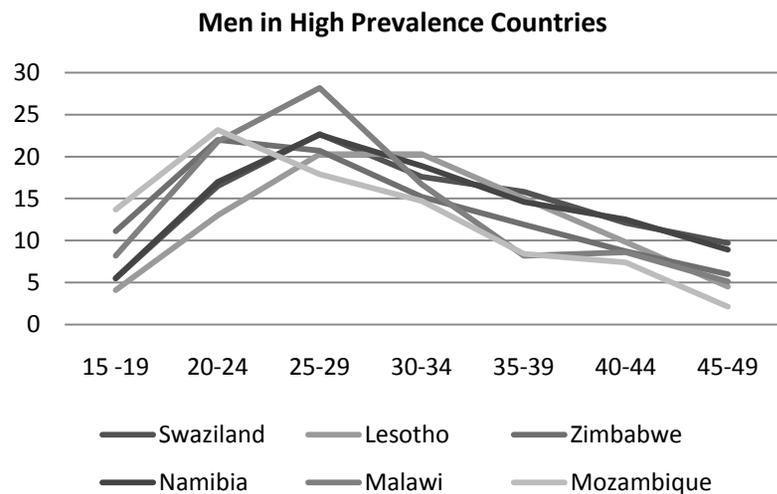
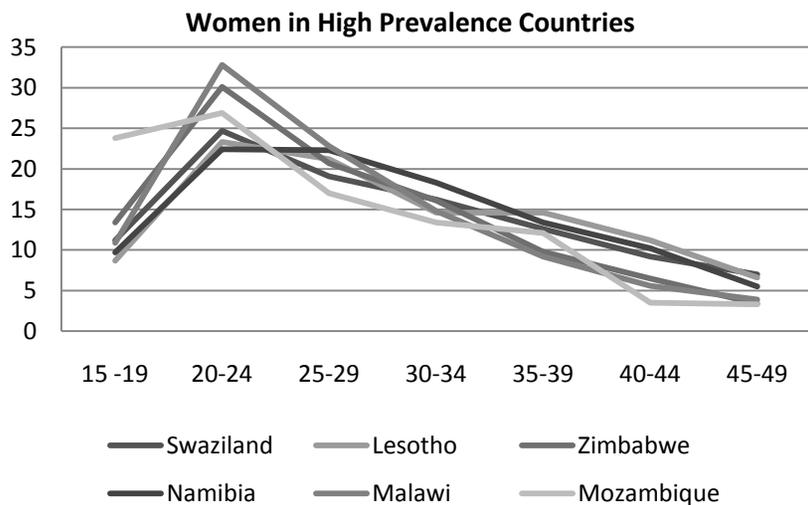
4a – Men



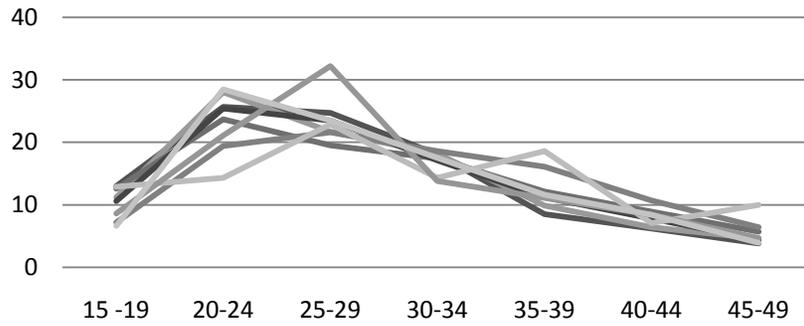
4b – Women



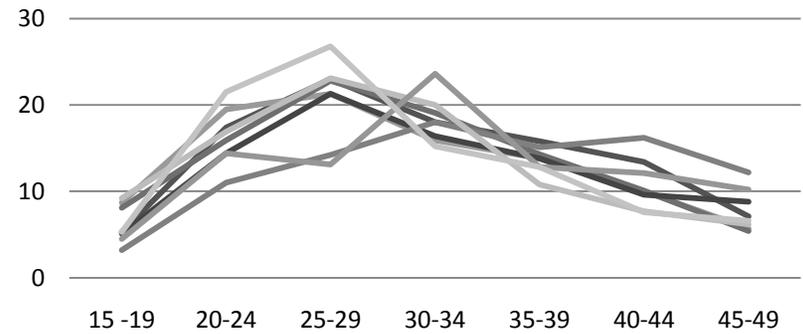
2-Figure 5: From 23 sub-Saharan African countries with DHS data collected between 2003 through 2007, the percentages of women and men who reported having received their HIV test results according to the age distribution of respondents from High, Medium, and Low HIV prevalence countries



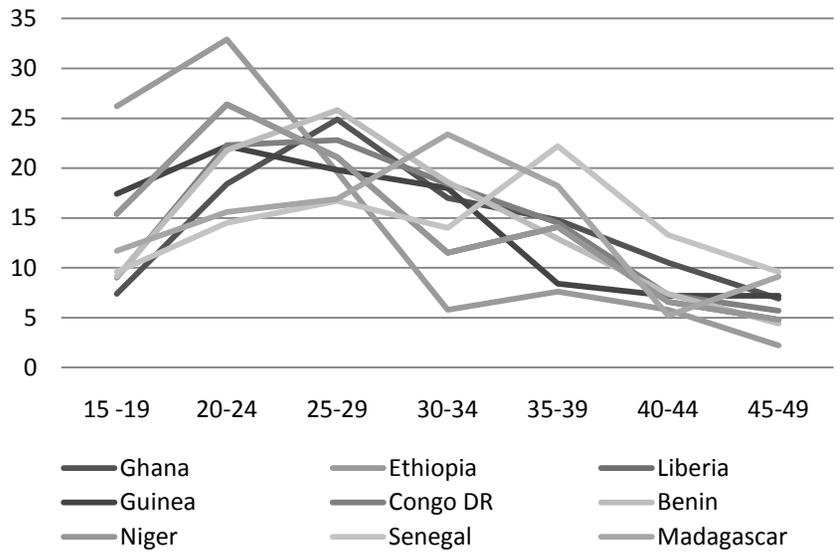
Women in Medium Prevalence Countries



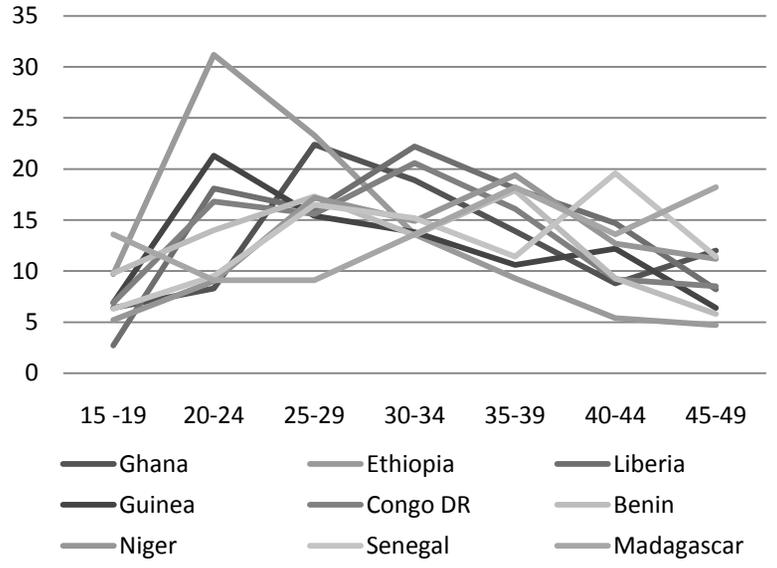
Men in Medium Prevalence Countries



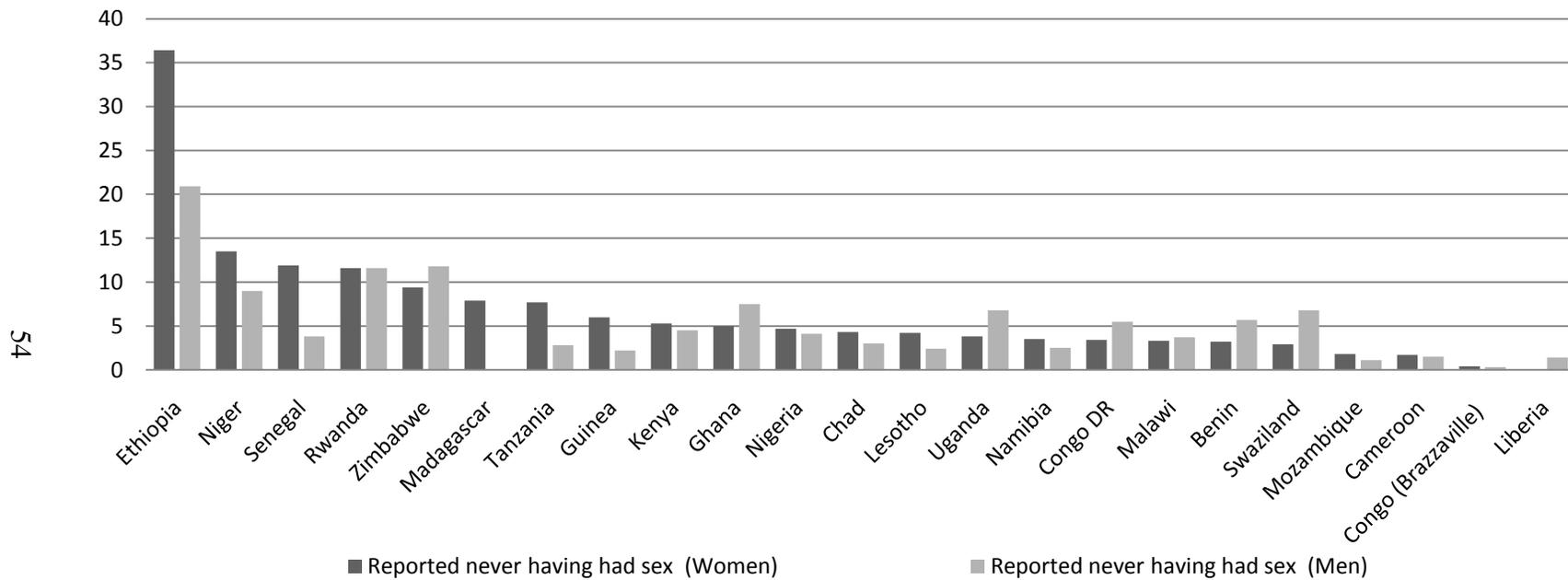
Women in Low Prevalence Countries



Men in Low Prevalence Countries



2-Figure 6: From 23 sub-Saharan African countries with DHS data collected between 2003 through 2007, the percentage women and men who reported never having had sex and who reported previously receiving HIV test results



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CHAPTER III

Probability of positive HIV status among males who don't use HIV testing in Lesotho and Swaziland: Evidence from the demographic and health surveys

INTRODUCTION

In the most recent UNAIDS Global Report (2009) it was estimated that worldwide, 33.4 million people are living with HIV and AIDS. Today more people are living with HIV and AIDS because of state-of-the-art medical treatment and care that has rendered HIV (for the most part) a chronic condition. While more resources have been pledged to treat and support those living with HIV, specifically in resource-constrained areas (like sub-Saharan Africa countries) the burden of HIV continues to overwhelm nations, health systems, and communities.

Lesotho and Swaziland, sovereign nations within southern sub-Saharan Africa, have exceptionally small populations (under 2 million inhabitants-CIA Factbook, 2008) yet worldwide rank among the five countries with the highest HIV prevalence rates (23.6% and 26.2%, respectively, UNAIDS, 2008). Many international reports do not currently distinguish HIV rates separately for men and women; the most accurate accounts come from the Demographic and Health Survey (DHS) program reports. Based on the 2004 Lesotho DHS (LDHS'04) data, 18.8% of Basotho⁹ males were HIV positive representing 39.9% of all those infected with HIV in the country (LDHS, 2004); and in

⁹ People of Lesotho are known as Basotho(s)

Swaziland based on its 2006-2007 DHS data (SDHS'06/07) 19.7% of Swazi¹⁰ males between the ages of 15 and 49 were HIV positive, representing 46% of all those infected (SDHS, 2006/07).

Although the only way to be certain of an HIV infection is to be screened, current UNAIDS estimates indicate 40% of those HIV infected (worldwide) are unaware of their HIV status (2009). The process of HIV screening and learning one's HIV status is recognized as a central component in HIV prevention and the gateway to all subsequent medical treatment and care (Higgins et al. 1991; King et al. 2009; Nimmons and Folkman, 1999; O'Dell et al. 2008; Painter, 2001; Shriver et al. 2000; Wolitski et al. 1997, 2003). Over the last two decades, international organizations, donors, researchers, and experts in the field have express frustration with the low levels of HIV testing particularly in sub-Saharan Africa where 68% of the known HIV cases exist (UNAIDS, 2009). Under the current World Health Organization (WHO) director Dr. Kevin DeCock, there has been a strong policy endorsement for universal provider-initiated HIV testing and counseling (PITC) across the global and particularly within countries with high HIV prevalence rates such as Lesotho and Swaziland (Bass, 2006; Beckwith et al., 2005; Clark, 2006; MMWR, 2007). It is believed with PITC there will be an increase in timely HIV testing and subsequently timely diagnosis and treatment resulting in minimizing rates of HIV infections and AIDS deaths (Helleringer et al., 2009; Kigozi et al., 2009; Nahmias and Feinstein, 1990). The benefits of routine HIV testing are believed to outweigh any associated risks (Steen et al., 2007). There are others however, who believe that universal offered HIV screening in the sub-Saharan African context could jeopardize tenuous relationships Africans currently have with hospital/clinical-based

¹⁰ People of Swaziland are known as Swazi(s)

medical care (Criel, 1998; Buor 2004; Asante, 2007) and that patients may stay away from facilities or fear they may be forced into HIV testing against their will (Rennie and Behets, 2006). My previous research has indicated that fewer men have actually tested as compared to women in countries where HIV prevalence is high. Others have reported that higher rates of infections have occurred among the limited number of men who *seek* HIV testing services as compared to women who *seek* such services which seem to imply differences in health seeking behavior (Steen et al., 2007).

Over the course of the 20th century, people from Africa and the African Diaspora have been the subjects of research related to sex and sexual behaviors (Allen LC, 1915; Hindman SS, 1915; Pesare PJ et al., 1950; Eisenberg L, 1973). Stereotypes resulting from such research (i.e. of women being underpowered victims and men being voracious sexual predators) have been the underpinning of social science research on sexuality, sex and sexual health in sub-Saharan Africa and has lead to a scientific discourse primarily focused on the female experience and issues of reproduction (Reid and Walker, 2005). Since HIV is largely transmitted through heterosexual contact in sub-Saharan Africa, women are considered particularly vulnerable to HIV infection from both biological and social perspectives. Women often have limited access to financial resources that can be used to purchase healthcare services and treatment (medications), lower levels of literacy, and have limited time for their own needs (Buor, 2004). Thus, in the context of the HIV/AIDS pandemic, men are viewed as the perpetrators of the disease transmission and thereby chiefly seen as being responsible for curbing the spread. But little has been understood about men's behaviors in seeking HIV screening services outside of the context of females' experiences or vulnerability.

Of the few articles that have focused on the utilization of HIV screening services in sub-Saharan Africa, most have focused on the acceptability of HIV screening in the context of clinical reproductive care for women (Daniel and Oladapo, 2006; de Paoli et al., 2004; Ekanem and Gbadegesin, 2004; Manzi et al., 2005; Martin-Herz et al., 2006; Worku and Enquesselassie, 2007). Other articles, which have included male subjects have focused on out-reach of mobile clinic screening services (Mbopi-Kéou et al., 2007; Morin et al., 2006), and the specifics of communities or clinical settings within a country (Bwambale et al., 2008; Hutchinson and Mahlalela, 2006; Irungu et al., 2008; Jereni and Muula, 2008; Reilley et al., 2004; Sherr et al., 2007; Wringe et al., 2008). All have used clinical-based respondent samples as opposed to population-based respondent samples, which have had more women than men respondents; and there has been limited comparisons to those who have not used HIV screening services.

In addition, there has been little published describing the utilization of HIV screening services in Lesotho and Swaziland specifically among men. On World's AIDS Day, December 1, 2005, Prime Minister Pakalitha Mosisili of Lesotho initiated a free national universal HIV testing program, "Know Your Status" (KYS) (Mills and Chong, 2006). As part of the program, all people over the age of 12 were to be tested for HIV. Mills and Chong (2006) raised questions about securing people's consent and ensuring confidentiality with regards to test results. Eventually, the KYS program was deemed a failure according to the AIDS and Rights Alliance of Southern Africa because there was insufficient funding, not enough counselors were trained, and services for those who tested HIV infected were not expanded (2008). Jennifer Furin and colleagues (2006) found that the mountainous region of Lesotho lacked basic health care services putting

those at risk of TB and HIV in grave jeopardy. According to Population Services International (PSI/Swaziland), around the same time as the KYS program was being launched in Lesotho, a new program called *Calakabusha (or New Start)* was initiated in Swaziland (2005). PSI/Swaziland worked with the Swaziland Nation AIDS Program (SNAP) to develop marketing messages for “informed demand” for HIV screening services and created a network of six to eight Volunteer Counseling and Testing (VCT) providers (http://www.psi.org/where_we_work/sa-regional.html). However, there are no additional public documents on the progress of Calakabusha. The lone research study on HIV screening in Swaziland by Mkhabela and colleagues (2008) reported on the day-to-day anguish of six nurses who work in Swazi-government-established VCT services. Mkhabela and colleagues suggested staff development programs that included educational training and job-related counseling as a means of empowering the nurses to deal with their daily stresses caring for people with HIV.

Given the paucity of literature on HIV screening in Lesotho and Swaziland and the limited literature focused on sub-Saharan African heterosexual men using population-based samples, the present study aims to determine the probability of being HIV infected among those men who have never been tested for HIV and detail characteristic factors that may be putting them at risk. Such a study can improve the scientific understanding of men’s HIV testing patterns in hyper-endemic countries and inform national and international decision-makers looking to bolster the utilization of existing HIV screening services particularly among those men at-risk but who have not yet tested.

METHODS

Data Source

For this study, I conducted a secondary analysis of the 2004 Lesotho and the 2006 Swaziland Demographic and Health Survey data. In 1984, the United States Agency for International Development (USAID) established the Demographic and Health Survey (DHS) project (Guide to DHS Statistics, 2003) to generate useful population-based data for national and international decision-makers to develop informed and effective policies, health programs, and accessible services. Over the years, people from more than 130 countries have participated in DHS health interviews, answering questions on maternal and child health, family planning, nutrition, sexually transmitted infections and other related issues (Mishra et al., 2006). Since 2001, several resource-constrained countries, which conducted a DHS survey (or similar survey through ICF Macro¹¹), included HIV surveillance as part of the data collection process (Garcia-Calleja et al., 2006; Mishra et al., 2006). Recently, population-based survey surveillance has been promoted over antenatal surveillance, which was, during the 1980s and 1990s, the primary source of national HIV prevalence data (Boerma et al., 2003; Mishra et al., 2006).

“The added value of population-based surveys is that they provide direct data on the distribution of HIV infection among the general adult population, remote rural populations..., men, young non-pregnant women, and regions or provinces”

Mishra et al., 2006, p. 538

Populations

HIV in sub-Saharan Africa is largely a sexually transmitted disease and those who have never been sexually active contribute very little to the overall prevalence rates.

¹¹ ICF Macro, an ICF International Company based in Washington, DC was initially founded as a software development firm in the 1960s. In the last year, the company was acquired by ICF International. The mission of the organization is to focus on research and evaluation, management consulting, information technology and social marketing communications.

Furthermore, in our previous research (Hall and Snow, 2010), I found most sub-Saharan Africans who reported never having had sex, rarely tested for HIV. Therefore to examine more accurately the probability of being HIV infected among those at-risk, I reduced the datasets to only include those men who were sexually active. As a result the final male samples (un-weighted) from Lesotho and Swaziland were 2304 and 2913, respectively.

Outcome Measure

The initial primary outcome variable from the DHS datasets used for this study included being HIV infected (or not) given characteristic factors gleaned from the DHS surveys. Based on our findings, I then disaggregated predicted probabilities of being HIV positive across four types of testing experiences 1) **NOT** having participated in *any* HIV testing and actively refusing DHS surveillance testing (untested); 2) **NOT** having tested prior to the DHS but participating in the surveillance testing; 3) having tested prior to the DHS but **NOT** participating in the DHS surveillance testing; and 4) having tested prior to the DHS surveillance and also participating in DHS surveillance testing. Other testing combinations that included blood not taken because a respondent was not present (or blood not taken for other reasons) were excluded.

Characteristics

The characteristic used in the study analysis were sorted into five groups: Basic social demographic factors, known behavioral HIV-risk factors, knowledge about HIV transmission, attitudes toward people living with HIV and AIDS (PLWHAs), and additional country specific factors.

Basic social demographic factors

Age. The age of an individual is often part of the research design or analysis of studies on the factors influencing the uptake of screening services such as cancer screening (Lin, 2008; Odedina et al., 2008; Ruffin et al., 2009). In the publicly available datasets, age was divided into 5 year age categories ranging from 15-54 (in the case of Lesotho to 59) based on the individual's age at the time of the interview. However, since I limited the study sample to those who were sexually active there were fewer men in the youngest age groups. Therefore I re-oriented the age categories into three groups: "15-29 years of age", "30-44 years of age", and "over 45 years of age."

Wealth. In a study conducted by Vinod Mishra and colleagues from the DHS (2007), the researchers reported that in eight sub-Saharan African countries adults in the wealthier quintiles had higher HIV prevalence than those in poorer quintiles. This is said to be explained by underlying factors of greater education, urban residence, and greater mobility (Mishra et al., 2007). In the DHS survey questionnaires, respondents were not directly asked about their income or household expenditures; rather a wealth index was generated based on several DHS survey items regarding the ownership of consumer durables (the type of housing material used, the availability of electricity, type of toilet facility, source of drinking water, the household possession of a television or a bicycle) (Mishra et al., 2007). This composite measure of cumulative living standards for a household was then used to divide each country's respondent populations into five wealth quintiles: "poorest", "poorer", "middle", "richer" and "richest".

Education. Like age, educational levels of study participants are often considered in the design or analysis of research on factors effecting the usage (or non-usage) of

health care services such as screening (Bakeera et al., 2009; Kyomuhendo, 2003). In the literature on HIV screening in sub-Saharan Africa, one article (Bradley et al., 2006) examined the relationship of educational attainment and HIV status of clients of a volunteer counseling and testing service in Ethiopia stating that those with greater education were less likely to be HIV infected than those with less education. The DHS manuals (Guideline to Statistics, 2003) indicated that in several countries the educational systems were not congruent with the standardized categories in the Phase-5 DHS questionnaire, therefore I analyzed in accordance to each country's reported demarcation of educational attainment.

Residence . Where one lives (residence) can represent adverse and beneficial experiences that can potentially affect health outcomes. Urban areas in developing countries often have more facilities than rural areas (Levesque, 2006) and this could result in limited access to care and a propensity toward self-treatment (Castro-Leal et al., 2000). DHS delineated “urban” residence as living in the capital city, a medium or small city or town, and “rural” residence as living in the countryside. Respondents were not asked about their residence but instead the residence status was coded by DHS surveyors according to each country's urban and rural scheme.

Marital Status. There has been a great deal published on the association of marital status and HIV infection (Anglewicz et al., 2010; Glynn et al., 2003; Marston et al., 2009; Noden et al., 2009; Shisana et al., 2004). However, most of the risk issues discussed in the articles centers again on women's risks of HIV infection. In the one article by Glynn and colleagues (2003), researchers reported their finding implied that most incidents of HIV infection among married males are acquired outside of marriage.

DHS respondents were asked if they had ever been married, were currently partnered and living together, partnered and not living together, widowed or divorced. For this analysis, we re-oriented the responses to reflect never been married (or coupled), currently married (or coupled whether living together or not), and previously married (widowed or divorced).

Employed. There have been a number of published reports on men's participation in workplace HIV prevention services among sub-Saharan African men (Charalambous et al., 2004; Collier et al., 2007; Corbett et al., 2006; Corbett et al., 2007; Lurie et al., 2003; Machekano et al., 1998; Mahajan et al., 2007). These articles primarily have encouraged further support and funding for workplace prevention services because working men are more likely to use these services than other available HIV related services.

Away from home for more than a month. Labor migration has been reported as increasing men's vulnerability to HIV infection because some men may be inclined to engage in sex with more partners and sex workers while working away from home (IOM report on migration, 2005). So whether men reported being away from home for a month or more in the last year was also variable of interest.

Known Behavioral HIV-risk factors

HIV is chiefly spread through sexual intercourse in sub-Saharan Africa; therefore the most salient behavioral HIV-risk factors pertained to sexual activities and sexual health. Several articles over the years have indicated that having concurrent partnerships can place people at particularly high risk for HIV infection (Halperin et al 2004; Halperin 2007; Hudson, 1993; Leclerc-Madlala, 2009; Watts and May 1992). In addition,

Swaziland's generalized HIV epidemic has reportedly been driven by sexual networking involving multiple concurrent partnerships (CDC GAP –Swaziland, 2008). Therefore, I examined testing patterns of respondents based on whether they had multiple partners/wives and/or ever paid for sex. In addition, since the presence of another sexually transmitted infection (STI) can place men at a higher risk of being HIV infected (Hallet et al., 2006) I decided examine whether or not the respondents had been diagnosed with an STI in the last year.

Over the last two decades, there has been a plethora of published research, which focused on men being circumcised as a way of preventing HIV infection. While the act of removal of foreskin has been around for centuries, circumcision as a means of reducing a man's susceptibility to STIs was first put forth in the mid-19th century (Bailey et al., 2001). During the 1990s and early turn of the 21st century many health care advocates and researchers in the field reported the association between the lack of circumcision and heighten risk for being HIV positive (Bailey et al 2001; Kebaabetswe et al., 2003; Moses et al., 1990; O'Farrell and Egger 2000; Van Howe et al., 1999; Weiss et al, 2000). However, it was not until after the advocacy of circumcision at the 2006 International AIDS Conference by prominent political and donor figures and the findings of two randomized control trials that were stopped in Kenya and Uganda that the 2007 WHO/UNAIDS published a technical paper promoting male circumcision as an effective prevention measure against HIV infection. In the two randomized control trials in Kisumu, Kenya and Rakai, Uganda, researchers demonstrated more than a 50% reduction rate in the risk of HIV infection among circumcised participants (Bailey et al., 2007; Gray et al., 2007). Given the fact that circumcision has been a strongly advocated

prevention method for men to reduce their risk of being HIV infected, I also examined the relationship of circumcision with HIV infection and subsequently with HIV testing patterns.

Knowledge about HIV transmission

Although most people are fairly knowledgeable about HIV and that it is a frail blood-borne pathogen transmitted primarily through sexual intercourse (Anglewicz and Kohler 2009; Klimas et al., 2008; Nahmias and Feinstein, 1990), many people lack sufficient information to appropriately estimate their own personal risk (Adams et al. 2003; Smith and Morrison, 2006). There was little variability in the responses to most of the DHS questions. However, previous research (Sarker et al., 2005) suggests that two questions are of particular value: Whether or not a respondent has first-hand knowledge of someone infected with HIV or who has died of AIDS, and whether or not the respondent believes a healthy-looking person can be infected with HIV. Since having multiple partners is a well-known HIV-risk factor (particularly in Swaziland), I also asked if respondents knew that having a monogamous partner could reduce the risks of HIV infections. I also analyzed the respondents' knowledge about medications that can treat an HIV infection and their screening.

Along with having accurate knowledge about transmission risk, I wanted to examine whether or not inaccurate beliefs about the origin of HIV would affect people's status as well as their willingness to be tested. Therefore I also analyzed whether or not respondents believed that HIV was in the condoms (*Lesotho only*) and if they believed HIV could be transmitted through supernatural means.

Attitudes about PLWHAs

A recent article out of South Africa indicated that those with poorer attitudes toward PLWHA were less likely to have been screened for HIV (Pettifor A. et al., 2008). The DHS's most recent questionnaires included questions and judgment statements about a respondent's attitude toward PLWHAs such as: "Would you be willing to care for an HIV infected relative"; "Would you buy vegetables from a vendor with HIV"; and "People with HIV should be allowed to keep their HIV infection a secret."

Additional country specific factors

In addition to the primary questions, I decided to analysis three additional questions, which were not in both of the surveys. From the Lesotho survey I included the questions "Do you believe condoms have the HIV virus" and "Have you ever spoken to your spouse about HIV?" From the Swaziland survey I included the statement "People with HIV are to blame for bringing HIV into the community." Respondents were asked if they agreed or disagreed with the statement.

Analysis

The primary aim of this study was to compare Basotho and Swazi men who reported never having been screened for HIV and who refused to participate in DHS surveillance HIV testing to those Basotho and Swazi men who either reported prior HIV screening and/or participated in the DHS surveillance testing. I began by conducting logistic regression models to determine the factors associated with being HIV infected. Given the final logistic regression models, I created predicted probability scores for each

respondent, and then compared the predicted probabilities of being HIV infected according to respondents' HIV testing experiences. Analyses were performed using SPSS (SPSS for Windows, version 17, Rel 15.01.2009, SPSS, Inc. Chicago IL. USA).

RESULTS

Table 1: Un-weighted percent distributions of men who tested HIV infected in Lesotho and Swaziland

The first table describes the percent distribution of men who were infected with HIV (based on the DHS surveillance testing results) given the characteristics I analyzed. The distributions of several characteristics were similar across both countries including age, being currently coupled (married) as opposed to never having been coupled or formerly coupled, having 1 or fewer partners, willing to care for an relative with HIV, and the belief that people with HIV should be allowed to keep their infection a secret. In Lesotho, HIV positive men were also likely to: be in the middle and richer wealth quintiles, the least educated (some primary or no education), rural residents, report been away from home for more than a month in the last year, be circumcised, *not* willing to buy produce from a vendor with HIV, and report having spoken to their spouse about HIV. In Swaziland most HIV positive men were also likely to: be in the richer and richest quintiles, moderately educated (had completed primary education or some secondary education), rural residents (although not as much as in Lesotho), and employed. Nineteen and 1/2 percent of the Basotho men who tested HIV positive had previously been tested, while 33.3% of Swazi men who tested HIV positive had previously been tested.

Table 2: Odds of being HIV infected, among Basotho men who tested with DHS Surveillance

In analyzing the odds of being HIV infected among Basotho men, I initially ran a logistic model with age, residence, wealth, and education since these primary demographic factors have been associated with being HIV infected and likely to influence the significance of other factors. My initial findings indicated that like in many other sub-Saharan African countries, mature men in their later reproductive years (thirty years of age or older) were significantly more likely to be HIV infected than men in their early reproductive years (15-29 in this case). In addition, Basotho men who resided in urban areas were also more likely to be HIV infected (OR 1.53, 95% CI 1.12 – 2.10). Although I saw that larger numbers of Basotho men infected in the middle and richer wealth quintiles, the odds of being HIV positive in these quintiles were not significantly higher than the odds of being HIV infected within the poorest quintiles. There were no significant difference in being HIV infected based on educational attainment either.

In the subsequent analysis I controlled for age and residence and because of our previous finding on HIV testing and because of Vinod Mishra and colleagues (2007) findings on HIV among those of higher wealth indices, I decided to still control for wealth. Our findings indicated Basotho men who were HIV infected were: most likely to be currently or formerly married and reporting having been diagnosed in the last year with an STI. Basotho men who did not know that a healthy person could be HIV infected and who did not know about life preserving medications were less likely to be HIV infected than those who were aware of these facts but these did not hold significance in the final model (See Table 2). Although there has been a great deal published on the

protective effects of circumcision, there was not a significant finding in being HIV positive between those Basotho men who were and were not circumcised (OR 1.17, 95% CI 0.99 – 1.51) – however the confidence interval was close to being significant.

In the final full multiple regression analysis, Basotho men who were HIV infected were significantly more likely to be: between the ages of 30-44 (OR 2.39, 95% CI 1.74 – 3.27); an urban resident (OR 1.41, 95% CI 1.01 – 1.96); currently married (OR 2.70, 95% CI 1.91 – 3.82) or formerly married (OR 4.23, 95% CI 2.58 – 6.95); diagnosed with an STI in the last year (OR 2.12, 95% CI 2.19 – 3.80). Basotho men who previously tested for HIV were more than twice as likely to test HIV positive with the DHS surveillance testing than those who *had no prior testing experience* (OR 2.23, CI 1.64 – 3.04) when I controlled for age, wealth, and residence.

Table 3: Odds of being HIV infected, among Swazi men who tested with DHS Surveillance

When I controlled for age, wealth, education, and residence our initial multiple logistic regression findings indicated Swazi men who were HIV infected were: most likely to be formerly or currently married; been diagnosed in the last year with an STI; and were likely to believe that people infected with HIV should be able to keep their infection a secret. In addition, Swazi men who were positive were least like to be employed or circumcised, when we controlled for age, wealth, education and residence.

In the final full multiple regression analysis, Swazi men who were HIV infected were most likely to have been: between the ages of 30-44 (OR 2.83, 95% CI 2.22– 3.62); an urban resident (OR 1.39, 95% CI 1.08 – 1.79); currently married (OR 1.72, 95% CI 1.34 – 2.22) or formerly married (OR 3.87, 95% CI 2.64 – 5.68); diagnosed with an STI

in the last year (OR 2.74, 95% CI 1.99 -3.75); and believe that people with HIV infections should be allowed to keep their infection a secret (OR 1.29, 95% CI 1.04 - 1.59). Swazi men who were HIV infected, were least likely to have been circumcised (OR 0.67, 95% CI 0.49 – 0.93). Swazi men who previously tested for HIV were nearly twice as likely to test HIV infected with the DHS surveillance testing than those who had no prior testing experience (OR 1.79, CI 1.47 – 2.17) when we controlled for age, wealth, education, and residence.

Figures 1a and 1b: The average predicted probabilities and the 75th through 25th percentile range of being HIV infected given respondents experiences with HIV testing (never having been tested, tested with the DHS only, tested prior to and as part of the DHS, and only tested prior to the DHS)

Based on my multiple logistic regression analyses, I generated predicted probability scores for each of the respondents. This allowed me to estimate the likelihood of being HIV positive among those men for whom no HIV testing information existed (specifically those men who reported never using existing testing services and who refused to participate in the DHS surveillance testing). Subsequently I plotted the average probability scores and the 75th through 25th percentile range for the respondents based on their experiences with HIV testing (or lack thereof)¹² (See Figures 1a and 1b).

Basotho men who had never been tested for HIV (untested) had an average predicted probability of 0.25 with a 25th through 75th percentile range of 0.13 to 0.35. This average along with the average of those men who reported no prior HIV testing but who agree to DHS surveillance testing (0.22, 25th through 75th percentile range of 0.10 to 0.31) was lower than the averages of both groups of men who reported testing prior to the

¹² There were three groups of testers, those who previously tested and participated with DHS testing, those who previously tested but refused to participate with DHS testing, and those who had never previously tested but accepted DHS testing.

DHS. Thus it appears that those most at-risk for HIV are, in fact, using existing services to be tested for HIV. Those men who reported prior testing but who refused to be tested as part of the DHS had the largest 25th through 75th percentile range of 0.08 to 0.41, where the other ranges were essentially the same distance apart. Given our findings, there was little difference between the groups of men with and without testing experiences.

Untested Swazi men had an average predicted probability of 0.28 with a 25th through 75th percentile range of 0.14 to 0.41. This average was only slightly less than men who had been tested previously and who accepted the DHS testing (average predicted probability 0.30). The averages of the men who only tested with the DHS and those who only reported prior HIV testing were the same (average predicted probability 0.27), slightly lower than the untested men. The 25th through 75th percentile range for untested men was the largest of the four groups. Unlike in Lesotho however, the range for men who had only tested through existing services was the smallest of the four groups (0.15 to 0.31). Essentially, the average predicted probability scores and the inner range of those untested Swazi men was not dramatically different than those with HIV testing experience(s).

Table 4: Percent distribution of salient factors associated with being HIV infected across the different HIV testing experiences of Basotho men

Untested Basotho men were similarly distributed across the age categories as both groups of testers who reported prior HIV testing through existing services. With regards to residence, untested men were nearly evenly split (½urban residents and ½ rural residents). More than half of the untested men were married but nearly 70% of the men

who reported prior HIV testing were also married. Both groups of men with no prior to DHS testing (DHS only testers and those untested) had smaller proportions of men with a diagnosed STI in the last year as compared to the men who both tested prior to and as part of the DHS. Finally in comparison to all three groups of tested men, untested men were more likely to report *NOT* being circumcised.

Table 5: Percent distribution of salient factors associated with being HIV infected across the different HIV testing experiences of Swazi men

Untested Swazi men in comparison to those men who had been previously tested through existing services were: more likely to be between the ages of 15-29, as likely to live urban areas, slightly less likely to be currently or formerly married, slightly less likely to have been diagnosed with an STI in the last year, less likely to be circumcised, and as likely to believe that people with HIV should be allowed to keep their infection a secret. Men with no prior testing experience but who agreed to DHS surveillance testing as compared to those men with prior testing experiences were: most likely to be between the ages of 15-29; rural residents, never married, and not circumcised. Disconcerting was my finding of similar proportions of Swazi men who tested both through existing services and the DHS and those Swazi men who had only been tested as part of the DHS surveillance - who reported being diagnosed with a sexually transmitted disease in the last year (7.6% and 8.6%, respectively).

DISCUSSION

My study findings add to the body of scientific knowledge regarding Basotho and Swazi men's uptake of testing and counseling services and who among them have not

been tested; thereby illuminating potential ways to increase HIV screening among sub-Saharan African men.

First, in both countries men who were found to be HIV infected among those tested through the DHS, were twice as likely to have prior tested. Thus it would appear that current in-country services were in large measure being used by those most at-risk. But there were still many, particularly rural residents, both in Lesotho and Swaziland, who tested infected and who had not previously been tested, suggesting improvements remain necessary to reach those who tested with the DHS surveillance but not existing services. I suspected from my previous research and the body of scientific literature, a critical reason many men (in resource-constrained countries) do not reach existing services has less to do with individual characteristics and more to do with the distribution of services. Focusing on the shortages of facilities and trained personnel will continue to be central to the successful scaling-up of HIV services, treatment, and care.

Second, it appears that despite the high prevalence of HIV in both countries, HIV infection largely exists in secret. This is based on the findings that more than half of HIV infected men (in both countries) reported *NOT* knowing someone with HIV or who has died of AIDS and that about one-third of the HIV infected men (in both countries) believed that people should be allowed to keep their HIV infection a secret. In addition, there were no significant differences given these factors for those who tested infected as compared those who did not. These findings are likely indicators of continued stigma around HIV infection, and probably undermine any efforts to increase men's involvement in understanding their personal risks and subsequent participation in HIV testing and counseling. HIV-related stigma remains a salient research issue and barrier to the use of

HIV services. Future efforts should remain focused on dismantling the negative effects of stigma on people's abilities to learning their HIV status.

I also found some ongoing misunderstandings about HIV transmission. I was surprised to learn that even in the early 21st century more than one-fourth of Basotho men who were infected with HIV believed HIV could be spread through the use of condoms and more than 10% did **NOT** know that a healthy-looking person could have HIV. Furthermore these findings among HIV infected men were not significantly different in comparison to those men who were not HIV infected. Such misconceptions about HIV transmissions gravely impact these men ability to engage in appropriate protective measures as well as assess their own personal risks for infection. While it was encouraging to see more Swazi men were accurately knowledgeable about HIV transmission, vigilance is necessary to make sure *all* are informed about HIV and its transmission. I definitely expect that to-date more Basotho men have improved knowledge about transmission risks but would suggest continued research on people's knowledge about HIV transmission to monitor the progress of prevention promotion efforts.

Another key prevention issue was the prevalence of circumcision. My findings indicated that being circumcised reduced chances of being HIV infected among the few Swazi men who reported being circumcised; but not being circumcised **did not** increase the chances of being HIV infected among the few Basotho men who reported not having been circumcised. This in no way negates the promotion of circumcision as a prevention measure among sub-Saharan Africa men. However, I believe that men should still be encouraged to know their HIV status and be monogamous and with monogamous

partners who are HIV negative (or at least known so they can make other sound choices), be screened and treated for STIs, and (if not engaging in sex for procreation) still encouraged to use condoms.

Addressing the primary research question given both final logistic regression models, I found untested men, in both countries, had similar probabilities of being HIV infected as the men who had tested through existing services and/or the DHS surveillance. The untested men, who may be infected, are likely unwittingly spreading HIV. The data indicated that untested men in comparison to those men with prior to the survey testing experience were: more likely to be younger, evenly split among rural and urban residence, and more likely to have never been married. However, the proportions of men who were formerly married among those untested men and those men who only participated in the DHS testing was not much lower than that of men who reported previously being tested through existing services. Since I know that being formerly married is a prominent risk factor for HIV infection, men who become widowed specifically should be targeted to be screened. While there was a notable difference in the proportion of men who were circumcised between the two countries, untested men in both countries were less likely to be circumcised. Given this finding I would encourage more research be conducted to understand the connection between not being circumcised and not being tested because future research may demonstrate that many of those who are not circumcised and who have not been tested are those men not being reached by existing clinical/hospital based services. Lastly, there were notable proportions of men (in both countries) who reported no previous testing through existing services who had

been diagnosed with an STI in the last year and more should be understood about the inclusion of HIV screening as part of other STI care.

Based on the findings I would suggest that provider-initiated offered HIV testing and counseling (PITC) be standard practice for all male patients who present themselves for clinical/hospital care. Furthermore, men who are infected with other STIs should be strongly encouraged to accept PITC and well-educated about their increased personal risk for HIV infection given the presence of other STIs.

There are some limitations to this study. I was unable to examine a couple of key concepts in both countries. First was the concept of “perceived risk (susceptibility)¹³, which is known in health behavioral theories as a powerful cue prompting people to reduce their risk by engaging in healthier activities such as increased condom use (Belcher et al., 2005) or being vaccinated against Hepatitis B (deWit et al., 2005). Recently, researchers examining HIV testing in resource-endowed countries have stated people are more likely to test if they have a perception that they are at high risk for infection (deWit and Adams, 2008; Jereni and Muula, 2008). I would suggest, in areas where HIV prevalence is high, future research should examine more not only the perceptions of HIV risk, but what shapes those perceptions, and how people in general but men in particular act on those perception and participate (or not) in HIV testing. Additionally, I would have liked to examine the utilization of HIV services within the context of overall use of medical services. It was stated earlier, researchers have found more infections among the fewer numbers of men who have reported prior to survey

¹³ Although a question about perceived risk was asked in the Lesotho DHS, only those men who reported not having been tested were asked the question –therefore we did not include it. For analysis purposes, it would have been better if all respondents were asked this question with follow-up questions regarding the factors shaping the perceptions.

testing; and my own evidence showed that men who used existing services were twice as likely to be HIV infected than those who tested only as part of surveillance. While PITC is likely to lead to more cases being diagnosed, among men in both countries – there may still be men in need of testing who are not being reached by any existing hospital/clinical-based services. Other researchers have reported that many men in the region are likely to seek care through other systems apart from clinical-based care (Collumbein and Hawkes, 2000; Varga, 2001). More needs to be understood about the overall usage by men of clinical services to best understand how PITC can reach those who would not otherwise volunteer to be tested on their own. I hope that in the future the DHS will included critical questions about the health seeking process (e.g. inquiring to whom men may first go to if they have a health problem or concern) to improve our overall understanding of the utilization of all available health services by those most in need.

There were amounts of missing response data for several of the questions. In addition, I did not use the provided sample weights; thereby allowing for the creation of the predicted probabilities for those who did not test as part of the DHS surveillance. It would initially appear that the missing data and our not using the sample weights would be a limitation, preventing me from generalizing the findings to the larger populations. However, since the samples were randomly selected and there were other measures to ensure the samples were robust and reflective of Basotho and Swazi men, I believe the findings are sufficiently representative.

Although I found no significant differences in the knowledge about HIV transmission between those who tested HIV positive and those who did not, it is unclear the effect counseling associated with prior testing may have improved some respondents'

knowledge about HIV transmission because the findings were based on cross-sectional data. Nonetheless, I know from the numbers I did see (of those who inaccurately answered transmission questions) that continued health promotion and education about HIV transmission is still necessary.

CONCLUSION

Given the findings, sexually active men who had not screened for HIV differed very little in terms of HIV associated risk from those that had tested. I would endorse routinely offered testing and counseling, but still have concerns men's overall usage of hospital/clinical-based medical care in general and more research in understanding the cues that are likely to prompt men to uptake HIV screening in particular. Since many resource-constrained countries like Lesotho and Swaziland are struggling to adequately provide health care services and distribute HIV prevention and treatment services; I would suggest (at a minimum) to have routinely offered testing and counseling specifically for men most at risk such as those in their thirties and early forties, those who are married or formerly married, and (*all*) those who seek clinical-based care for STIs. Finally I would endorse scaled-up efforts to routinely offer counseling and male centered education to improve prevention promotion and ensure more men have accurate knowledge of HIV transmission and their own individual risks.

3-Table 1: Un-weighted percent distributions of men who tested HIV positive in Lesotho and Swaziland

	Lesotho Males who were HIV positive (N=404)	Swaziland Males who were HIV positive (N= 679)
<i>Basic Social Demographics</i>	n (%)	n (%)
Age		
15 – 29	126 (31.2)	230 (33.9)
30 – 44	209 (51.7)	386 (56.8)
45+	69 (17.1)	63 (9.3)
Wealth		
Poorest	82 (20.2)	101 (14.9)
Poorer	76 (18.8)	106 (15.6)
Middle	91 (22.5)	117 (17.2)
Richer	90 (22.3)	156 (23.0)
Richest	65 (16.1)	199 (29.3)
Education Attained¹⁴		
No Education	104 (25.7)	84 (12.4)
Some Primary	76 (37.1)	225 (33.1)
Completed Primary	59 (14.6)	310 (45.7)
Secondary or more	91 (22.5)	60 (8.8)
		No Education Complete Primary Incomplete Secondary Higher than Secondary
Residence		
Rural	294 (72.8)	395 (58.2)
Urban	110(27.2)	284 (41.8)
Marital Status		
Never Coupled	79 (19.6)	211 (31.1)
Currently Coupled	269 (66.6)	372 (54.8)
Formerly Coupled	56 (13.9)	96 (14.1)
Respondent is currently working	163 (40.3)	498 (73.3)
Respondent has been away from home for more than 1 month in the last year	93(50.3)ψ	136 (28.1)ψ

¹⁴ Although the educational attainment measures were standardized by the DHS, the countries each had their own measures of education and we did our best to honor those separations given the data.

<i>Known Behavioral HIV-risk Factors</i>		
Respondent has paid for sex	40 (9.9)	<i>NO Data</i>
Respondent has been diagnosed with an STD in the last year	28 (7.0)	98 (14.5)
Has multiple partners		
0-1 Partners	389 (96.3)	651 (95.9)
2+ Partners	15 (3.7)	28 (4.1)
Respondent is circumcised	255 (63.1)	61 (9.0)
<i>Knowledge about HIV transmission</i>		
Respondent knows someone with HIV or who has died of AIDS	90 (23.4)	315 (46.7)
Respondent <i>DOES NOT</i> (or is unsure) knows that a healthy-looking person can have HIV	53 (13.8)	9 (1.3)
Respondent <i>DOES NOT</i> knows about life-preserving medications for those infected with HIV	38 (9.9)	25 (3.7)
Respondent believes that HIV can be reduced by having sex with a monogamous partner	36 (9.4)	52(87.7)
Respondent believes AIDS can be spread through supernatural means	26 (6.8)	42 (6.4)
<i>Knowledge and attitudes toward PLWHA</i>		
Respondent is willing to care for a relative with HIV	323 (83.9)	641 (96.0)
Respondent would <i>NOT</i> buy produce from a vendor known to be HIV infected	205 (53.2)	136 (20.3)
Respondent believes that people should be allowed to keep their HIV infection a secret	130 (33.9)	209 (30.9)

Respondent previously tested for HIV	75 (19.5)	225 (33.3)
<i>Country specific questions</i>		
<i>LESOTHO ONLY</i>		
Respondent believes condoms have the AIDS virus	105 (26.1)	N/A
<i>LESOTHO ONLY</i>		
Respondent has spoken to spouse about HIV	149 (58.7)	N/A
<i>SWAZILAND ONLY</i>		
PLWHAs are to blame for HIV in their communities	N/A	43 (6.4)

Ψ Some respondents did not answer all questions, therefore numbers and percentages are reflective of the actual responses coded in the data

3 -Table 2: Odds of being HIV infected among Basotho men who, tested with the DHS surveillance

<i>Basic social demographic factors</i>		Observed Numbers	Odds adjusted for age, wealth, residence OR (95% CI)§	Odds adjusted for all salient factors OR (95% CI)
Age	15-29	933	ref	ref
	30-44	535	4.23 (3.26 – 5.48)†	2.39 (1.74 – 3.27)†
	45+	367	1.54 (1.11 – 2.13)†	0.77 (0.52 – 1.14)
Wealth	Poorest	406	ref	ref
	Poorer	395	0.98 (0.68 – 1.40)	0.88 (0.60 – 1.31)
	Middle	356	1.43 (1.00 – 2.04)	1.40 (0.95 – 2.06)
	Richer	345	1.43 (0.98 – 2.08)	1.43 (0.95 – 2.16)
	Richest	333	0.80 (0.52 – 1.23)	0.76 (0.47 – 1.23)
Education	No Education	417	ref	
	Incomplete Primary	743	0.78 (0.51 – 1.07)	
	Complete Primary	243	0.83 (0.55 – 1.26)	
	Secondary or More	432	0.75 (0.51 – 1.11)	
Residence	Rural	1433	ref	ref
	Urban	402	1.53 (1.12 – 2.10)†	1.41 (1.01 – 1.96)†
Marital Status	Never Married	738	ref	ref
	Currently Married	943	2.76 (1.98 – 3.84)†	2.70 (1.91 – 3.82)†
	Formerly Married	152	4.28 (2.67 – 6.87)†	4.23 (2.58 – 6.95)†
Employed	No	1212	ref	
	Yes	621	1.21 (0.95 – 1.54)	
Worked away from home for more than a month in the last year	No	392	ref	
	Yes	400	1.02 (0.72 – 1.44)	

§ un-weighted OR=Odds ratio; CI=confidence intervals

† $p \leq 0.05$

Known Behavioral HIV-risk Factors		Observed Numbers	Odds adjusted for age, wealth, residence OR (95% CI)§	Odds adjusted for all salient factors OR (95% CI)
Ever paid for sex	No	1715	ref	
	Yes	119	1.43 (0.94 – 2.18)	
Has been diagnosed with a STI in the last year	No	1756	ref	ref
	Yes	66	2.72 (1.56 – 4.75)†	2.12 (2.19 – 3.80)†
Has multiple sex partners	0-1	1785	ref	
	2 more	50	1.19 (0.62 – 2.27)	
Is circumcised	Yes	1088	ref	ref
	No	745	1.17 (0.99– 1.51)	0.96 (0.73 – 1.25)
Knowledge about HIV transmission				
Knows someone with HIV or who has died of AIDS	No	1303	ref	
	Yes	422	0.83 (0.62 – 1.11)	
Knows that a healthy-looking person can have HIV	Yes	1264	ref	ref
	No	315	0.67 (0.48 – 0.95)†	0.71 (0.50 – 1.01)
	Don't Know	145	0.86 (0.55 – 1.34)	0.87 (0.55 – 1.38)
Knows about life-preserving medications for those infected with HIV	Yes	840	ref	ref
	No	231	0.66 (0.44 – 0.98)†	0.67 (0.44 – 1.01)
	Don't Know	654	0.94(0.72 – 1.22)	0.94 (0.72 – 1.24)
Believes that HIV can be reduced by having sex with a monogamous partner	Yes	1423	ref	
	No	294	1.04 (0.75 – 1.44)	
Believes AIDS can be spread through supernatural means	No	1360	ref	
	Yes	133	0.90 (0.56 – 1.43)	
	Don't Know	227	1.40 (1.00 – 1.97)	

§ un-weighted OR=Odds ratio; CI=confidence intervals

† $p \leq 0.05$

Knowledge and attitudes toward PLWHA		Observed Numbers	Odds adjusted for age, wealth, education, residence OR (95% CI)§	Odds adjusted for all salient factors OR (95% CI)
Willing to care for a relative with HIV				
	Yes	1402	ref	
	No	302	0.91 (0.66 – 1.27)	
Would buy produce from a vendor known to be HIV infected				
	Yes	971	ref	
	No	729	1.15 (0.89 – 1.49)	
Believes that people should be allowed to keep their HIV infection a secret				
	No		ref	ref
	Yes			
	Don't Know			
Country specific questions				
LESOTHO ONLY				
Believes condoms have the AIDS virus				
	No	677	ref	
	Yes	531	0.82 (0.61 – 1.11)	
	Don't Know	623	1.10 (0.83 – 1.45)	
LESOTHO ONLY				
Has spoken to spouse about HIV				
	No	501	ref	
	Yes	381	0.98 (0.71 – 1.36)	
Was previously tested for HIV				
	No	1854	ref	
	Yes	616	2.23 (1.64 – 3.04)†	

§ un-weighted OR=Odds ratio; CI=confidence intervals

† $p \leq 0.05$

3 -Table 3: Odds of being HIV infected, among Swazi men who tested with the DHS surveillance

Basic social demographic factors		Observed Numbers	Odds adjusted for age, wealth, education, residence OR (95% CI)§	Odds adjusted for all salient factors OR (95% CI)
Age	15-29	1350	ref	ref
	30-44	914	3.83 (3.13 – 4.68)†	2.83 (2.22 – 3.62)†
	45+	215	2.15 (1.54 – 3.01)†	1.37(0.98 – 2.01)
Wealth	Poorest	346	ref	ref
	Poorer	344	1.25 (0.88 – 1.76)	1.31 (0.92 – 1.88)
	Middle	452	0.94 (0.67 – 1.32)	0.99 (0.69 – 1.41)
	Richer	560	0.91 (0.64 – 1.29)	0.98 (0.68 – 1.40)
	Richest	777	0.67 (0.46 – 0.98)†	0.72 (0.49 – 1.08)
Education	No Education	254	ref	ref
	Complete Primary	763	1.05 (0.76 – 1.44)	1.03 (0.74 – 1.44)
	Incomplete Secondary	1187	0.99 (0.72 – 1.37)	1.09 (0.75 – 1.51)
	Secondary or More	256	0.63 (0.41 – 0.97)†	0.69 (0.44 – 1.08)
Residence	Rural	1530	ref	ref
	Urban	949	1.48 (1.16 – 1.88)†	1.39 (1.08 – 1.79)†
Marital Status	Never Married	1259	ref	ref
	Currently Married	1049	1.82 (1.43 – 2.32)†	1.72(1.34 – 2.22)†
	Formerly Married	171	4.28 (2.94 – 6.21)†	3.87 (2.64 – 5.68)†
Employed	Yes	1625	ref	ref
	No	839	0.79 (0.63 – 0.98)†	0.85 (0.67 – 1.08)
Worked away from home for more than a month in the last year	No	1248	ref	
	Yes	482	1.08 (0.84 – 1.38)	

§ un-weighted OR=Odds ratio; CI=confidence intervals

† $p \leq 0.05$

<i>Known Behavioral HIV-risk Factors</i>		Observed Numbers	Odds adjusted for age, wealth, education, residence OR (95% CI)§	Odds adjusted for all salient factors OR (95% CI)
Has been diagnosed with a STI in the last year	No	2254	ref	ref
	Yes	210	3.06 (2.25 – 4.18)†	2.74 (1.99 – 3.75)†
Has multiple sex partners	0-1	2422	ref	
	2 more	57	1.64 (0.95 – 2.84)	
Is circumcised	No	2233	ref	ref
	Yes	246	0.68 (0.49 – 0.93)†	0.67 (0.49 – 0.93)†
<i>Knowledge about HIV transmission</i>				
Knows someone with HIV or who has died of AIDS	No	1316	ref	
	Yes	1146	1.04 (0.86 – 1.25)	
Knows that a healthy-looking person can have HIV	Yes	2404	ref	
	No	46	0.51 (0.24 – 1.10)	
Knows about life-preserving medications for those infected with HIV	Yes	2336	ref	
	No	120	0.64 (0.39 – 1.02)	
Believes that HIV can be reduced by having sex with a monogamous partner	Yes	2298	ref	
	No	151	1.40 (0.97 – 2.03)	
Believes AIDS can be spread through supernatural means	No	2288	ref	
	Yes	114	1.20 (0.79 – 1.81)	

§ un-weighted OR=Odds ratio; CI=confidence intervals

† $p \leq 0.05$

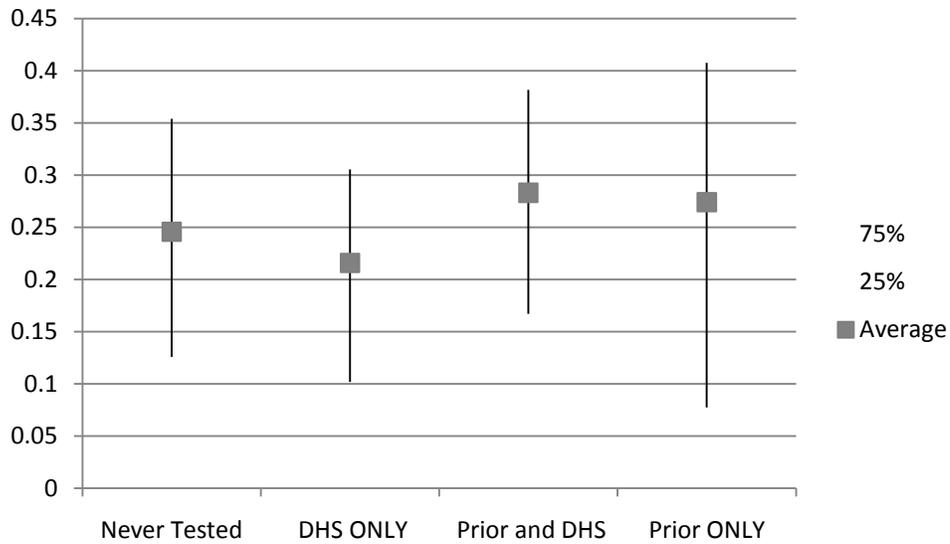
Knowledge and attitudes toward PLWHA		Observed Numbers	Odds adjusted for age, wealth, education, residence OR (95% CI)§	Odds adjusted for all salient factors OR (95% CI)
Willing to care for a relative with HIV				
	Yes	2296	ref	
	No	139	0.73 (0.47 – 1.14)	
Would buy produce from a vendor known to be HIV infected				
	Yes	1926	ref	
	No	517	0.80 (0.64 – 1.01)	
Believes that people should be allowed to keep their HIV infection a secret				
	No	1585	ref	ref
	Yes	676	1.35 (1.10 – 1.66)†	1.29 (1.04 – 1.59)†
	Don't Know	209	1.26 (0.90 – 1.76)	1.24 (0.88 -1.74)
Country specific questions				
SWAZILAND ONLY				
People with HIV are to blame for bring HIV into the community.				
	No	2295	ref	
	Yes	173	1.07 (0.74 – 1.54)	
Was previously tested for HIV				
	No	1854	ref	
	Yes	616	1.79 (1.47 – 2.18)†	

§ un-weighted OR=Odds ratio; CI=confidence intervals

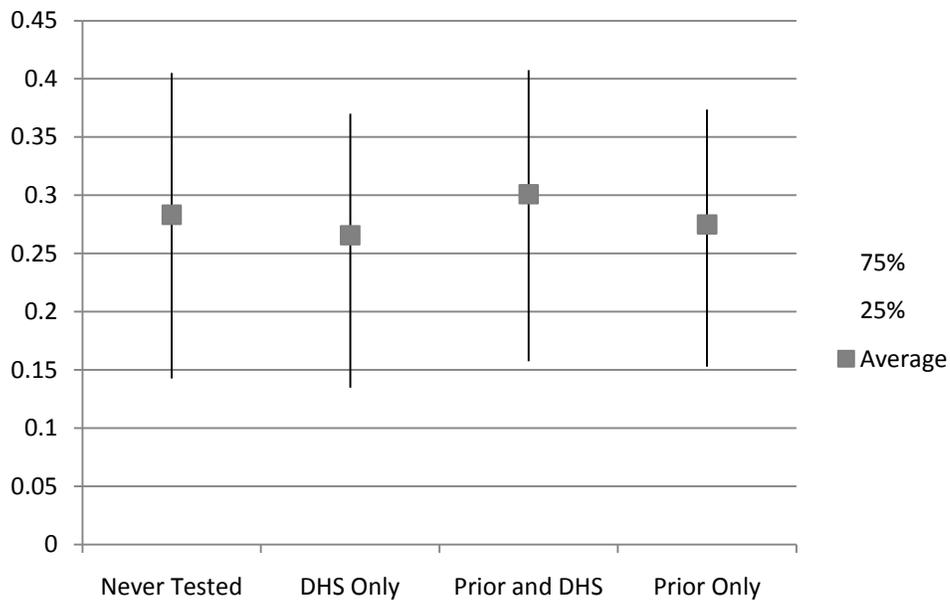
† $p \leq 0.05$

3 -Figures 1a and 1b: The average predicted probabilities and the 75th through 25th percentile range of being HIV infected given respondents experiences with HIV testing (never having been tested, tested with the DHS only, tested prior to and as part of the DHS, and only tested prior to the DHS)

1a –Lesotho



1b – Swaziland



3 -Table 4: Percent distribution of salient factors associated with being HIV positive across the different HIV testing experiences of Lesotho men

	Prior Tested and DHS Tested	Prior Tested BUT Refused DHS Tested	NO Prior Testing but tested with DHS	Untested Men
	n (%)	n (%)	n (%)	n (%)
Age				
15 - 29	76 (36.0)	26 (41.3)	825 (52.7)	120 (45.1)
30 - 44	87 (41.2)	25 (39.7)	434 (27.7)	88 (33.1)
45+	48 (22.7)	12 (19.0)	306 (19.6)	58 (21.8)
Residence				
Rural	143 (67.8)	34 (54.0)	1220 (78.0)	140 (52.6)
Urban	68 (32.2)	29 (46.0)	345 (22.0)	126 (47.4)
Marital Status				
Never been married	48 (22.9)	18 (28.6)	667 (42.6)	96 (36.1)
Currently married	146 (69.5)	42 (66.7)	768 (49.1)	151 (56.8)
Formerly married	16 (7.6)	3 (4.8)	129 (8.2)	19 (7.1)
Been diagnosed in the last year with an STI				
Yes	11 (5.3)	0 (0.0)	49 (3.2)	9 (3.4)
No	198 (94.7)	63 (100)	1506 (96.8)	255 (96.6)
Circumcised				
Yes	127 (58.8)	33 (52.4)	921 (58.9)	124 (46.8)
No	87 (41.2)	30 (47.6)	643 (41.1)	141 (53.2)

3 -Table 5: Percent distribution of salient factors associated with being HIV positive across the different HIV testing experiences of Swaziland men

	Prior Tested and DHS Tested	Prior Tested BUT Refused DHS Tested	NO Prior Testing but tested with DHS	Untested Men
	n (%)	n (%)	n (%)	n (%)
Age				
15 - 29	245 (39.8)	46(41.1)	1098(59.2)	148 (51.7)
30 - 44	302 (49.0)	56 (50.0)	610 (32.9)	119 (41.6)
45+	69 (11.2)	10 (8.9)	146 (7.9)	19 (6.6)
Residence				
Rural	328 (53.2)	49 (43.8)	1196 (64.5)	130 (45.5)
Urban	288 (46.8)	63 (56.3)	658 (35.5)	156 (54.5)
Marital Status				
Never been married	225 (36.5)	45 (40.2)	1029 (55.5)	130 (45.5)
Currently married	341 (55.4)	59 (52.7)	704 (38.0)	141 (49.3)
Formerly married	50 (8.1)	8 (7.1)	121 (6.5)	15 (5.2)
Been diagnosed in the last year with an STI				
Yes	47 (7.6)	1 (0.9)	158 (8.6)	14 (5)
No	568 (92.4)	111 (99.1)	1678 (91.4)	267 (95.0)
Circumcised				
Yes	90 (14.6)	21 (18.8)	156 (8.4)	25 (8.8)
No	526 (85.4)	91 (81.3)	1698 (91.6)	260 (91.2)
Believes that people infected with HIV should be allowed to keep their infection a secret				
No	397 (64.4)	70 (62.5)	1188 (64.1)	178 (62.2)
Yes	153 (24.8)	26 (23.2)	523 (28.2)	67 (23.4)
Don't Know	66 (10.7)	16 (14.3)	143 (7.7)	41 (14.3)

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CHAPTER IV

Sex differences in the receipt of HIV test results in Zimbabwe

INTRODUCTION

With 67% of the world's 33.1 million HIV cases, sub-Saharan Africa continues to be the epicenter of the global HIV pandemic (UNAIDS Epidemic Report, 2009). At the heart of the epicenter, in southern sub-Saharan Africa, is the Republic of Zimbabwe (Zimbabwe) which ranks among the top five countries' with the highest HIV prevalence rate (UNAIDS Epidemic Report, 2008). Zimbabwe, in recent years, has experienced an economic collapse resulting in high unemployment and hyperinflation (Teslik, 2007; Wines, 2006), dictatorial rule by the current administration (Caves, 2008; Musiyiwa, 2005), and a cholera outbreak (CNN, 2009; WHO News release, 2009). Home to just over 15 million people, Zimbabwe has experienced sharp declines in life expectancy from 60 years (in 1990) to 37 years for men and 34 years for women in 2006, in part due to the rise in under-nutrition and the collapse of the health infrastructure, but also in large measure because of the country's HIV and AIDS epidemic (WHO, 2006).

The first Zimbabwean HIV case was reported in 1985, after which the government introduced a universal HIV screening of blood and blood products; and in 1987 the establishment of a National AIDS Coordination Program (NACP) under the auspices of the Ministry of Health and Child Welfare (USFC Report, 2003). Despite economic and political problems, the ongoing universal blood-supply screening program

in Zimbabwe has been deemed one of the most successful in the world (UNGASS, 2007). At the turn of the 21st century, the newly created National AIDS Council (NAC) established the Zimbabwean National AIDS Trust Fund (NATF) which collected 3% of all taxable income to finance HIV prevention and AIDS care (ZNAP, 1999; ZNASP, 2006; UNGASS, 2007). In addition the NAC has established a National AIDS Plan that:

- 1) renewed government's commitment to meeting international development goals through sustainable changes;
- 2) recognized that behavioral changes (at the individual, family and community levels) do not come from awareness alone; and
- 3) acknowledged that the country must move toward an era of universal access to prevention, care and treatment.

The recent increases in international funding for HIV and AIDS treatment, care, (particularly in sub-Saharan Africa) mandates that those vulnerable to HIV infection know their risks and HIV status because this knowledge is the primary gateway to all systems of care, and also to the decline in rates of transmission. While we have a deep and growing understanding of what behaviors place people at risk for HIV infection, the health behavior field has given far less attention the social or behavioral profile of those who comply with opportunities to test for HIV, and whether or not the use of HIV screening services reflects the realities of individual risk. Currently there is a paucity of literature from Zimbabwe on HIV screening utilization. Of all the articles found through a PubMed¹⁵ literature search, less than 5% of the scientific articles devoted to the subject of HIV in Zimbabwe, pertained to HIV screening. A large proportion of these articles were on the uptake of HIV screening in antenatal settings and the target study participants were mostly women (Shetty et al, 2008; Mugore et al, 2008; Zvandasara et al, 2006;

¹⁵ The website of The US National Library of Medicine – National Institutes of Health

Chandisarewa et al, 2007;Perez et al, 2006; Shetty et al, 2006; Bassett, 2002). Other relevant articles, examined HIV volunteer counseling and testing (VCT) programs in the workplace (Corbett et al, 2006; Machekano et al., 2000) and mobile units (Morin et al, 2006). While these articles provide useful information, the samples were limited to clinical samples (not population-based samples) and none offered a clear comparisons of characteristics that may shape (differentially) women's and men's utilization of HIV screening services. There was one lone DHS working paper from 2008 (Sabisa), which examined AIDS related stigma with the uptake of HIV testing in Zimbabwe. In this paper Sabisa compared respondents based on their pathways to HIV testing (having asked for the test, offered and accepted the test, or be required to test). However, the focus of the analysis was on the association between the pathway of testing and HIV related stigma comparing testers directly to one another based on those pathways and separately analyzing the barriers (to testing) of non-testers. In addition, Sabisa did not include information or analysis about the completion of the testing process (knowing the results of a test).

This study is a departure from the existing literature from Zimbabwe in that it describes and compares the individual-level characteristics of men and women who responded to a population-based survey and reported the receipt of an HIV test result through existing services as compared to those who did not. Such a study has the potential to provide decision-makers with necessary information on who is (and who isn't) using critical services, and whether or not the most vulnerable are among those screening. Such data may inform where best to target limited resources to enhance the

reach of testing services not only to those who want testing, but also to those who need them, if these groups are not one and the same.

METHODS

Data Source

In 1984, the United States Agency for International Development (USAID) established the Demographic and Health Survey (DHS) project (Guide to DHS Statistics, 2003) to generate useful population-based data for the development of informed effective policies, health programs, and accessible services. Over the years, people from more than 130 countries have participated in DHS health interviews, answering questions on maternal and child health, family planning, nutrition, sexually transmitted infections and other related issues (Mishra et al., 2006). Since 2001, several resource-constrained countries which conducted a DHS survey (or similar survey through ORC Macro) also included HIV surveillance as part of the data collection process (Garcia-Calleja et al., 2006; Mishra et al., 2006).

“The added value of population-based surveys is that they provide direct data on the distribution of HIV infection among the general adult population, remote rural populations..., men, young non-pregnant women, and regions or provinces.”
Mishra et al., 2006 p 538.

Theoretical underpinning– The Health Care Utilization Model

Researchers have described health care utilization patterns based on such aspects as organizational frameworks, demographic characteristics, economic and social structural, family resources, and social psychological models (Wolkinsky, 1980). Within the field of health behavior the Health Belief Model and the Theory of Planned Behavior/Theory of Reasoned Action have been frequently applied to explain observed

patterns of health behavior, including condom use (Carmack et al., 2009; Cha et al., 2008; Cort and Modeste 2007; Hounton et al., 2005; Jemmott et al., 2007; Munnoz-Silva et al., 2007; Schaalma et al., 2009). The Health Belief Model (HBM) is predicated on the idea that behavior is guided by the expectancy and values related to a health threat (and its severity) and a health behavior (and its perceived benefit(s)) (Brewer and Rimer, 2008). Key concepts of the HBM include the existence of “cues to action”, i.e. factors that initiate (or prompt) an active response of self-care (Champion and Skinner, 2008), and the concept of “self-efficacy”, which is the belief in one’s own ability to accomplish a desired outcome (Bandura, 1997). Like HBM the Theory of Planned Behavior (TPB) and the closely linked Theory of Reasoned Action (TRA) are also predicated on the idea that behavior stems from an expected benefit of a health behavior linked to concepts of behavioral intention and perceived control (Brewer and Rimer, 2008; Glanz et al., 2008). Analysis of cues to action or self-efficacy requires collection of data on self-perceived risks, and psychological measures of self-confidence regarding some defined future or action. The DHS contains data on self-perceived risk of HIV, but regrettably has not been expanded to include the psychological variables needed for a full analysis of the behavioral profile associated with use of HIV screening.

Another behavioral model, the Behavioral Model of Health Care Utilization created by Andersen, Aday, Newman, and others has been used as a guiding framework to analysis individual level factors associated with usage of healthcare services (Laveist, TA et al., 1995; Phillips, A et al, 1998). The behavioral model of Health Care Utilization classifies the individual level factors associated with use of health care services into three categories: *predisposing*, *enabling* and *need* factors. Predisposing factors can be viewed

as those correlates which affect the proclivity of an individual to use a particular service and include demographic characteristics such as age, marital status, education, attitudes or beliefs about the service, the illness (for which the service is being sought to correct) or knowledge about the disease. The second set, or *enabling* factors, include the socioeconomic status of an individual or family, or the proximity to care resources as dictated by urban or rural residence. Research finding from the 1980s (Kleinman, 1980; Heller et al., 1981) indicated, for example, that despite similar predisposing factors, those in the higher socioeconomic strata in Africa were enabled to use hospital/clinical based “Western-style” care as opposed to more traditional forms of medicine used by those in with fewer economic resources; in short, knowledge and beliefs about health services were far less significant than economic *enabling*.

The third and final factors defined within the Health Care Utilization model are the *need* factors. Mechanic (1968) and Wan and Soifer (1974) found that a person’s self-assessment of his/her health *need* is one of the most salient predictors of health care utilization. *Need* is closely linked to one’s perceived susceptibility to a particular illness, in the absence of a generalized variable about one’s health or the perceived seriousness of a particular symptom. An additional dimension of perceived need is the *evaluative perception of need*, or one’s overall risk for poor health, i.e. the rationale evaluation of likely risk given personal and social context.

In the following analysis the Behavioral Model of Health Care Utilization will be applied to examine the relative importance of *predisposing*, *enabling* and *need* factors, in explaining the use (or non-use) of HIV screening services among men and women in Zimbabwe.

Data Factors

Outcome Measure

It is not enough to simply begin the HIV testing process; individuals must receive test results to learn their HIV status. Thus, focus of this analysis centers on one DHS question: “I don’t want to know the results, but *the last time you got tested did you get your test results?*”

Predisposing Factors

The vast majority of DHS questions address *predisposing* factors including demographic factors (age, educational attainment, marital status, whether or not a respondent is the head of his/her household, the size of a household, being employed), knowledge of HIV (knowing that a healthy-looking person can have HIV, knowing about life preserving medications, and knowing that having a monogamous sexual partner is best), and beliefs about HIV (agreeing to blame people living with HIV and AIDS (PLWHAs) for bring HIV into the community, and willing to buy produce from a PLWHA).

Enabling Factors

As early as 1969, Rosenstock reported a direct association between income and the use of preventive health services in ostensibly healthy people. Quintiles of household wealth are available for all individuals in the DHS. Apart from wealth, attributes affecting proximity to health services are critical, but proximity variables are lacking

within the DHS. The density of clinical services is typically, but not always, greater in urban centers of Africa, and therefore in the absence of true proximity measures, I will use being a resident in a rural, peri-urban, or an urban area as a proxy for proximity to HIV screening services (Castro-Leal et al., 2000; Levesque, 2006).

Need Factors

Not surprisingly, reporting one's perception of overall health is one of the strongest predictors of general health care utilization (Wan and Soifer, 1974). But in the DHS, there are no questions that ask about a respondents' perceived overall health. There is, however, a question on personal perception of HIV risk, which will be applied in this analysis as a direct indication of *perceived need*. In addition, there are several variables in the DHS that can be used to measure the *evaluative perception of need*, specific to HIV infection. These include whether or not a respondent knew someone who had HIV or had died of AIDS, whether or not the respondent has been diagnosed with an STI in the last year, whether or not a female respondent could refuse sex with her partner, and whether or not a male respondent was circumcised or had multiple (concurrent) partners.

Analysis

Using the Zimbabwean DHS (collected between 2005 and 2006) this study employed univariate and multivariate logistic regression analyses to describe which respondents were most inclined to report the receipt of an HIV test result. Given the previously reported research in this dissertation, there appears to be a need to understand model-defined factors on the outcome of receipt of a test result. As such, from a statistical perspective the inclusion of a dummy variable representing a respondent's sex

would be inadequate to understand what is needed to develop interventions (geared toward increased use of HIV screening services) to affect the sex differences in the receipt of HIV test results. Therefore, the datasets for the Zimbabwean men and women were not combined and were analyzed separately. Provided sample weights were used. Data analyses were conducted using statistical analysis programs PASW Statistics 17 (SPSS for Windows, version 17, Rel 15.01.2009, SPSS, Inc. Chicago, IL. USA). All data results are presented in the aggregate as not to single out a specific respondent.

RESULTS

Since the overwhelming majority of adult HIV case in the region are among those who are (or have ever been) sexually active, the analysis was restricted to only those adults who reported *ever having* sexual activity. Analysis of this question in Chapter 2 of this dissertation presents reasonable evidence that within the DHS, those who report never having sex are at minimal risk of HIV in all but one country of SSA. The final weighted women's sample was 7059; and the final weighted men's sample was 5381. Within those populations, 2081(29.5%) women and 1159 (21.5%) men had ever initiated the HIV testing process. However, only 1755 (24.9%) women and 1036 (19.3%) men reported the receipt of an HIV test result prior to the DHS survey (representing a 15.7% and 10.6% loss-to-follow-up, respectively). Among sexually active adults who were found to be HIV positive through the DHS surveillance testing 382(27.1%) women and 170 (19.8%) men also reported the previous receipt of HIV test results.

Table 1: Characteristics of the women and men's who reported the receipt of an HIV test result

In first examining the proportion of women and men who reported the receipt of an HIV test result, I found the greater proportion of women who received a test result among those: between the ages of 15-34 (39.8%), of average education (70.5), married (73.8), living in an average size household (56.3), to believe that a healthy-looking person could have HIV(91.8), to know knew about life preserving medications (80.8), to believe a person living with HIV and AIDS (PLWHA) should be allowed to keep his/her infection a secret (54.7), to know that having a monogamous sex partner is ideal (for protection against HIV) (84.3), willing to buy produce from a known PLWHA, in the richer or richest wealth quintiles (27.3 and 32.4, respectively), an urban resident (30.4), to believe themselves to be at no or low risk for HIV(27.5), and reportedly able to refuse sex (69.4) (a measure not established for the men).

The proportion of men who reported the receipt of an HIV test result looked similar to their female counterparts with the exception that these men were also more likely to be the head of their household (62.7), employed (78.1), more likely to know someone who has died of AIDS (46.2), more likely to be uncircumcised (86.0), and who reported having only one partner (92.5) (this measure not established for women).

Not all respondents answered all questions so percentages are reflective of those who did respond to the questions and not of the full sample.

Table 2: The odds of being a woman who reported the receipt of HIV test results

In terms of *predisposing* factors women with greater than a completed secondary education were more likely to complete the HIV screening process and receive their HIV test results (OR 1.81 CI 95% 1.31 – 2.49) when controlling for other *predisposing* factors.

However, women who were of older age cohorts (as compared to 15-24 year olds), had less than a completed primary education, and had never been married were less inclined to report the receipt of an HIV test result. Women who did not know about life-preserving medications (for those who are infected with HIV), believe people with HIV should be blamed for bring HIV into the community, and not willing to buy produce from an HIV infected person were also less inclined to report the receipt of an HIV test result when controlling for other factors.

Of the two *enabling* factors, the wealth and residence of a respondent, the odds of receiving an HIV test result increased with the wealth gradient when controlling for residence status. Residence was not significantly associated with the receipt of a test result when controlling for wealth.

Among the *need* factors, women who knew someone who had HIV or who had died of AIDS had significantly greater odds of reporting the receipt of HIV test results when controlling for the perception of risk and being diagnosed with a sexually transmitted infection. Those women who reported having low risk or not knowing their risk were less likely to report the receipt of an HIV test as compared to those women who reported no perceived risk.

In the final full model for the female respondents, high educational attainment and the incremental increase in a woman's wealth (from poorest to richest) were significantly associated with greater odds of reporting the receipt of an HIV test result when all other *predisposing*, *enabling*, and *need* factors were controlled. The increase in age (from youngest to oldest), low educational attainment, never having been married, not knowing

about life-preserving drugs, not willing to buy produce from a known PLWHA vendor, and having some perceived risk or not knowing one's risk of HIV were significantly associated with lower odds of reporting the receipt of an HIV test result when controlling for all other salient *predisposing*, *enabling*, and *need* factors.

Table 3: The odds of being a man who reported the receipt of HIV test results

With regards to *predisposing* factors among men, those who were between the ages of 25-44, and had completed greater than a secondary education were more likely to the receipt of their HIV test results when controlling for other *predisposing* factors. However, men who: had less than a completed primary education, did not know about life-preserving medications, and were not willing to buy produce from an HIV infected person were all less inclined to report the receipt of an HIV test result when controlling for other salient predisposing factors.

Of the two *enabling* factors, the wealth and residence of a respondent, the odds of receiving an HIV test result increased with the wealth gradient when controlling for residence status. Residence was not significantly associated with the receipt of a test result when controlled for wealth.

Among the *need* factors, men who knew someone who had HIV or who had died of AIDS and who reported being circumcised had significantly greater odds of reporting the receipt of HIV test results when controlling for the perception of risk, being diagnosed with a sexually transmitted disease, and reporting the use of a condom at last sex.

In the final full model for the male respondents, high educational attainment and the incremental increase in a man's wealth (from poorest to richest), knowing someone with HIV (or who had died of AIDS) and being circumcised were significantly associated with greater odds of reporting the receipt of an HIV test result when all other salient *predisposing, enabling, and need* factors were controlled. Low educational attainment, not knowing about life-preserving drugs, and not willing to buy produce from a known PLWHA vendor were significantly associated with lower odds of reporting the receipt of an HIV test result when controlling for all other salient *predisposing, enabling and need* factors.

DISCUSSION

Before discussing the study findings it is important to mention the characteristics of those described as the most vulnerable to HIV infection in the existing literature from Zimbabwe. This information will provide additional context to the discussion of the findings. According to research literature, characteristics that make Zimbabweans particularly vulnerable to HIV infection are: having multiple concurrent partnerships (Bassett et al., 1992; Lopman et al., 2007), the presence of a sexually transmitted disease (Bassett et al., 1992; de Muylder et al., 1990; Gregson et al., 2001; Lopman et al., 2007; Machekano et al., 2000), being divorced or widowed (Gregson et al., 2001; Humphrey et al., 2007; Lopman et al., 2009), being a “working” man (Gregson et al., 2001; Madisodza et al., 2006), and women who have an early sexual debut (Hallett et al., 2007; Pettifor et al., 2004).

Although a greater percentage of women reported the initiation of the HIV testing process, a smaller proportion of that percentage of women received their HIV test results

as compared to the proportion of the percentage of men. Since more women are infected with HIV in Zimbabwe, it is disconcerting to know that many women who start the process don't complete it, which may result, particularly for those who are infected, a delay in treatment, possible re-infection, or the possible spread of HIV to children or sex partners. In Zimbabwe, as in other countries in the region, prevention of mother-to-child transmission services (PMTCT) have expanded into the majority of antenatal services, meaning women are offered HIV screening within the context of routine antenatal or delivery care. This provides reproductive age women (i.e. the target age group of the DHS) with more routine opportunities to either opt-in or opt-out of HIV screening than men, without having exercised a specific intent to screen. Testing in such services is still associated with very significant loss to follow-up as women agree to an HIV test, but fail to secure results or return for a clinical delivery. While males may also have HIV screening offered to them in select circumstances (i.e. workplace testing), routine offering of HIV testing is less common for men than. This difference in the routine provision of HIV screening to women and men may explain, in part, women's greater likelihood to not receive for results. We also understand the reasons why the DHS did not collect information about the status of those who reported having been HIV tested through existing services. But when I examined more closely the evidence, that so many of those who tested HIV positive with the DHS had received prior test results; I am inclined to wonder if there was a change in status between the two test. If improvements are necessary in post-test counseling or other follow-up measures to help people maintain their negative statuses, we have no information to make definite recommendations.

Another important contrast we found between women and men had to do with age. The odds of receipt of a test result among the women decreased with age but the odds for men increased with age; and the difference remained significant when we controlled for other salient factors such as wealth (with the exception of the oldest cohort of men). There are many ways in which these findings could be interpreted: younger women and older men maybe more targeted by educational campaigning and healthcare services (i.e. antenatal services) to be screened, older women may feel less secure in their relationships if by chance their partner finds out they have been tested, or younger men may believe that they are less vulnerable because they have had fewer sexual partners or believe that HIV screening is something that older men do. My findings may also be interpreted as a systems issue in who is really accessing healthcare services overall, however given the survey data we cannot determine specifically what is happening here. Nonetheless, I can say that more needs to be done to understand why older sexually active women and younger sexually active men have not been screened for HIV and ways in which to best address their barriers to screening.

In the final full models of all salient *predisposing*, *enabling* and *need* factors, wealth was the primary factor associated with the receipt of a HIV test result for Zimbabwean men and women. From a theoretical prospective this is a distressing fact because it indicates a disparity in the utilization of HIV screening services based on wealth. In many sub-Saharan African countries people have to pay for health care services (James et al., 2006; Nabyonga et al., 2005; Steinhardt et al., 2009); the cost for the services themselves and associated costs may be a large deterrent to accessing HIV screening services. In addition to the costs associated with being screened, there are

potentially larger costs associated with subsequent care for those who are infected. However, the association between HIV testing and wealth may reflect the rationale distribution of risk, as individual wealth in Africa has repeatedly been found to be strongly (and positively) associated with sexual risk-taking behavior (Awusabo-Asare and Annim, 2008; Mishra et al, 2007; Shelton, Cassell and Adetunji, 2005) and increased risk for HIV infection. However, in the context of Zimbabwe the findings show prior receipt of HIV test results follows the wealth gradient but other HIV behavioral risk factors did not remain significant in the model (i.e. concurrent partnerships, the diagnosis of an STI, etc); hence, I cautiously interpret the findings to indicate a wealth disparity in the use of HIV testing services, highlighting the role of *enabling* factors. More evidence, beyond the scope of this analysis, is necessary to determine the best ways to reach those with fewer resources who are at great-risk for HIV to know their HIV status. Provider-initiated screening will not reach those who are not engaged in medical-based services and care.

Another very important perceived *need* factor associated with the receipt of an HIV test result for both men and women was whether or not a respondent's partner/spouse had also been tested for HIV. This remained significant in the full models in which other key factors were controlled. Unfortunately, the question was only asked of those who were married and it could have been pertinent to the situation of all the respondents, particularly those who reported being formerly married. Where available, this factor was more important to receipt of test results than wealth, suggesting the possibility that when perceived need is high, it provides a tipping point for the use of screening, independent of wealth. Since this factor was available for less than ½ of both

samples (i.e. male and female) it was not included in our final overall model. Further research should explore the issue of one's uptake of HIV screening linked to the screening of a partner or spouse. How did a respondent find out? Did the respondent's partner suggest that s/he (the respondent) get tested because of results or post-test counseling? Did the respondent and partner test as a couple; as part of antenatal, STI, or TB care? Such information can be used in educational campaigns as well as in discussions care providers have with their clients to encourage screening.

Several additional measures were considered for inclusion in the analysis but because of missing or uncollected data were dropped from the final analysis. The first was the method of initiating the HIV testing process –patient initiated (asked for test), provider recommended (offered and accepted test), provider initiated (required). While the full sample of men who reported HIV testing were asked to respond to this question, about ½ of the women who reported HIV testing were asked to respond to this question. It is not clear why this occurred¹⁶ therefore it was not included as part of the final analysis. Of those who did answer the question, more than 50% of those who got their test results reported that they asked for the test.

A second question of interest for analyze was whether or not the respondent tested at a public or private facility. Such information would have been useful for local decision-makers to determine where best to allocate their scarce resources. This question, however, was only asked in the women's questionnaire, and of only ½ of those respondents. Another question of potential value in future analyses is whether or not a respondent tested as part of other health related services (i.e. antenatal services,

¹⁶ There was no clear skip pattern found to understand why only half of the women who reported being HIV tested were asked the question as to the method of initiating the process.

tuberculosis care, and STI care). Only a portion of the women in the Zimbabwean DHS were asked if they had tested as part of antenatal care.

A fourth behavioral question of growing interest to HIV vulnerability would be the number of concurrent partners for *both* men and women since concurrent partnership has been reported to place people at higher risk for HIV infection (Morris and Kretzchmar, 1997; Watts and May, 1996). But the question about having concurrent partners was not asked of the women participants. Although another possible question could have been used “How many partners have you had in the last year?” it was not clear that these partnerships were concurrent or if the respondents were engaging in serial monogamy. It has also been reported that serial monogamy is likely the norm for many in general populations (Eames and Keeling, 2004; Johnson et al. 2001) so any actions proposed to reach those in concurrent partnerships may have been misdirected.

Although I included the *need* factor of the use of a condom at last sex, I believe this is a poor proxy for *perceived need* without for more data on the context of the last time the respondent had sex: were they with someone who they knew was HIV negative, had they discussed risk concerns with that last partner, did they know that partners monogamous status, etc. In addition, only 10% of the women and a third of the men actually reported the use of a condom at last sex, and very few respondents answered a question about condom use prior to the last time they had had sex. The real risk factor with condom use is whether or not people are consistent in their use of condoms when they are not seeking to procreate. In the future, I would suggest better lines of questioning of *all* sexually active respondents about their use of condoms such as in the

last three months how many times did you have sex, and in what proportion of those sex acts did you use a condom, in order to better understand the consistency of condom use.

This study had three primary limitations. First, the datasets were cross-sectional in nature. So factors that dealt with the knowledge of HIV transmission and beliefs about PLWHA may have changed through HIV screening associated counseling. Although I included the *need* factor of the use of a condom at last sex, I believe this is a poor proxy for *perceived need* without for more data on the context of the last time the respondent had sex: were they with someone who they knew was HIV negative, had they discussed risk concerns with that last partner, did they know that partners monogamous status, etc. In addition, only 10% of the women and a third of the men actually reported the use of a condom at last sex, and very few respondents answered a question about condom use prior to the last time they had had sex. The real risk factor with condom use is whether or not people are consistent in their use of condoms when they are not seeking to procreate. In the future, I would suggest better lines of questioning of *all* sexually active respondents about their use of condoms such as in the last three months how many times did you have sex, and in what proportion of those sex acts did you use a condom, in order to better understand the consistency of condom use. Participants who tested negative (and maybe who even tested positive) may have responded that they believed they were, at the time of the survey, at little or no risk because they already knew their HIV status. In the future, better questions might be [only for those who reported previous receipt of test results] At the last time you got tested for HIV, what was your perceived risk of infection –has that perception changed since then – would you say your current perception of risk higher or lower than when you last tested for HIV?

Second, there were some key factors that are of direct relevance to analysis of motivations for use of screening that could not be examined because the questions are not included in the DHS. Individual level information about cues that prompt people to get screened (other than getting screened because a partner/spouse got screened), the reputation of local testing services, and the extent to which other (non-HIV) services are used would significantly extend the analysis of how factors affecting use of HIV services are similar (or not) from those factors affecting use of other services in the country.

The final limitation of this study was that it was solely individual-level data. While it proved useful to infer some realities of inequitable access to HIV screening services, additional systems characteristics about the health policy, the finances devoted to screening services, the organization of services (i.e. such as having HIV screening as an integral part of antenatal, Tuberculosis, and STI services), and more information about the overall health indices, would illuminate more specifically the areas where the scaling-up of services will be the most effective. Zimbabwe and other countries have pledged their commitment to offer routine HIV screening in all health services. Following this DHS data collection Zimbabwe increased their domestic spending on HIV nearly three-fold (UNAID Zimbabwe Epidemiological Report, 2008). A repeat analysis of the correlates of testing in several years will be of value, but the absence of data on the health system before and after such investment will limit attribution. Further, if the overall health system is not extended and sufficiently staffed by trained personnel, then those not currently using hospital/clinical-based health care will not likely to benefit from policy changes; thereby perpetuating the inequities of the current system. Andersen (2008), recognizing the dynamic nature of his theory on health care utilization, proposed

improving access to care through the creation of new systematic and comprehensive analyses that integrate the study of contextual and individual level factors. This more inclusive examination of factors is likely to strengthen any policy to improve HIV screening among all, and particularly those most in need.

CONCLUSION

Successful efforts to curb the pandemic, prevent transmission, and detect HIV cases early requires that people, particularly those in highly endemic areas, get screened and become aware of their HIV status. These efforts will be, as my finding show, difficult to accomplish when *enabling* factors such as an individual's wealth (or lack thereof) is potentially a dominant factor determining use of HIV testing, as appears to be the case in Zimbabwe.

4 -Table 1: Weighted distribution of characteristics for men and women who reported the receipt of an HIV test result in the DHS

	Women who received an HIV test result N =1755 n(%)	Men who received an HIV test result N=1036 n(%)
<u>Predisposing Factors</u>		
Age		
15-24	679 (38.7)	265 (25.5)
25-34	699 (39.8)	408 (39.3)
35-44	311 (17.7)	242 (23.3)
45+	66 (3.8)	123 (11.8)
Education		
Completed primary to Incomplete secondary	1237 (70.5)	682 (65.8)
Less than a completed primary	379 (21.6)	137 (13.2)
Completed secondary education or more	138 (7.9)	217 (20.9)
Marital Status		
Currently Married	1295 (73.8)	682 (65.8)
Formerly Married	312 (17.8)	68 (6.6)
Never Been Married	148 (8.4)	286 (27.6)
Respondent is the head of the household	381 (21.7)	650 (62.7)
Size of Household		
Average 4-7	988 (56.3)	542 (52.3)
Small 1-3	407 (23.2)	335 (32.3)
Large 8+	360 (20.5)	159 (15.3)
Employed	745 (42.0)	808 (77.9)
Knows someone with HIV or who has died of AIDS	330 (29.3) ψ	306 (46.2) ψ
Believes a healthy-looking person can have HIV	1588 (91.8)	999 (96.5)
Knows about life preserving medications for HIV	1311 (80.8)	838 (85.8)
Believes people with HIV are to blame for bring HIV into the community	307 (17.8)	183 (17.7)
Believes people with HIV should be allowed to keep it a secret	941 (54.7)	607 (61.6)
Knows to prevent HIV, it is best to have a monogamous partner	1477 (85.3)	896 (86.9)
Willing to buy produce from a person living with HIV or AIDS (PLWHA)	1119 (64.2)	757 (73.9)

	Women who received an HIV test result N =1755 n(%)	Men who received an HIV test result N=1036 n(%)
<u>Enabling Factors</u>		
Wealth		
Poorest	187 (10.7)	85 (8.2)
Poorer	236 (13.5)	108 (10.4)
Middle	285 (16.2)	131 (12.6)
Richer	478 (27.3)	309 (29.8)
Richest	568 (32.4)	403 (38.9)
Residence		
Rural	886 (50.5)	431 (41.6)
Peri-urban	336 (19.1)	222 (21.4)
Urban	533 (30.4)	384 (37.0)
<u>Need Factors</u>		
Perceived Risk of HIV		
No Risk	527 (30.0)	381 (36.8)
Low Risk	483 (27.5)	344 (33.3)
Moderate Risk	388 (22.1)	163 (15.8)
High Risk	169 (9.6)	105 (10.2)
Don't Know Risks	187 (10.7)	41 (4.0)
Been diagnosed in the last year with an STI	93 (5.3)	33 (3.2)
Used a condom at last sex	129 (8.7)	260 (28.6)
Circumcised (Men Only)		145 (14.0)
Has concurrent sex partners (Men Only)		
1 Partner		442 (92.5)
2+ Partners		36 (7.5)
Has the ability to refuse sex (Women Only)	896 (69.4)	

ψ Some respondents did not answer all questions, therefore numbers and percentages are reflective of the actual responses coded in the data

4 -Table 2: The odds of being a woman who reported the receipt of HIV test results

	n	Unadjusted odds receipt of HIV test result Odds Ratios (CI 95%)	Within group adjusted odds receipt HIV test result Odds Ratios (CI 95%)	Fully adjusted odds of receipt of HIV test result Odds Ratios (CI 95%)
Predisposing Factors				
Age				
15-24	2274	ref		
25-34	2595	0.89 (0.78 – 1.00)	0.78 (0.68 – 0.90)†	0.73 (0.61 – 0.87)†
35-44	1555	0.62 (0.53 – 0.72)†	0.57 (0.48 – 0.69)†	0.54 (0.43 – 0.67)†
45+	618	0.31 (0.23 – 0.40)†	0.37 (0.27 – 0.50)†	0.35 (0.23 – 0.52)†
Education				
< Completed Secondary	4166	ref		
< Completed Primary	2601	0.43 (0.38 – 0.49)†	0.48 (0.37 – 0.62)†	0.68 (0.56 – 0.83)†
Completed Secondary or more	275	2.33 (1.83 – 2.96)†	2.11 (1.62 – 2.73)†	1.81 (1.31 – 2.49)†
Marital Status				
Currently Married	5115	ref		
Formerly Married	1311	0.88 (0.76 – 1.01)	1.00 (0.85 – 1.17)	0.83 (0.67 – 1.02)
Never Been Married	590	1.07 (0.88 – 1.31)	0.74 (0.59 – 0.92)†	0.65 (0.49 – 0.85)†
Head of Household ±				
NOT head	5259	ref		
Head of Household	1783	0.76 (0.67 -0.86)†		
Size of Household				
Average 4-7	4077	ref		
Small <4	1467	1.11 (0.97 – 1.27)		
Large >7	1498	1.00 (0.87 – 1.15)		
Employed ±				
No	4216	ref		
Yes	2819	1.11 (1.00 – 1.25)†		

	n	Unadjusted odds receipt of HIV test result Odds Ratios (CI 95%)	Within group adjusted odds receipt HIV test result Odds Ratios (CI 95%)	Fully adjusted odds of receipt of HIV test result Odds Ratios (CI 95%)
Believes a healthy-looking person can have HIV				
Yes	6073	ref		
No	627	0.76 (0.62 – 0.92)†	1.07 (0.86 – 1.33)	
Knows about life-preserving medications				
Yes	4192	ref		
No	1796	0.47 (0.41 – 0.54)†	0.53 (0.46 – 0.62)†	0.59 (0.49 – 0.71)†
Believes PLWHA are to blame for bringing disease into the community				
No	5206	ref		
Yes	1526	0.67 (0.58 – 0.77)†	0.82 (0.70 – 0.95)†	0.86 (0.71 – 1.05)
Believes PLWHA should keep infection a secret				
Yes	3468	ref		
No	3301	1.29 (1.16 – 1.44)†	1.01 (0.90 – 1.15)	
Knows having a monogamous partner is best				
Yes	5655	ref		
No	1070	0.93 (0.79 – 1.08)		
Willing to buy produce from a PLWHA				
Yes	3750	ref		
No	3083	0.63 (0.56 – 0.70)†	0.73 (0.64 – 0.83)†	0.74 (0.63 – 0.86)†

	n	Unadjusted odds receipt of HIV test result Odds Ratios (CI 95%)	Within group adjusted odds receipt HIV test result Odds Ratios (CI 95%)	Fully adjusted odds of receipt of HIV test result Odds Ratios (CI 95%)
Enabling Factors				
Wealth				
Poorest	1401	ref		
Poorer	1359	1.45 (1.18 – 1.79)†	1.45 (1.18 – 1.79)†	1.53 (1.13 – 2.07)†
Middle	1288	1.87 (1.53 – 2.29)†	1.86 (1.52 – 2.28)†	1.92 (1.42 – 2.58)†
Richer	1540	2.59 (2.15 – 3.13)†	2.35 (1.89 – 2.95)†	2.10 (1.59 – 2.78)†
Richest	1454	3.56 (2.96 – 4.28)†	3.07 (2.36 – 4.80)†	2.43 (1.82 – 3.25)†
Residence				
Rural	4711	ref		
Peri-Urban	736	2.08 (1.79 – 2.41)†	1.18 (0.94 – 1.46)	
Urban	1595	2.08 (1.83 – 2.36)†	1.16 (0.94 – 1.42)	
Need Factors (Perceived and Evaluated)				
Perceived Risk				
No Risk	1770	ref		
Low Risk	2004	0.73 (0.63 – 0.84)†	0.81 (0.68 – 0.97)†	0.70 (0.58 – 0.86)†
Moderate Risk	1430	0.90 (0.77 – 1.05)	0.94 (0.77 – 1.15)	0.75(0.60 – 0.93)†
High Risk	629	0.84 (0.69 – 1.03)	0.96 (0.74 – 1.24)	0.89 (0.67 – 1.18)
Didn't Know Risk	1049	0.52 (0.43 – 0.62)†	0.74 (0.59 – 0.92)†	0.64 (0.50 – 0.85)†
Knows someone with HIV				
No	3475	ref		
Yes	1133	1.35 (1.16 – 1.57)†	1.33 (1.15 – 1.55)†	1.05 (0.89 – 1.25)
Diagnosed with STI in last year				
Yes	6729	ref		
No	282	1.34 (1.04 – 1.72)†	1.31 (0.92 – 1.86)	1.32 (0.89 – 1.95)

	n	Unadjusted odds receipt of HIV test result Odds Ratios (CI 95%)	Within group adjusted odds receipt HIV test result Odds Ratios (CI 95%)	Fully adjusted odds of receipt of HIV test result Odds Ratios (CI 95%)
Used a condom at last sex				
No	5352	ref		
Yes	494	1.06 (0.86 – 1.31)		
Has the ability to refuse sex (Married Women Only)				
Yes	3428	ref		
No	1672	0.82 (0.72 – 0.94)†		1.14 (0.92 – 1.35)
Partner/husband has been tested for HIV (Married Women Only)				
Yes	3785	ref		
No	721	8.04 (6.78 – 9.54)†		7.05 (4.77 – 7.68)†
Don't Know	468	1.52 (1.22 – 1.90)†		1.68 (1.24 – 2.27)†

† $p \leq 0.05$

± Was not significant when age and
educational attainment were
controlled for in the model

4 -Table 3: The odds of being a man who reported the receipt of HIV test results

	n	Unadjusted odds receipt of HIV test result Odds Ratios (CI 95%)	Within group adjusted odds receipt HIV test result Odds Ratios (CI 95%)	Fully adjusted odds of receipt of HIV test result Odds Ratios (CI 95%)
Predisposing Factors				
Age				
15-24	1623	ref		
25-34	1853	1.41 (1.19 – 1.67)†	1.34 (1.06 – 1.69)†	1.30 (1.03 – 1.64)†
35-44	1086	1.41 (1.16 – 1.71)†	1.36 (1.03 – 1.79)†	1.38 (1.06 – 1.78)†
45+	750	1.06 (0.84 – 1.34)	1.10 (0.82 – 1.47)	1.13 (0.81 – 1.56)
Education				
Average completed primary but less than completed secondary	3348	ref		
< Completed Primary	1469	0.45 (0.37 – 0.55)†	0.51 (0.41 – 0.64)†	0.70 (0.53 – 0.92)†
Completed Secondary or more	495	2.83 (2.34 – 3.43)†	2.42(1.97 – 2.98)†	2.06 (1.58 – 2.67)†
Marital Status				
Currently Married	3361	ref		
Formerly Married	353	0.96 (0.73 – 1.27)		
Never Been Married	1598	0.87 (0.74 – 1.01)		
Head of Household				
NOT head	2038	ref		
Head of Household	3274	1.04 (0.91 – 1.20)		
Size of Household				
Average 4-7	2842	ref		
Small <4	1490	1.13 (0.98 – 1.31)		
Large >7	980	0.83 (0.68 – 1.00)		
Employed				
Yes	3900	ref		
No	1398	0.78 (0.66 – 0.91)†		

	n	Unadjusted odds receipt of HIV test result Odds Ratios (CI 95%)	Within group adjusted odds receipt HIV test result Odds Ratios (CI 95%)	Fully adjusted odds of receipt of HIV test result Odds Ratios (CI 95%)
Believes a healthy-looking person can have HIV				
Yes	4946	ref		
No	309	0.54 (0.38 – 0.77)†	0.86 (0.59 – 1.25)	
Knows about life-preserving medications				
Yes	3562	ref		
No	1291	0.45 (0.38 – 0.55)†	0.57 (0.47 – 0.71)†	0.74 (0.58 – 0.95)†
Believes PLWHA are to blame for bringing disease into the community				
No	4129	ref		
Yes	1122	0.78 (0.66 – 0.93)†	1.00 (0.82 – 1.21)	
Believes PLWHA should keep infection a secret				
Yes	2408	ref		
No	2752	1.35 (1.17 – 1.56)†	1.13 (0.97 – 1.32)	
Knows having a monogamous partner is best				
Yes	4611	ref		
No	643	0.78 (0.80 – 1.20)		
Willing to buy produce from a PLWHA				
Yes	3441	ref		
No	1822	0.66 (0.57 – 0.77)†	0.80 (0.67 – 0.95)†	0.89 (0.72 – 1.10)†

	n	Unadjusted odds receipt of HIV test result Odds Ratios (CI 95%)	Within group adjusted odds receipt HIV test result Odds Ratios (CI 95%)	Fully adjusted odds of receipt of HIV test result Odds Ratios (CI 95%)
Enabling Factors				
Wealth				
Poorest	995	ref		
Poorer	989	1.27 (0.94 – 1.71)†	1.27 (0.94 – 1.71)†	1.50 (0.98 – 2.30)†
Middle	864	1.75 (1.31 – 2.37)†	1.73 (1.29 – 2.32)†	1.59 (1.03 – 2.44)†
Richer	1419	2.27 (1.75 – 2.93)†	2.01 (1.49 – 2.72)†	2.21 (1.52 – 3.23)†
Richest	1088	4.36 (3.38 – 5.62)†	3.65 (2.60 – 5.12)†	3.16 (2.14 – 4.68)†
Residence				
Rural	3414	ref		
Peri-Urban	589	2.17 (1.81 – 2.61)†	1.18 (0.91 – 1.52)	
Urban	1309	2.42 (2.07 – 2.83)†	1.22 (0.95 – 1.56)	
Need Factors (Perceived and Evaluated)				
Perceived Risk				
No Risk	1797	ref		
Low Risk	1757	0.95 (0.81 – 1.12)	0.91 (0.73 – 1.14)	
Moderate Risk	968	0.76 (0.62 – 0.93)†	0.83 (0.64 – 1.09)	
High Risk	440	1.12 (0.87 – 1.43)	1.16 (0.83 – 1.61)	
Didn't Know Risk	322	0.55 (0.39 – 0.78)†	0.67 (0.43 – 1.04)	
Knows someone with HIV				
No	2297			
Yes	1418	1.58 (1.33 – 1.87)†	1.58 (1.32 – 1.91)†	1.31 (1.09 – 1.58)†
Diagnosed with STI in last year				
Yes	5135			
No	167	1.00 (0.68 – 1.48)		

	n	Unadjusted odds receipt of HIV test result Odds Ratios (CI 95%)	Within group adjusted odds receipt HIV test result Odds Ratios (CI 95%)	Fully adjusted odds of receipt of HIV test result Odds Ratios (CI 95%)
Used Condom at last sex				
No	3480	ref		
Yes	1131	1.32 (1.12 – 1.55)†	1.17 (0.95 – 1.45)	
Circumcised (Men Only)				
No	4658	ref		
Yes	639	1.25 (1.03 – 1.53)†	1.46 (1.13 – 1.89)†	1.40 (1.08 – 1.82)†
Concurrent Partnership (Men Only)				
No (1 partner now)	3026	ref		
Yes (2+ partners)	335	0.80 (0.60 – 1.08)		
Partner/Wife has been tested for HIV (Married Men Only)				
No	1667	ref		
Yes	737	7.17 (5.88 – 8.74)†		
Don't Know	186	2.13 (1.49 – 3.04)†		

† $p \leq 0.05$

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CHAPTER V

CONCLUSION

“Some knowledge of its [screening] principles and of what it entails
in practice should form part of the intellectual equipment of all
concerned with the control of disease and the maintenance of health”
-Wilson and Junger, 1968

Principles and practices of screening for disease

Thirty years after the first cases were identified in the US; HIV and AIDS infections are no longer a new or uncommon occurrence; now that there are proven life-preserving medications it is discouraging to know that so many people are still unaware of their HIV status; and further more the global community does not have more definitive numbers on those who are newly screened. Global institutions and research scientists have spent much money and effort describing in detail those at-risk for infection. But, it has only been recently that more resources are being used to describe the accessibility, acceptance, and clinical populations using HIV screening services. The articles in this dissertation add to that body of scientific literature by providing descriptions of those who initiate and complete the HIV screening process in contrast to those who do not, through the use of nationally representative samples. This information and other such works are critical for the transparency being sought by policymakers and donors who want to wisely move forward in scaling-up and financing the fight against the HIV and AIDS pandemic.

During, and more importantly since, the collection of the DHS data analyzed for this dissertation there have been notable changes in the fight against HIV. The funding from international and domestic sources have soared exponentially over the past decade to scale-up efforts to treat those with HIV and continue in the provision of prevention, education, and care of those who seek it (Levine and Oomman, 2009; Liberman et al., 2009). It was in 2007 when the WHO and others issued new guidance on provider-initiated HIV screening. Many countries have pledged the adoption of the guideline but it seems few policymakers have noticed that provider-initiated HIV screening was already in many national policy plans and being proposed with antenatal and in some cases STI patients. While the pledges have been made, there remains the significant problem of insufficient trained personnel and poor health care infrastructures to provide the level of services necessary to curb the pandemic much less the level of care necessary to address sub-Saharan Africa's overall health needs (Levine and Oomman, 2009). As noted in the first chapter this was a great concern during the 1990s about the weakened infrastructures in the region, but the focus then (and has been) on increasing technology and quality assurance (Colebunders and Ndumbe, 1993). The more pertinent problem that remains is the insufficient staffing and facilities in sub-Saharan Africa already burdened with other disease crises; thereby inadequate to deal with the HIV and AIDS crisis too. Sub-Saharan Africa has less than 1.5% of the medical workforce globally but 25% of the world's disease burden (Naicker et al., 2009). In addition, at least ½ of all hospital beds in the region have been occupied by people with HIV (UNAIDS, 2006).

Everyone is grappling with the issues and ways with demonstrating true success. Some sub-Saharan African countries have reported an increase in the use of HIV

screening services since the collection of their DHS survey data, mapped out national plans to curb the local epidemics, and complied with international agencies providing reports on various aspects of the scaling-up of efforts including the increases in the number of sites offering testing. Although more HIV screenings appears to be occurring, it is not clear from the evidence to what extent *more* people are being screened. It is also not clear how many people are screening and now benefiting from improved timely discovery of their HIV infection status. It is this level of detail about the utilization of HIV screening and subsequent care that is necessary to ensure the increased funding is being utilized to the fullest measure possible.

SUMMARY OF KEY FINDINGS

An important finding from two of the three papers is that the wealth of an individual appears to be a strong link associated with the utilization of HIV screening services in sub-Saharan Africa. While there are those who have purported that HIV risk-behaviors are strongest among the wealthy; and thereby would say that this is a good finding, there are others who would clearly state that the finding points out an income-related disparity in the use of medical services. Given previous literature, cited in the dissertation papers, wealthier sub-Saharan Africans also seem more inclined to use hospital/clinical based care. But very little is known about the process of seeking care by poorer sub-Saharan Africans and the burdens placed upon their limited time and finances by that process. This issue is beyond what the individual will do (or not do) in making the healthiest choices but what the individual is *capable* of reaching give personal, familial resources and the structural provision of care, which can be navigated by wealthier individuals. There have been articles which state that there has been cost

sharing of health services in the region, but little has been published on the associated cost of HIV screening and subsequent services or the perceptions of cost and how these may serve as barriers to seeking timely care.

Another important finding from the first paper was the observed gaps between the percentages of people who said that they initiated the HIV screening process but who for whatever reasons did not follow-through with learning their HIV status. From a service provision viewpoint, it would be beneficial to know how many people, who did not know their HIV status, had been tested through rapid or non-rapid testing procedures. If the gaps are due to the method of testing more could be done to scale-up rapid testing and ensuring that people get their status in a timely fashion. From a health behavioral perspective, if there are discernible characteristics of those who initiate but don't complete the process, then greater efforts can be made to identify people early in the process and encourage the receipt of a test result. Other researchers have reported that people who know their HIV status can and do take protective measures with their sexual partners, so knowing one's status is paramount to prevention and treatment.

Despite the ongoing efforts and the reporting from the DHS data summaries that so many sub-Saharan Africans are well informed about HIV and HIV transmission, my findings contribute to the literature that states many people are still unaware (underestimate or are in denial) of their own personal risks (Adams et al., 2003; Smith and Morrison, 2006). However in the third empirical paper on Zimbabwe, because the data was cross sectional in nature, it is hard to measure people's accurate perceptions of risk or understand their perception of risk at the time of getting tested. Great too are the concerns of people's the unwillingness to purchase produce from a known PLWHA, I

believe the fears about being stigmatized and discriminated continue to factor in people's participation in the HIV screening process. While it seems that more provider-initiated HIV testing should make the discussion of HIV more common at least in the hospital/clinical settings, it is still not clear that enough people will be included in that conversation. Linking back to the issue of wealth, poorer people will have more to lose if they do not have the social supports that help them sustain themselves and those concerns must be addressed before people are willing to know their own HIV status.

IDEAS FOR FUTURE RESEARCH

Data analyses on service utilization, such as those carried out in this dissertation, are critical to the future monitoring and evaluating the success of HIV screening services. But as with any empirical research, more questions have been raised by the findings and point to new research possibilities.

Future research should include not only individual level data but also structural level data which looks at the policy planning and the service delivery. This data should include the expectations as laid out by the policy plans and an understanding of which institutions and service providers meet or exceed those expectations. Individuals should be asked more detailed information about their satisfaction with services rendered and the burdens of the process in seeking HIV screening services. To strengthen the screening process itself, more needs to be understood about people's repeated use of those services over the course of their lifetime. From a data analysis point of more possibilities to do multilevel modeling would be ideal for future research in this area.

While I in large measure (in two of the three papers) analyzed at the differences between women and men's patterns in HIV screening, there is more work to be done to understand how the sex differences are shaped by gendered realities. More women have access to HIV testing particularly women in their earlier reproductive years yet many don't complete the process and that may be because of gendered issues (i.e. fear of reprisal by a spouse or family, etc.). The transmissions of other sexual disease have largely been blamed on women, yet physically and behaviorally HIV transmission has been shown to be perpetuated by men. Unfortunately it seems too that the international community has so focused on the protection of the "innocent" (i.e. babies and women) that we have "villain-ized" the men and perhaps to such a magnitude as to drive them from needed preventative and medical care. Since HIV is largely a sexually transmitted disease more efforts should be made to de-emphasis the issues of blame of who transmitted the disease and more emphasis getting people to understand that protection from the disease is everyone's right and responsibility.

Lastly, I would suggest more detailed (perhaps qualitative) research should be done to understand what shapes people's perceptions of risk in hyper-endemic areas such as sub-Saharan Africa. We know from health behavioral models that perceptions of risk and overall perceptions of health are strong predictors of the health choices people make. In resourced-constrained areas like sub-Saharan Africa little is known about the costs of care in both time and finances and even less scientific evidence exists about the potential loss of resources for those who find themselves to be HIV positive. More is needed to understand what shapes perception of risk and how actions based on those perceptions

may be derailed by fears – of stigmatization, of being infected, and of continuing (or not) being an active sexual being.

Despite key international reports from WHO and UNAIDS stating that the number of HIV cases peaked in the 1990s, the need for scaling-up prevention efforts to curb the HIV and AIDS pandemic have not waned (Shelton et al., 2006) and will likely to continue for some time. Now that scientific breakthroughs have rendered HIV a chronic condition that can be manage through medical care and treatment, more people need to know their HIV status. But to make that happen, greater efforts are needed to illuminate the shortcomings in the delivery of care and in our understanding of individuals' concerns and fears in following through with knowing their HIV status.

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