

Lall, Priya

**Working Paper**

## Social factors affecting women's susceptibility to HIV in India

ADB Working Paper, No. 485

**Provided in Cooperation with:**

Asian Development Bank Institute (ADBI), Tokyo

*Suggested Citation:* Lall, Priya (2014) : Social factors affecting women's susceptibility to HIV in India, ADB Working Paper, No. 485, Asian Development Bank Institute (ADBI), Tokyo

This Version is available at:

<https://hdl.handle.net/10419/101172>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



## **ADB Working Paper Series**

### **Social Factors Affecting Women's Susceptibility to HIV in India**

---

Priya Lall

No. 485  
June 2014

**Asian Development Bank Institute**

Priya Lall is a research fellow at the Centre of Excellence for Research in AIDS, University of Malaysia.

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of ADBI, ADB, its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

Working papers are subject to formal revision and correction before they are finalized and considered published.

The Working Paper series is a continuation of the formerly named Discussion Paper series; the numbering of the papers continued without interruption or change. ADBI's working papers reflect initial ideas on a topic and are posted online for discussion. ADBI encourages readers to post their comments on the main page for each working paper (given in the citation below). Some working papers may develop into other forms of publication.

Suggested citation:

Lall, P. 2014. Social Factors Affecting Women's Susceptibility to HIV in India. ADBI Working Paper 485. Tokyo: Asian Development Bank Institute. Available: <http://www.adbi.org/working-paper/2014/06/12/6307.women.susceptibility.hiv.india/>

Please contact the author for information about this paper.

Email: [priya.lall81@gmail.com](mailto:priya.lall81@gmail.com)

Asian Development Bank Institute  
Kasumigaseki Building 8F  
3-2-5 Kasumigaseki, Chiyoda-ku  
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500  
Fax: +81-3-3593-5571  
URL: [www.adbi.org](http://www.adbi.org)  
E-mail: [info@adbi.org](mailto:info@adbi.org)

© 2014 Asian Development Bank Institute

**Abstract**

India is the epicenter of the HIV/AIDS epidemic in Asia. Previous research indicates that the majority of HIV-positive women in India were infected by their husbands, their only sexual partner, which makes them difficult to identify as a high-risk population. This paper seeks to assess social factors associated with the transmission of HIV based on demographic determinants, such as age; sexual behavior; and gendered discrimination, such as domestic violence.

Research for this paper consists of secondary statistical analysis of the National Family Health Survey, which collected quantitative data on demographic and socioeconomic determinants for analysis of healthcare, domestic abuse, and emerging health issues. As most participants were tested for HIV as part of the survey, it provides regional estimates of HIV serostatus for the general population in India.

Results from the bivariate analyses indicate that for the female participants, socioeconomic status has an association with serostatus, as HIV-positive women were significantly ( $p < 0.001$ ) more likely to have a low level of education than their HIV-negative counterparts. Unexpectedly, female HIV-positive respondents displayed low tendencies toward high-risk sexual behavior, as less than 10% had two or more sexual partners in their lifetime. Finally, they were significantly more likely to have previously experienced domestic violence (45%) and sexual violence (22%) than the rest of the population.

Findings from the multivariate analyses show that female respondents who were formerly married (OR=5.27, CI=3.07–9.04), Hindu (OR=2.35, CI=1.22–4.54), or employed (OR=1.45, CI=0.96–2.18) had significantly ( $p < 0.05$ ) increased odds of being seropositive than their counterparts. Moreover, female participants with low levels of education were 2.26 times as likely to be HIV infected, compared to those who had attended secondary or higher education institutions (OR=2.27, CI=1.40–3.68).

Results illustrate that Indian women's vulnerability to HIV infection is not the product of their sexual risk behavior. The most prominent social factors are their socioeconomic status, such as their level of education, and other sociodemographic determinants, including their region of residence.

**JEL Classification:** I00, I19, J16, R00

## Contents

1.	Introduction.....	3
2.	Selection of Variables to Measure “Susceptibility”.....	3
3.1	Sociodemographic Characteristics.....	5
3.2	Socioeconomic Factors.....	7
3.3	Social Status.....	10
3.4	Multivariate Analysis of Macroenvironmental Predictors of HIV Status.....	12
4.	Micro-Social Predictors of HIV Status .....	15
4.1	Gendered Discrimination.....	15
4.2	Attitudes to HIV .....	18
4.3	Geographical Mobility .....	20
4.4	Multivariate Analysis of Micro-Social Predictors of HIV Status .....	21
5.	Behavioral Predictors of HIV Status.....	23
5.1	Sexual Behavior.....	23
5.2	Multivariate Analysis of Behavioral Predictors of HIV Status .....	25
6.	Multivariate Analysis of Macroenvironmental, Micro-Social and Behavioral Predictors of HIV Status .....	25
7.	Discussion .....	27
8.	Conclusions .....	28
9.	Policy Implications .....	29
10.	Limitations .....	29
	References .....	31
	Appendix.....	36

## 1. INTRODUCTION

The HIV epidemic in India is complex to analyze due to the vast size of the population and geographical area (Wilson and Claeson 2009). Recent research suggests that prevalence is concentrated in certain geographical areas and among populations displaying high-risk behavior, such as injecting drug users (IDUs) (Gajendra et al. 2011). Currently, the estimated prevalence of HIV is higher among men (0.36%) than women (0.22%) with a female-to-male ratio of 0.61 (NACO 2010; UNAIDS and WHO 2007).

Literature on HIV transmission among women highlights two groups within the Indian population that are particularly susceptible to infection. The first is fairly simple to identify as it consists of marginalized sections of the population that often partake in sexual risk behavior, e.g., casual sex workers (CSWs) or injecting drug users (Nagelkerke et al. 2002). The second comprises women married to men belonging to high-risk groups, such as migrant laborers (Newmann et al. 2000; Venkataramana and Sarada 2001). These women are difficult to identify as few partake in high-risk activities themselves.

Most research on HIV transmission tends to focus on how an individual's behavior, such as injecting drug use, can potentially leave them at risk of contracting HIV. This type of analysis sometimes fails to take into account that many women married to men belonging to high-risk groups may not have partaken in high-risk sexual activity themselves, e.g. extra-marital sexual relationships. In these cases, it is more fruitful to investigate social dynamics leading to infection within this group of women.

This paper will use data from the National Family Health Survey (NFHS-III) to examine social predictors of HIV status among women in India. The NFHS-III is a multi-round, nationally representative, cross-sectional household survey, which collects data on demographic and socioeconomic determinants for family planning, nutrition, and emerging health issues. The advantage of using data from the NFHS-III is that many adult participants were tested for HIV as part of the survey, meaning that it is possible to examine how social and behavioral factors impact women belonging to low-risk groups. Hence, the following section describes how variables from the NFHS-III were selected to measure the social factors influencing the HIV statuses of the female participants.


## 2. SELECTION OF VARIABLES TO MEASURE “SUSCEPTIBILITY”

As this paper aims to explore possible predictors of HIV infection among women in India according to Barnett and Whiteside's (2002) model of “susceptibility,” this conceptual framework places social determinants on a spectrum based on their distance from susceptibility or risk of contracting HIV. “Distal” determinants of HIV-related risk affect the individual's behavior through a long chain of events, whereas “proximal” factors more directly influence an individual's propensity toward HIV infection. These determinants of susceptibility are further ranked according to their structural components. The most distal determinants are macroenvironmental ones, which encompass the economic and political context. Behavioral factors are more proximal as they directly influence the individual's risk of contracting HIV, such as sexual behavior.

Following Barnett and Whiteside's (2002) model, the dependent variable used in all bivariate and multivariate analyses is the serostatus of the participant, while independent variables are ranked according to their distance from risk and structural components. For instance, variables deemed to be reflective of economic and political context are assigned to the macroenvironmental dimension of susceptibility.

The macroenvironmental dimension of susceptibility encompasses (i) sociodemographic characteristics, including age, region, and area of residence; (ii) socioeconomic status, comprising level of education, wealth, and occupation; and (iii) social status, including religion, caste identity, and marital status. Table 1 displays how independent variables were allotted to measure Barnett and Whiteside's (2002) model of susceptibility, which is modified for the purposes of this paper.<sup>1</sup>

**Table 1: Assignment of Independent Variables**

*Distal*  *Proximal*

<b>Macroenvironmental Determinants</b>	<b>Micro-Social Determinants</b>	<b>Behavioral Determinants</b>
<b>Sociodemographic Factors</b>	<b>Gendered Discrimination</b>	<b>Sexual Behavior</b>
Age	Attitudes to domestic violence	Total lifetime number of sexual partners
Marital status	Controlling behavior	Recent sexual activity
State	Emotional violence	Last intercourse condom use
Area of residence	Experience of physical violence from spouse	
	Experience of sexual violence	
<b>Social Status</b>	<b>Awareness and Attitudes to HIV</b>	
Religion	Ever heard of AIDS	
Caste	Knows of transmission routes of HIV	
Marital status	Misconception of HIV	
<b>Socioeconomic Factors</b>	<b>Mobility</b>	
Level of education	Ever moved residence	
Income/wealth	Previous type of residence	
Occupation		

Note: Barnett and Whiteside's (2002) model was adapted to the Indian context for the purposes of this paper.

Source: Barnett and Whiteside 2002.

Variables proven through research to act as an aggregated proxy indicator of risk, e.g., experience of sexual violence, were assigned to the "micro-social" dimension of susceptibility (Rehle et al. 2007; Pettifor et al. 2009; Pettifor et al. 2005). This dimension encompasses (i) gendered discrimination, which incorporates variables

<sup>1</sup> Firstly, the NFHS-III recorded whether participants self-identified as belonging to a caste or tribe. Respondents who did not self-identify as either category were allotted as having no caste/tribe status or as not knowing which group they belong to. Then, it further documented participants' caste status by utilizing governmental measures of caste, which compress heterogeneous categories of caste into five broad groups (Ministry of Home Affairs, Government of India 2001): scheduled castes, scheduled tribes, other backwards classes (OBC), and "none of them."

measuring inter-relationship dynamics, and history of domestic and sexual violence of female respondents; (ii) geographical mobility, which includes variables assessing female participants' previous type of residence, how many years they had been living in their current household, and male respondents' patterns of migration; and (iii) attitudes to HIV, which incorporate measurements of participants' knowledge of routes of transmission. Measurements of respondents' awareness of HIV include their understanding of methods to prevent sexual transmission,<sup>2</sup> their knowledge of treatment required for HIV,<sup>3</sup> and misconceptions held regarding the illness.<sup>4</sup>

Finally, behavioral determinants were investigated. The NFHS-III included measures of sexual behavior, which recorded respondents' recent and lifetime history of sexual behavior. These variables document the number of lifetime sexual partners, recent sexual activity, and information on sexual partners during the 12 months preceding the survey.<sup>5</sup> As prevalence of high-risk behavior was very low in the general population, it is difficult to analyze some of the results comprehensively. Hence, some measurements of sexual behavior used in the NFHS-III are not applied in this paper, such as the length of time respondents knew their previous sexual partner.

Statistical tests were conducted in two stages. First, a series of bivariate analyses was conducted on variables within each dimension of susceptibility. Then, a three-step logistical regression model was conducted in order to control for confounding factors affecting results from the bivariate phase of analysis. These models also identified which dimensions acted as the strongest predictors of HIV status among female participants.

### 3. MACROENVIRONMENTAL PREDICTORS OF HIV STATUS

#### 3.1 Sociodemographic Characteristics

A set of bivariate analyses was conducted to examine the relationship between age and HIV status. It was found that female HIV-infected respondents in the NFHS-III tended to be on average slightly older ( $M = 30.73$ ,  $SD = 7.5$ ) than the general population ( $M = 29.03$ ,  $SD = 9.5$ ),  $t(114) = 2.4$ ,  $p < 0.02$ ,  $r = 0.22$ ). This could be a product of the age distribution of female HIV-positive participants being roughly bell shaped, with a sharp peak between the ages of 30 and 34. In contrast, the age distribution of HIV-negative women was heavily skewed toward the youngest age groups. Figure 1 illustrates the distribution of ages by HIV status for women.<sup>6</sup>

---

<sup>2</sup> Participants in the NFHS-III who had heard of HIV/AIDS were asked if it was possible to prevent transmission of HIV by abstaining from sexual intercourse, being faithful to one's partner, and by using condoms. These respondents were also asked to list other ways to avoid HIV.

<sup>3</sup> Participants were asked if they knew that HIV could be vertically transmitted from mother to child during and after birth, whether this could be prevented through drugs given to the mother, and whether they had heard of "special antiretroviral" drugs to prolong the life of an HIV-infected patient.

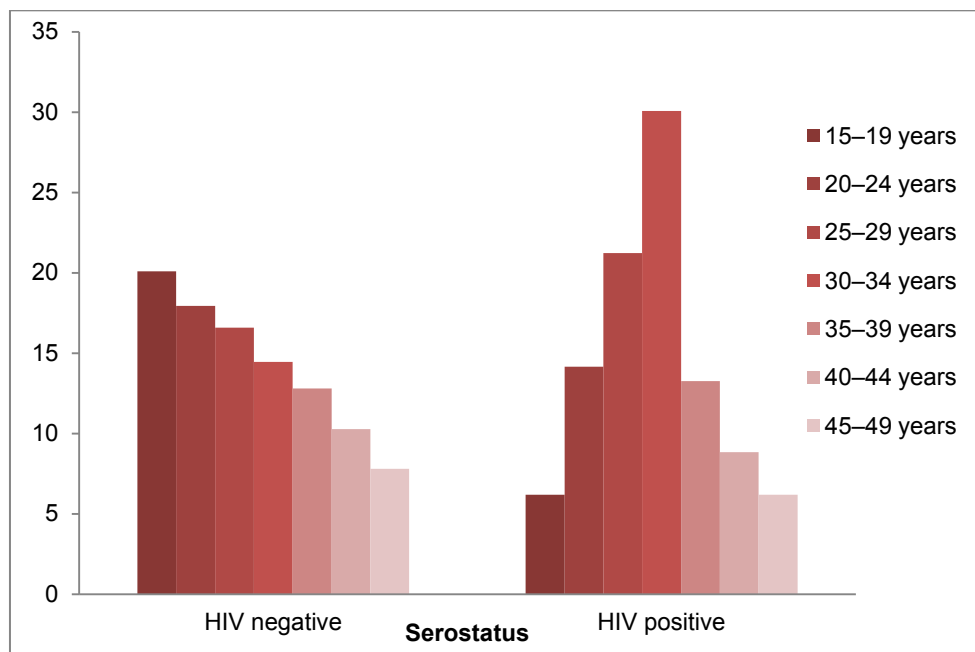
<sup>4</sup> Participants in the NFHS-III were asked whether they believed that a healthy looking person could have HIV and whether it could be transmitted through hugging others, mosquito bites, or sharing food with HIV-positive individuals.

<sup>5</sup> Respondents were asked to identify their relationship with their previous sexual partner, duration of their relationship, and use of condoms during the time.

<sup>6</sup> Expansion weights were provided with the NFHS-III dataset in order to create estimates of the size of the HIV-infected population at a national and state level in India. This increased the size of the sample to such an extent that most bivariate analyses would have had statistically significant results. These



**Figure 1: Age Distribution by HIV Status for Female Respondents**  
(weighted, % of participants)



Source: International Institute for Population Sciences (IIPS) and Macro International 2007.

Additionally, there was a highly significant relationship ( $p < 0.01$ ) between the HIV status of female participants and their area of residence, with higher rates of HIV prevalence among women in urban areas (0.29%) than rural areas (0.18%). These findings concur with that of other studies, which indicate that HIV prevalence was higher in urban areas than rural areas (Munro et al. 2008; Perkins et al. 2009). It has been argued that the reason for these findings is that certain types of risk-taking behavior, e.g., drug injecting use and sexual contact with CSWs, are more common in urban than rural places of residence (Mahanta et al. 2008; Saidel et al. 2008; Kumar et al. 2008; Gajendra et al. 2011; Gupta et al. 2010; Saggurti et al. 2008). Table 2 displays the serostatus of female participants according to area of residence.

**Table 2: Serostatus and HIV Prevalence of Female Participants by Area of Residence**  
(weighted)

Area of Residence	HIV Prevalence	Serostatus of Female Participants			
		HIV negative		HIV positive	
		Count	%	Count	%
Rural	0.18	35,470	67	50	43
Urban	0.29	17,269	33	65	57
Total	0.22	52,739	100	115	100

Source: International Institute for Population Sciences (IIPS) and Macro International 2007.

weights were adjusted into relative weights, which reduced the number of weighted cases to the actual size of the sample by dividing the expansionary weights by their average.

Finally, the clustered nature of HIV prevalence in India was further investigated by performing a chi-squared test on HIV status and region of residence for the female participants. There was a highly significant ( $p < 0.001$ ) relationship between the region of residence and HIV prevalence. The majority of the regions had an HIV prevalence among women of below 0.3%, apart from the northeast (0.3%), west (0.4%), and south (0.5%) of India. Moreover, the bulk of female HIV-positive participants were living in southern states (53%). Table 3 displays female participants' serostatus according to the region of India they live in.

**Table 3: Serostatus and HIV Prevalence of Female Participants by Region of India**  
(weighted)

Region	Serostatus of Female Participants			Number
	HIV negative (%)	HIV positive (%)	Prevalence	
<b>India Total</b>			<b>0.22</b>	<b>52,854</b>
North	13.5	6.9	0.1	7,153
Central	23.2	9.5	0.1	12,239
East	22.4	1.7	0.02	11,794
Northeast	3.8	5.2	0.3	2,032
West	14.3	24.1	0.4	7,559
South	22.8	52.6	0.5	12,077

Source: IIPS and Macro International 2007.

## 3.2 Socioeconomic Factors

A set of bivariate analyses illustrates that female HIV-positive participants had lower levels of education in comparison to the general population. The majority of female HIV-infected respondents had either never attended school (49%) or had only a primary level of education (24%). Moreover, female HIV-positive respondents spent an average of 3.3 years in education—nearly 2 years less than the population average of 5.11 years. These low levels of education may have contributed to the majority of women living with HIV/AIDS (WLHA) being illiterate (66%). Table 4 displays female participant serostatus by level of education.

**Table 4: Serostatus and HIV Prevalence of Female Participants by Level of Education**  
(weighted)

Measure of Education	HIV Prevalence	Serostatus of Female Participants			
		HIV negative		HIV positive	
		Count	%	Count	%
Highest Educational Level***					
No education	0.27	20,957	40	56	49
Primary	0.35	8,018	15	28	24
Secondary	0.15	19,891	38	29	25
Higher	0.05	3,871	7	2	2
Total	0.22	52,737	100	115	100
Completed Educational Level***					
No education	0.27	20,957	40	56	49
Incomplete primary	0.48	4,333	8	21	19
Complete primary	0.16	3,685	7	6	5
Incomplete secondary	0.15	17,409	33	26	23
Complete secondary	0.08	2,482	5	2	2
Higher	0.05	3,871	7	2	2
Total	0.22	52,737	100	113	100
Literacy***					
Literate	0.14	26,879	51	39	34
Illiterate	0.29	25,605	49	75	66
Total	0.22	52,484	100	114	100

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

Furthermore, the majority of female HIV-positive respondents were employed (59%), whereas many HIV-negative respondents were not working (63%). Employed female respondents had higher levels of HIV prevalence (0.34%) than those who were unemployed (0.1%). Many employed female HIV-infected respondents were working in low-skilled occupations, including agricultural employment (23%) and services (20%), indicating that these participants were hired for domestic work (e.g., as housekeepers) or customer service.<sup>7</sup> Table 5 displays female participant serostatus by work status and occupation.

<sup>7</sup> Level of occupation was recorded by grouping respondents into six categories, resembling Goldthorpe and Hope's (1974) conceptualization of class in conjunction with the level of "skill" involved in the occupation.

**Table 5: Serostatus and HIV Prevalence of Female Participants by Work Status, Occupation, and Wealth**  
(weighted)

Socioeconomic Status	HIV Prevalence	Serostatus of Female Participants			
		HIV negative		HIV positive	
		Count	%	Count	%
Work Status***					
Unemployed	0.1	33,174	63	47	41
Employed	0.34	19,500	37	67	59
Total	0.2	52,674	100	114	100
Occupation***					
Not working	0.2	30,059	57	47	41
Professional occupation	0.07	1,478	3	11	0.9
Clerical	0.4	456	0.9	2	2
Sales	0.5	785	1.5	4	4
Agricultural employee	0.2	13,108	25	26	23
Services	1.4	1,631	3	23	20
Skilled and unskilled manual	0.2	5,203	10	11	10
Don't know	0	1	100	0	0
Total	0.22	52,721	100	114	100

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

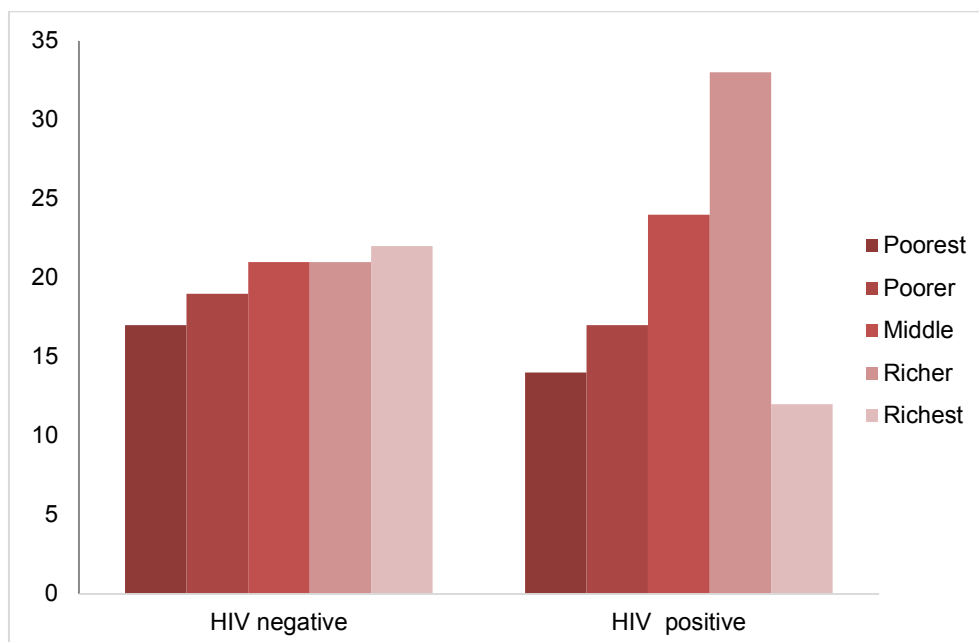
Other measurements of employment suggested that many WLHA could be working in the formal labor market.<sup>8</sup> For instance, almost a quarter of female HIV-negative participants worked at home.<sup>9</sup> In contrast, over three quarters of female HIV-positive participants worked outside of their home. Furthermore, female HIV-infected participants were significantly ( $p < 0.001$ ) more likely to be paid in cash only (79%) or in cash and kind (16%) than those in the general population.

On the other hand, findings on wealth suggest that WLHA in India tended to come from better-off backgrounds. The NFHS-III defined levels of wealth in terms of ownership of household items, which were assigned weighted scores based on factor analysis procedures and then divided into quintiles (IIPS and Macro International 2007). As the NFHS-III measures wealth in terms of ownership of household items, some employed WLHA could have greater purchasing power after entering the cash economy. Being part of the formal market could offer these WLHA the economic means and opportunity to interact with wider groups and potentially sustain multiple sexual partnerships. Wealth distribution for seropositive women was skewed toward the middle and richer wealth quintiles, with over half of the respondents belonging to these categories (56%). In contrast, wealth distribution for female HIV-negative participants was evenly spread. Figure 2 shows female participant serostatus by level of wealth.

<sup>8</sup> NFHS-III employed multiple measures of agricultural work that ascertained female participants' employment statuses in the formal and informal economies. It recorded what type of land respondents worked on, their type of earnings, and whether they were employed all year or seasonally.

<sup>9</sup> Please see Appendix, Table A.1 for multiple measurements of agricultural work and female participant serostatus.

**Figure 2: Female Participant Serostatus According to Level of Wealth**  
(weighted, % of participants)



Source: IIPS and Macro International 2007.

These results could be indicative of wider social dynamics related to the trajectory of the HIV epidemic in India. In the early phases of the HIV epidemic in sub-Saharan Africa, seroprevalence was high among women from better-off backgrounds (Ziegler et al. 1997; Cleland et al. 1999; Kirunga and Ntozi 1997). A survey conducted on pregnant women attending an antenatal clinic between 1989 and 1990 in Malawi demonstrated that having a relatively affluent socioeconomic status was a “risk factor” (Dallabetta et al. 1993). Findings on HIV status and wealth among women in the NFHS-III will be further investigated through multivariate analysis to test whether wealth still influences women’s propensity to contract HIV when extraneous variables are taken into account. The following section will examine the impact of social status on serostatus, starting with religion.

### 3.3 Social Status

A chi-squared test was performed to examine the relationship between religion and HIV status for the female respondents. Hindu respondents had a significantly ( $p < 0.005$ ) higher rate of HIV prevalence (0.25%) in comparison to their non-Hindu counterparts (0.1%). On the other hand, caste did not appear to have a significant association with women’s serostatus. The highest rates of HIV prevalence for women were among those who did not know their caste status (0.77%) or belonged to the category of “other backward classes” (OBC) (0.24%). A large proportion of female HIV-infected participants (46%) belonged to the category of OBC. The categorization of OBC has been previously used by governmental programs to allot certain types of social or monetary services, such as the provision of food rations, to impoverished sections of the population (Jaffrelot 2006; Perkins et al. 2009). These findings suggest that some WLHA could belong to socioeconomically deprived backgrounds (Ministry of Home Affairs, Government of India 2001). Table 6 displays female participant serostatus by religion, caste or tribal identity, and type of caste.

**Table 6: Serostatus and HIV Prevalence of Female Participants by Religion, Caste or Tribe Identity, and Type of Caste**  
(weighted)

Social Status	Prevalence	Serostatus of Female Participants			
		HIV negative		HIV positive	
		Count	%	Count	%
Religion***					
Hindu	0.25	42,338	80	104	91
Non-Hindu	0.1	10,337	20	10	9
Total	0.22	52,675	100	114	100
Caste or Tribe Identity					
Caste	0.23	47,153	89	107	94
Tribe	0.11	36,34	7	4	4
No caste/tribe	0	1,258	2	0	0
Don't know	0.44	682	1	3	3
Total	0.22	52,727	100	114	100
Type of Caste					
Scheduled caste	0.23	9,869	19	23	21
Scheduled tribe	0.12	4,188	8	5	4
Other backward class	0.24	20,804	41	51	46
None of them	0.19	16,142	31	31	28
Don't know	0.77	259	1	2	2
Total	0.22	51,262	100	112	100

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

There was, however, a highly significant ( $p < 0.001$ ) relationship between women's marital status and serostatus. The majority of HIV-positive respondents were married (66%), while a larger proportion of female HIV-positive participants were widowed (23%), divorced (2%), or living separately from their partners (6%) in comparison to the rest of the population. Moreover, there was a high prevalence of HIV within these marital categories. Table 7 displays female participants' serostatus according to their marital status.

**Table 7: Serostatus and HIV Prevalence of Female Participants by Marital Status**  
(weighted)

Marital Status	HIV Prevalence	Serostatus of Female Participants			
		HIV negative		HIV positive	
		Count	%	Count	%
Never married	<b>0.04</b>	10,743	20	4	4
Married	<b>0.19</b>	39,468	75	75	66
Widowed	<b>1.5</b>	1,709	3	26	23
Divorced	<b>1.27</b>	156	0.3	2	2
Not living together	<b>1.04</b>	663	1	7	6
<b>Total</b>	<b>0.22</b>	<b>52,739</b>	<b>100</b>	<b>114</b>	<b>100</b>

Source: IIPS and Macro International 2007.

Finally, there was a significantly ( $p < 0.001$ ) higher rate of seroprevalence among women who had been married for 10–14 years (0.4%) and 15–19 years (0.4%) in comparison to those who had a marital duration of 0–4 years (0.2%) and 5–9 years (0.2%). These findings suggest that there is a possibility that some women married to seropositive men may have acquired HIV through repeated sexual contact with their husbands. Table 8 shows the duration of female respondents' marriage in years and their serostatus.

**Table 8: Marriage Duration and Serostatus of Female Respondents**  
(weighted)

Duration of Marriage	HIV Prevalence	Serostatus of Female Participants			
		HIV negative		HIV positive	
		Count	%	Count	%
Never married	<b>0.04</b>	10,743	20	4	3
0–4 years	<b>0.2</b>	7,270	14	16	14
5–9 years	<b>0.2</b>	8,155	15	17	15
10–14 years	<b>0.4</b>	7,258	14	29	25
15–19 years	<b>0.4</b>	6,858	13	28	24
20–24 years	<b>0.2</b>	5,802	11	12	10
25–29 years	<b>0.2</b>	4,250	8	7	6
30 or more years	<b>0.1</b>	2,403	5	3	3
<b>Total</b>	<b>0.2</b>	<b>52,739</b>	<b>100</b>	<b>116</b>	<b>100</b>

Source: IIPS and Macro International 2007.

### 3.4 Multivariate Analysis of Macroenvironmental Predictors of HIV Status

Bivariate analyses of female respondents' sociodemographic characteristics, socioeconomic factors, and social status provided a complex profile of the macroenvironmental predictors affecting WLHA in India. According to findings within the sociodemographic characteristics component of macroenvironmental predictors, female HIV-positive respondents were older and lived in regions with a history of high seroprevalence (NACO 2010). These rates of seroprevalence by region indicated that

there was a probability that certain types of risk behaviors could be located within a small geographical area, which would result in pockets or hubs of HIV prevalence.

The objective of the multivariate analysis was to identify significant macroenvironmental predictors of HIV status within the female sample, controlling for the effect of confounding factors. The first forced model (Step 1) includes sociodemographic factors (age, area of residence, and state), with the dependent variable being the HIV status of the female respondent. As there are over 30 states, they were divided by the level of HIV prevalence according to estimates generated by NACO (2010). This was done in order to test the earlier hypothesis generated from bivariate findings that living in environments with high rates of prevalence may increase the odds of female respondents being HIV positive.

This hypothesis seems to be substantiated, as the only variable that had a significant ( $p < 0.001$ ) impact on female respondents' HIV status was the level of seroprevalence in their state. In comparison to those living in a region with low HIV prevalence, women residing in high-prevalence states displayed increased odds of being seropositive.

The second forced model (Step 2) includes variables that had been previously used in bivariate analysis to measure socioeconomic factors. These include level of education, wealth, employment status, and occupation. Age and wealth did not have a significant association with HIV status. On the other hand, female participants' level of education and employment status had a highly significant ( $p < 0.001$ ) relationship with serostatus. Employed women displayed higher odds of being seropositive than their unemployed counterparts (OR=2.68, CI=1.44–4.99). Additionally, female participants who were uneducated or who only had a primary level of education were 2.99 times as likely to be seropositive compared to those who were better educated (OR=3.01, CI=1.85–4.91). Table 9 presents the intercept, with Step 1 including variables measuring sociodemographic characteristics, Step 2 comprising variables evaluating socioeconomic status, and Step 3 incorporating measurements of social status.



**Table 9: Macroenvironmental Predictors of HIV Status among Female Participants in the NFHS-III**  
(weighted)

	Step 1	Step 2	Step 3
<b>Intercept</b>	***0.00	***0.00	***0.00
<b>Sociodemographic characteristics</b>			
<b>Age</b>	1.02 (0.99–1.04)	0.997 (0.98–1.02)	*0.98 (0.95–1.00)
<b>Area of residence (rural)</b>			
Urban	1.403 (0.97–2.03)	**1.75 (1.13–2.70)	*1.63 (1.06–2.23)
<b>States (low prevalence)</b>			
High prevalence	***4.28 (2.75–6.67)	***4.14 (2.66–6.45)	***4.01 (2.57–6.25)
<b>Socioeconomic factors</b>			
<b>Level of education (secondary/higher)</b>			
No education/primary		***3.01 (1.85–4.91)	***2.94 (1.80–3.78)
<b>Wealth (poor/poorer)</b>			
Middle/richer		1.46 (0.92–2.32)	*1.63 (1.02–4.72)
<b>Employment (unemployed)</b>			
Employed		***2.68 (1.44–4.99)	*2.05 (1.11–3.78)
<b>Occupation (skilled)</b>			
Unskilled		0.77 (0.39–1.47)	0.76 (0.41–1.43)
<b>Social Status</b>			
<b>Religion (non-Hindu)</b>			
Hindu			**2.47 (1.29–4.72)
<b>Marital status (never married/currently married)</b>			
Formerly married			***7.78 (4.99–12.14)

Notes: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ . Numbers in parentheses are confidence intervals of odds ratios.

Source: IIPS and Macro International 2007.

The final model (Step 3) includes variables assigned to social status. For the female participants, religion and marital status had a significant ( $p < 0.01$ ) association with HIV status. Marital status had the strongest association with HIV status. Formerly married participants, meaning that they were divorced, widowed or separated, were 7.1 times more likely to be seropositive than those who were either never married or were currently married (OR=7.78, CI=4.99–12.14). These findings suggest that Indian women's marital statuses could increase their odds of being seropositive.

Ramesh et al. (2008) illustrate that women in these marital categories are more likely in some areas of India to partake in casual sex work, perhaps through lack of available employment. Nevertheless, it is difficult to ascertain the direction of causation as it is just as possible that the HIV statuses of the respondents or their partners may have caused difficulties in their marriages, or have led to them to becoming widowed (Das et al. 2009).

In addition, level of education, employment status, and rate of seroprevalence within states retained significance ( $p < 0.05$ ) when controlled for variables measuring social status. In accordance with the previous multivariate models, female respondents who were uneducated, employed, and lived in states with higher rates of seroprevalence

displayed higher odds of being HIV positive in comparison to their counterparts. These findings suggest that a low level of education could act as a contributing risk factor, as respondents may have little or no awareness of HIV (Rahbar et al. 2007; Shrotri et al. 2003; Kalasagar et al. 2006) with negative effects on their sexual risk behavior (Firth et al. 2010; Godbole and Mehendale 2005).

Strikingly, some variables measuring sociodemographic characteristics and socioeconomic factors seemed to gain significance ( $p < 0.05$ ) after variables evaluating social status were incorporated into the final model (Step 3). These variables were wealth, area of residence, and age. Results related to area of residence indicated that female respondents living in urban areas displayed higher odds ( $OR = 1.63$ ,  $CI = 1.02$ – $4.72$ ) of being HIV positive than those residing in rural areas. These findings seemed to further substantiate multivariate results on states, which illustrated that women living in states with higher levels of seroprevalence were almost 4 times as likely to be HIV positive ( $OR = 4.01$ ,  $CI = 2.57$ – $6.25$ ). This may be because recent research has demonstrated that hubs of high seroprevalence are often located in urban areas, where populations displaying sexual risk behaviors (e.g., CSWs) may reside (UNAIDS and WHO 2009; UNAIDS and WHO 2007; Pandey et al. 2009).

Nonetheless, findings on wealth and age seem to contrast with other results on female participants' sociodemographic characteristics and socioeconomic factors, which suggest that HIV-positive respondents could belong to economically deprived communities as they are less educated than the general population. Female respondents who belonged to the middle/richer wealth categories displayed higher odds of being HIV positive ( $OR = 1.63$ ,  $CI = 1.02$ – $4.72$ ) than those who were poor/poorer. Moreover, older respondents displayed marginally increased odds ( $OR = 0.98$ ,  $CI = 0.95$ – $1.00$ ) of being seropositive. As these odds were close to 1, it is possible that age has little or no impact on a participant's serostatus. Age is, therefore, excluded from the final model in this paper, despite having a significant ( $p < 0.05$ ) association with HIV status.

On the other hand, most of these variables operate on such a distal level that there is a possibility that they also act as indicators for other proximal determinants. For instance, the fact that Hindu respondents display a higher odds ratio of being seropositive ( $OR = 2.47$ ,  $CI = 1.29$ – $4.72$ ) in comparison to their non-Hindu counterparts could be indicative of behavioral predictors. As a large proportion of the religious minority in India is Muslim (Srinivas 1952; Bojko et al. 2010), there is a possibility that many non-Hindu men are circumcised, which has been illustrated by epidemiological research to be a protective factor against the transmission of HIV (Ruxrungtham et al. 2004). The following section will therefore examine the impact of micro-social predictors on respondents' serostatus, starting with their experience of gendered discrimination.

## **4. MICRO-SOCIAL PREDICTORS OF HIV STATUS**

### **4.1 Gendered Discrimination**

Recent research has demonstrated that in developing countries, women who have experienced interpersonal violence (IPV) display an elevated risk of contracting HIV (Kambou et al. 2007; Buseh et al. 2002; Panchanadeswaran et al. 2008). In Tanzania, Maman et al. (2002) found that young, HIV-positive women had a 10-fold increased odds of reporting physical violence compared to their HIV-negative counterparts. The NFHS-III created a set of variables to measure comprehensively inter-relationship dynamics, participants' attitudes to IPV, and female respondents' history of domestic

and sexual violence.<sup>10</sup> Inter-relationship dynamics were examined through variables that assessed female participants' experiences of "controlling behavior" and "emotional violence."<sup>11</sup>

Female HIV-positive respondents were significantly ( $p<0.05$ ) more likely to experience different types of controlling behavior on the part of their spouses in comparison to the general population. This behavior included: (i) being accused of unfaithfulness (22%); (ii) their husband limiting contact with their family (18%); and (iii) their spouse insisting on knowing where they were (20%).<sup>12</sup> These results indicated that the forms of controlling behavior that HIV-positive women may encounter interacted with control of their sexual behavior and movement in the public sphere.

The second component of inter-relationship dynamics, emotional violence, recorded married female participants' experiences of being humiliated, threatened with harm and insulted by their husbands. Female HIV-positive respondents in the NFHS-III were significantly ( $p<0.05$ ) more likely to have ever experienced emotional violence (24%) than the general population (16%). This could be a product of a significantly ( $p<0.05$ ) higher proportion of female HIV-infected participants reporting that they were humiliated (21%) and insulted (18%) in comparison to their HIV-negative counterparts. Table 10 displays serostatus and multiple measures of female participants' experiences of emotional violence on the part of their husbands.

**Table 10: Experience of Emotional Violence According to Serostatus for Female Participants**  
(weighted)

Measure of Emotional Violence	Serostatus of Female Participants		
	HIV negative	HIV positive	Total number
	%	%	
Ever experienced any emotional violence*			
Yes	16	24	
No	84	76	
Total	100	100	30,900
Types of emotional violence			
Spouse ever humiliated her*	13	21	30,901
Spouse ever threatened her with harm	5	12	30,901
Spouse ever insulted her or made her feel bad**	9	18	30,900

Note: \*\*\* =  $p<0.005$ , \*\* =  $p<0.01$ , and \* =  $p<0.05$ .

Source: IIPS and Macro International 2007.

In addition, attitudes to IPV were used to gauge WLHA's acceptance of gendered norms, as experts on IPV have posited that it is culturally sanctioned in the Indian context (Mahajan 1990b). The majority of female participants rejected most of the justifications for wife beating. Nevertheless, in comparison to their HIV-negative

<sup>10</sup> These attitudes were gauged by asking participants whether it was justified for a husband to beat his wife if she left the house without telling him, neglected her children, argued with him, refused to have sex with him, or burnt their food.

<sup>11</sup> These variables gauged whether married participants experienced the following types of behavior from their spouse: jealousy if they spoke to other men, accusations of infidelity, being prohibited from speaking to relatives or friends, and lack of trust in relation to money.

<sup>12</sup> Please see Appendix, Table A.2 for serostatus and multiple measures of controlling behaviors involving female participants.

counterparts, WLHA were significantly ( $p < 0.05$ ) more likely to agree that it was justified for a wife to be beaten if she neglected her children (51%), burned food (31%), was disrespectful towards her in-laws (54%), or had extramarital sexual relationships (36%).<sup>13</sup> These findings suggest that many seropositive women may endorse traditional gendered norms similar to those displayed in Hindu religious texts that authorize husbands to retain absolute control of their wives' bodies and minds through the use of "physical corrective methods" (Mahajan 1990b: 120).

Female seropositive respondents in the NFHS-III were also significantly ( $p < 0.001$ ) more likely to have experienced severe violence (26%) than the general population (13%).<sup>14</sup> These findings could be a product of HIV-positive participants being significantly ( $p < 0.001$ ) more likely to have experienced many different forms of physical violence on the part of their spouse, including being pushed (23%), kicked (25%), strangled (8%), punched (26%), threatened with a weapon (9%), or having their arm twisted (30%). Table 11 illustrates the types of violence that married female participants experienced and their HIV statuses within their partnerships.

**Table 11: Types of Violence Experienced by Married Female Participants and HIV Status within Their Partnership**  
(weighted)

Type of Violence Incurred by Husband	Serostatus of Female Participants		
	HIV negative	HIV positive	Total number
	%	%	
Pushed, shook, or threw something**	14	23	30,891
Slapped	35	43	30,893
Punched with fist or something harmful***	12	26	30,889
Ever kicked or dragged***	12	25	30,890
Strangled or burned***	2	8	30,889
Twisted her arm or pulled her hair***	16	30	30,885
Threatened or attacked with knife/gun or other weapon***	1	9	30,802

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

I also explored the possibility that certain social dynamics related to gendered discrimination could negatively affect women's ability to prevent transmission of HIV by testing when domestic abuse started against female participants' serostatus. HIV-positive respondents seemed to experience physical abuse significantly ( $p < 0.01$ ) earlier in marriage than the general population.<sup>15</sup> Many of these participants first encountered IPV during the first year of marriage (26%). In contrast, physical abuse started for most HIV-negative respondents in 1–4 years of marriage (64%). These results suggest that there is a possibility that some female seropositive participants may have experienced IPV prior to contracting HIV.

<sup>13</sup> Please see Appendix, Table A.3 for multiple measures of attitudes to domestic violence and female respondents' serostatus.

<sup>14</sup> Please see Appendix, Table A.4 for severity of violence experienced from spouse according to serostatus of female respondents.

<sup>15</sup> Please see Appendix, Table A.5 for when IPV started and the serostatus of the female respondents.

Finally, HIV-positive female participants were significantly ( $p<0.001$ ) more likely to have experienced sexual violence at some point in their lifetime than the general population.<sup>16</sup> Almost a quarter of HIV-positive women had been sexually abused in comparison to 10% of their HIV-negative counterparts. Moreover, female HIV-positive respondents were significantly ( $p<0.001$ ) more likely than the general population to have been physically forced to have sex by their spouse. Table 12 displays history of sexual violence by serostatus for the female participants.

**Table 12: History of Sexual Violence of Female Participants According to Serostatus (weighted)**

Measure of Sexual Violence	Serostatus of Female Participants		
	HIV negative	HIV positive	Total number
	%	%	
<b>Experienced any sexual violence***</b>	<b>10</b>	<b>22</b>	<b>30,892</b>
Anyone forced respondent to perform sexual acts***	3	11	35,856
Spouse ever physically forced sex when not wanted***	10	21	30,892
Spouse ever forced other sexual acts when not wanted	5	9	30,892

Note: \*\*\* =  $p<0.005$ , \*\* =  $p<0.01$ , and \* =  $p<0.05$ .

Source: IIPS and Macro International 2007.

Findings for gendered discrimination provide a multidimensional picture of WLHA, showing that these women were more likely to have experienced IPV and sexual violence in the past than their seronegative counterparts. These gendered risk factors might have been exacerbated by traditional beliefs on IPV, indicating that they were more likely to condone the use of domestic violence to control women's behavior. However, it is important to note that domestic violence is fairly common in India, with 45% of all female participants in the NFHS-III having experienced some form of physical abuse from their spouse prior to the survey. As seroprevalence is fairly low, these findings suggest that domestic violence does not by itself directly lead to HIV but acts in concert with other social structural determinants. The following section will examine the impact of female respondents' attitudes toward HIV on their serostatus.

## 4.2 Attitudes to HIV

The association between serostatus and female participants' awareness of HIV was first examined. A significantly ( $p<0.001$ ) higher proportion of female HIV-positive respondents (79%) were aware of the existence of HIV than those in the general population (62%).<sup>17</sup> Female participants who were aware of the existence of HIV displayed an inconsistent level of knowledge on routes of transmission. On one hand, the majority of both HIV-positive and HIV-negative female participants knew that

<sup>16</sup> The NFHS-III created a set of measures that recorded female participants' experiences of sexual abuse. They were asked whether anyone had ever forced them to perform sexual acts, whether their spouse had ever forced them to have sex, the age at which they were first sexually abused, and the identity of the abuser. Only the first two variables were analyzed as there were too few participants to answer the latter two questions.

<sup>17</sup> Please see Appendix, Table A.6 for serostatus and female participant awareness of the existence of HIV.

limiting sexual partners (73%), abstaining from sexual intercourse (66%), and condom use (60%) were possible means of avoiding HIV infection.<sup>18</sup> On the other hand, very few female participants could recall any forms of transmission related to contact with HIV-infected blood. This is a crucial gap in knowledge as HIV is transmitted through direct contact with blood and other bodily fluids (Shah 2006; Avert 2009). Hence, many female participants were unsure of other means of preventing transmission of HIV, with a large proportion of respondents believing that it was possible to avoid HIV by not kissing others (67%) and using blood only from relatives (64%).<sup>19</sup>

This may explain why many female participants held misconceptions on routes of HIV transmission. The two most commonly held misconceptions among female participants were that a healthy looking person could not be HIV positive (22%) and that it is possible to acquire HIV by sharing food (18%). Moreover, a significantly ( $p<0.005$ ) higher proportion of female HIV-positive respondents were not sure whether mosquito bites transmitted HIV (32%), compared to the general population (18%). Table 13 shows serostatus for the female participants and their commonly held misconceptions about HIV.

**Table 13: Female Participants' Commonly Held Misconceptions about HIV by Serostatus (weighted)**

Misconceptions about HIV	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
<b>A person who appears healthy can be HIV positive</b>				
Yes	20,049	61	53	59
No	7,290	22	17	19
Don't know	5,272	16	20	22
Total	32,611	100	90	100
<b>Can acquire HIV by sharing food with person who has AIDS</b>				
Yes	5,935	18	18	20
No	22,380	69	57	63
Don't know	4,295	13	16	18
Total	32,610	100	91	100
<b>Can acquire HIV by hugging person who has AIDS</b>				
Yes	4,917	15	13	14
No	23,084	71	60	66
Don't know	4,601	14	18	20
Total	32,602	100	91	100
<b>Can acquire HIV through mosquito bites***</b>				
Yes	6,465	20	17	19
No	20,229	62	42	46
Don't know	5,915	18	32	35
Total	32,609	100	91	100

Note: \*\*\* =  $p<0.005$ , \*\* =  $p<0.01$ , and \* =  $p<0.05$ .

Source: IIPS and Macro International 2007.

<sup>18</sup> Please see Appendix, Table A.7 for female participants' serostatus and their knowledge of the "abstaining from sexual intercourse, being faithful to one's partner, and condom use" (ABC) method of HIV prevention.

<sup>19</sup> Please see Appendix, Table A.8 for serostatus and answers by female participants on ways to avoid HIV.

Findings on female participants' attitudes to HIV illustrate that although the majority of female HIV-infected participants in the NFHS-III were aware of the existence of HIV (19%), their knowledge of routes of transmission were limited to factors related to sexual risk behavior (e.g., condom use). This could be the product of governmental and NGO programs that promote these methods of HIV prevention within the local population (Chhabra and Anand 2010; Dean and Fenton 2010; Dandona et al. 2009).

### 4.3 Geographical Mobility

Previous studies of transmission of HIV in India have illustrated that mobile labor could be a contributing factor to men's sexual risk behavior (Gupta et al. 2010; Saggurti et al. 2008; Saggurti et al. 2009). This is because they are more likely to have sexual contact with CSWs when working away from home. Therefore, analysis was conducted on variables that measured participants' migratory behavior to ascertain whether this had an impact on their HIV status.

Unfortunately, the NFHS-III collected very little data on women's migratory behavior, perhaps as few are involved in mobile occupations such as truck driving. I, firstly, examined whether HIV-infected respondents were any more likely to have moved household in their lifetime than the general population. HIV-positive women were not any more likely to have moved household (62%) in comparison to their HIV-negative counterparts (67%). These preliminary findings indicate that many seropositive women may not be mobile. Table 14 illustrates female participants' history of mobility and their serostatus.

**Table 14: Distribution of Female Participants Aged 15–49 in the NFHS-III According to History of Mobility and Serostatus**  
(weighted)

<b>Ever Moved Residence</b>	<b>HIV Prevalence</b>	<b>HIV Negative</b>	<b>HIV Positive</b>	<b>Count</b>
		(%)	(%)	
Always lived in the same residence	0.24	33	38	17,688
Moved	0.2	67	62	35,125
<b>Total</b>	<b>0.22</b>	<b>100</b>	<b>100</b>	<b>52,813</b>

Source: IIPS and Macro International 2007.

These findings were further investigated by examining where respondents had previously lived. The majority of the female respondents had lived in the countryside (74%) before relocating elsewhere. HIV-positive women displayed similar trends in migration, except that a significantly ( $p < 0.005$ ) larger percentage of them had previously lived in a city (25%) than the general population (13%). These results indicate that substantial sections of the female HIV-infected population are undergoing a reverse migratory trend from urban to rural areas in comparison to that of the general population who move from the countryside in search of employment. Table 15 shows female participants' previous area of residence according to serostatus.

**Table 15: Distribution of Female Participants Aged 15–49 in the NFHS-III  
According to Previous Area of Residence and Serostatus**  
(weighted)

Type of Previous Place of Residence	HIV Prevalence	HIV Negative (%)	HIV Positive (%)	Count
City	0.38	13	25	4,719
Town	0.26	13	17	4,556
Countryside	0.16	74	58	25,732
<b>Total</b>	<b>0.20</b>	<b>100</b>	<b>100</b>	<b>35,007</b>

Source: IIPS and Macro International 2007.

As there are few variables measuring female participants' geographical mobility, it is difficult to ascertain the impact that this social factor has on serostatus. Findings suggest that women's geographical mobility has little impact on their propensity to contract HIV as seropositive participants did not seem to be any more likely to have moved households than their seronegative counterparts. On the other hand, female participants who previously lived in cities were more likely to be HIV infected than their counterparts, suggesting that it could be the pattern of migration which impacts serostatus rather than whether they had moved in their lifetime.

#### 4.4 Multivariate Analysis of Micro-Social Predictors of HIV Status

Bivariate analysis of female respondents' attitudes to HIV, gendered discrimination, and geographical mobility illustrates which 'micro-social' predictors may impact HIV status. Results on gendered discrimination indicate that there could be factors within marital relationships that can affect women's HIV status. Female HIV-positive respondents were significantly ( $p < 0.05$ ) more likely to have experienced psychological and physical abuse than the general population. For example, a larger proportion of female HIV-infected participants reported that their husbands had humiliated (21%) and insulted them (18%) prior to the survey in comparison to their HIV-negative counterparts.

The original purpose of the first forced multivariate model (Step 1) was to identify which indicator of gendered discrimination within marital relationships had the most impact on women's status when controlling for other micro-social predictors. Unfortunately, it was not possible to utilize all measures of gendered discrimination due to logistical constraints. Only a small subset of participants from the married female sample was questioned on their experience of psychological and physical abuse (IIPS and Macro International 2007); and thus, inclusion of these measurements within the model reduced the dataset to a quarter of its original size. Therefore, the only measurement of gendered discrimination included was their attitudes to IPV, as every female participant was asked these questions.

Female respondents who agreed with any justification of IPV displayed a higher odds ratio ( $OR = 1.59$ ,  $CI = 1.08–2.34$ ) of being HIV positive in comparison with those who did not. These findings suggest that some WLHA may condone domestic violence, believing that it could be used to control a wife's behavior. In Jejeebhoy's (1998) paper on women's attitude toward their autonomy in Uttar Pradesh and Tamil Nadu, participants believed that it was justified for a man to physically abuse his wife if she acted in a disobedient manner toward him by failing to perform her household duties.



The second model (Step 2) incorporated measurements of female respondents' attitudes to HIV. Measurements of knowledge of routes of transmission and misconceptions about HIV were not included in this model as it was found that there was a degree of multicollinearity between these variables. This meant that it was difficult to generate reliable results when all these measurements of attitudes to HIV were included in the model. Consequently, only one variable measuring participants' awareness of the existence of HIV was included in the second model. This variable was chosen because it is difficult for an individual to know how HIV is transmitted unless they know of its existence. Table 16 presents the intercept, with Step 1 including variables measuring gendered discrimination; Step 2 comprising variables measuring attitudes towards HIV; and Step 3 including measurements of geographical mobility.

**Table 16: Micro-Social Predictors of HIV Status among Female Participants in the NFHS-III**  
(weighted)

	Step 1	Step 2	Step 3
<b>Intercept</b>	***0.002	***0.000	***0.001
<b>Gendered discrimination</b>			
<b>Agreed with any justification for domestic violence (no)</b>			
Yes	**1.59 (1.08–2.34)	**1.70 (1.15–2.50)	**1.70 (1.15–2.50)
<b>Attitudes toward HIV</b>			
<b>Ever heard of HIV (no)</b>			
Yes		***2.49 (1.57–3.90)	***2.45 (1.54–3.87)
<b>Geographical mobility</b>			
<b>Ever moved residence (no)</b>			
Yes			0.909 (0.621–1.33)

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

It was found that female participants who knew of the existence of HIV/AIDS were 2.49 times more likely to be seropositive than those who had never heard of the illness (OR=2.49, CI=1.57–3.90). One could argue that these findings indicate that awareness of the existence of HIV could predispose one to contract the virus. However, it is equally possible that some WLHA could be aware of HIV through educational programs in their community or through meeting other HIV-infected individuals.

The final model (Step 3) included measurements of female participants' history of geographical mobility. Variables measuring gendered discrimination and attitudes towards HIV retained their significance ( $< 0.05$ ) even when controlling for the effect of geographical mobility. Female respondents who agreed with any justification for domestic violence (OR=1.70, CI=1.15–2.50) and knew of the existence of HIV/AIDS (OR=2.45, CI=1.54–3.87) displayed higher odds of being HIV infected than their counterparts.

On the other hand, female respondents who had changed residence in their lifetime seemed to be no more likely to be HIV positive than those who had never moved home (OR=0.91, CI=0.62–1.33). These findings aligned with those of the bivariate results, which indicated that most HIV-positive women were not geographically mobile. It is possible that findings in the NFHS-III on women's geographical mobility could be indicative of other structural determinants associated with cultural practices of

marriage. In southern areas of India it is fairly common for Hindu and Muslim women to marry cousins belonging to the same community, meaning that they are rarely expected to move far from the area where they were born (Basu 1999; Moily 2011; Nagamani and Sharma 2011; Kalpagam 2008).

## 5. BEHAVIORAL PREDICTORS OF HIV STATUS

### 5.1 Sexual Behavior

Studies of sub-Saharan Africa have identified premarital sex as a potential risk factor for HIV transmission as many unmarried women could be forced through poverty and hardship to partake in transactional sexual relationships (Booyesen and Summerton 2011; Gregson et al. 2009; King et al. 2009). Contrary to findings in these studies, the majority of HIV-positive male (61%) and female (87%) participants in the NFHS-III first had intercourse when they were married. These results suggest that there is a possibility that cultural practices related to arranged partnerships, such as separation of sexes under the purdah system prior to marriage (Olsen and Mehta 2006), could mediate people's sexual behavior in the Indian context. Table 17 shows sexual history and HIV status for the female participants in the NFHS-III.

**Table 17: Previous Sexual History and Serostatus of Female Participants**  
(weighted)

Sexual History	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
Never had intercourse	10,712	20	4	3
Had sexual intercourse at first union	5,629	69	11	87
Had intercourse prior to marriage	36,390	11	100	10
<b>Total</b>	<b>52,731</b>	<b>100</b>	<b>115</b>	<b>100</b>

Source: IIPS and Macro International 2007.

On the other hand, female HIV-infected respondents displayed slightly higher levels of sexual risk activity than those in the general population. For instance, a significantly ( $p < 0.001$ ) higher proportion of WLHA had two or more sexual partners in their lifetime (8%) in comparison with their HIV-negative counterparts (2%). Table 18 displays female respondents' recent and lifetime number of sexual partners and their HIV statuses.

**Table 18: Serostatus and Number of Sexual Partners of the Female Participants**  
(weighted)

Measure of Sexual Behavior	Serostatus of Female Participants		Count
	HIV negative (%)	HIV positive (%)	
<b>Number of lifetime sexual partners***</b>			
1	98	92	41,281
2 or more	2	8	735
Total	<b>100</b>	<b>100</b>	<b>42,016</b>
<b>Number of sexual partners in the last 12 months***</b>			
0	28.2	29.8	14,895
1	71.8	69.3	37,894
2 or more	0.04	0.9	21
Total	<b>100</b>	<b>100</b>	<b>52,810</b>

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

Furthermore, WLHA were significantly ( $p < 0.001$ ) more likely to have had a sexual relationship with someone other than their husband (5%) compared to the general population (0.2%).<sup>20</sup>

Respondents' recent sexual activity was also examined. WLHA were significantly ( $p < 0.001$ ) more likely not to have been sexually active (45%) in the 4 weeks prior to the survey than those who were HIV negative (22%).<sup>21</sup> This indicates that most of the HIV-positive female respondents may not have acquired the virus through engaging in high-risk sexual behavior. It was not possible to analyze whether these findings could be affected by respondents' awareness of their serostatus as the latter were not asked this question during the survey to ensure that the interviewer did not know the HIV status of the participants.

Finally, participants' use of condoms during their last sexual intercourse was analyzed. The vast majority of women (94%) had not used a condom during their last act of sexual intercourse.<sup>22</sup> HIV-positive women did not seem to be any more likely than those in the general population to have used a condom, indicating that they may not perceive themselves as being at risk of contracting HIV.

Variables within the behavioral component of susceptibility add another dimension to the increasingly complex and nuanced depiction of dynamics affecting the serostatus of women in India. Although it is possible that many participants may not have truthfully disclosed their sexual behavior prior to the NFHS-III, the findings indicate that most respondents engaged in little sexual behavior, with many having their first sexual experience of intercourse after marriage. This suggests that at this stage of the HIV epidemic in India, the transmission of HIV within the heterosexual population occurs through a minority of individuals engaging in risk-taking sexual behavior. Some HIV-infected individuals may unknowingly transmit HIV to their sexual partners who may abide by traditional sociocultural practices forbidding sex outside marriage. The

<sup>20</sup> Please see Appendix, Table A.9 for female participants' relationship to their last sexual partner and their serostatus.

<sup>21</sup> Please see Appendix, Table A.10 for female participants' recent sexual behavior and their serostatus.

<sup>22</sup> Please see Appendix, Table A.11 for female participants' use of condoms in their last act of sexual intercourse and their serostatus.

following section will further investigate the dynamics of HIV transmission through multivariate analysis of the behavioral predictors.

## 5.2 Multivariate Analysis of Behavioral Predictors of HIV Status

The objective of the multivariate analysis is to identify significant individual-level variables that are associated with HIV status within the female sample, controlling for the effect of other variables. As there were few variables to analyze, a two-step forced logistical regression model was used.<sup>23</sup> The first forced model tested when participants reported their sexual debut and this model yielded no significant results. Findings in the second step of the model were contradictory and unexpected. On the one hand, female participants who reported having recently had sex experienced lower odds of being HIV positive (OR<1, CI=0.31–0.65) in comparison to those who had no sexual activity. On the other hand, female participants who stated that they had two or more partners had an increased odds ratio (OR=4.71, CI=2.34–9.50) of being HIV infected than those who had only one sexual partner during their lifetime. Table 19 presents the intercept, Step 1, which includes a variable measuring when respondents first had intercourse, and Step 2, which comprises of variables measuring recent and lifetime sexual behavior.

**Table 19: Correlates of Behavioral Predictors of HIV Status**  
(weighted)

	Step 1	Step 2
Intercept	***0.00	***0.00
<b>Sexual behavior</b>		
<b>When respondents first had intercourse (first union)</b>		
Had intercourse prior to marriage	0.69 (0.37–1.1)	0.65 (0.35–1.23)
<b>Recent sexual activity (no sexual activity)</b>		
Recently had sex		***0.44 (0.31–0.65)
<b>Lifetime sexual partners (1)</b>		
2 or more		***4.71 (2.34–9.50)

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

## 6. MULTIVARIATE ANALYSIS OF MACROENVIRONMENTAL, MICRO-SOCIAL AND BEHAVIORAL PREDICTORS OF HIV STATUS

An overarching multivariate logistic model was created with the purpose of identifying which proximal and distal social structural predictors of susceptibility could in combination possibly impact female respondents' HIV status. This forced model was conducted in three steps, which tested variables within each dimension of susceptibility that had a significant ( $p < 0.05$ ) association with female participants' serostatus in previous bivariate and multivariate analyses.

The first model (Step 1) tested macroenvironmental predictors, which included: area of residence, rate of prevalence in states, level of education, wealth, employment status,

<sup>23</sup> Respondents who reported that they had never had sexual intercourse were excluded from this model.

religion, and marital status. All variables tested, apart from wealth, had a significant ( $p < 0.05$ ) association with female respondents' HIV status. Female participants who lived in urban areas ( $OR = 1.58$ ,  $CI = 1.02\text{--}2.46$ ) and in states with high levels of seroprevalence ( $OR = 4.06$ ,  $CI = 2.58\text{--}6.38$ ) displayed increased odds of being seropositive in comparison with their counterparts.

The second forced model (Step 2) tested variables that measured micro-social predictors of HIV transmission, which included respondents' attitudes to domestic violence and their awareness of the existence of HIV. Most variables incorporated into the previous model retained their significance, indicating that the macroenvironmental component of susceptibility has an ability to predict the HIV status of female participants. For instance, formerly married participants were 5.6 times more likely to be seropositive than those who had either never been or were currently married ( $OR = 6.05$ ,  $CI = 3.97\text{--}9.21$ ).

On the other hand, variables assigned to the micro-social component of susceptibility had less of an impact on female participants' serostatus in comparison to macroenvironmental predictors. Adding variables allotted to micro-social predictors to the second model (Step 2) marginally increased the amount of variance explained in the female sample from 9.7% to 11%. Furthermore, the only variable within the micro-social component of susceptibility which had a significant impact on female respondents' serostatus was their awareness of the existence of HIV/AIDS. Female participants who knew that HIV existed displayed increased odds of being HIV infected ( $OR = 2.82$ ,  $CI = 1.71\text{--}4.65$ ) in comparison to those who had never heard of the virus.

The third forced model (Step 3) tested variables which measured behavioral predictors of female participants' serostatus. These variables were female participants' reporting of recent sexual activity and the number of sexual partners they have had during their lifetime. As in the previous model, measuring only behavioral predictors, women who had two or more lifetime sexual partners were 4.21 times more likely to be HIV positive than those who had only one lifetime partner ( $OR = 4.38$ ,  $CI = 2.11\text{--}9.10$ ). These findings indicate that there is a possibility that there are some women who may have contracted HIV through their own sexual risk behavior, rather than that of their partner.

The most illuminating findings, however, are within the macroenvironmental and micro-social components of susceptibility. These results indicate that distal social structural factors related to educational opportunities and social status may mediate female participants' propensity to be HIV positive. It was found that female respondents who were formerly married ( $OR = 5.27$ ,  $CI = 3.07\text{--}9.04$ ), Hindu ( $OR = 2.35$ ,  $CI = 1.22\text{--}4.54$ ), or employed ( $OR = 1.45$ ,  $CI = 0.96\text{--}2.18$ ) showed significantly ( $p < 0.05$ ) increased odds of being seropositive compared to their counterparts. Moreover, female participants who had a low level of education were 2.26 times more likely to be HIV infected than those who had attended secondary or higher education institutions ( $OR = 2.27$ ,  $CI = 1.40\text{--}3.68$ ).

These multivariate results on socioeconomic status indicate that many female HIV-positive respondents could belong to disadvantaged groups that deprive them of educational opportunities. Other studies have illustrated that women with low levels of education displayed a heightened risk of contracting HIV (Rajesh et al. 2011; Van Rompay et al. 2008; Samuel et al. 2007). Silverman et al. (2008) noted that a lower proportion of female participants with a secondary level of education were seropositive, in comparison to those who had only attended primary school. Table 20 presents the intercept, with Step 1 including variables measuring micro-social predictors; Step 2 comprising variables evaluating macroenvironmental predictors; and Step 3 including measurements of individual behavioral predictors.

**Table 20: Correlates of All Predictors of HIV Transmission**  
(weighted)

	Step 1	Step 2	Step 3
<b>Intercept</b>	***0.00	***0.00	***0.00
<b>Macroenvironmental predictors</b>			
<b>Area of residence (rural)</b>			
Urban	*1.58 (1.02–2.46)	1.44(0.93–2.22)	1.42(0.92–2.19)
<b>States (low prevalence)</b>			
High prevalence	***4.06 (2.58–6.38)	***3.35(2.11–5.32)	***3.48(2.19–5.54)
<b>Level of education (secondary/higher)</b>			
No education/primary	**1.92(1.19–3.08)	***2.35(1.45–3.79)	***2.27(1.40–3.68)
<b>Wealth (poor/poorer/middle)</b>			
Richer/richest	1.54 (0.97–2.44)	1.32(0.84–2.08)	1.35(0.85–2.13)
<b>Employment (unemployed)</b>			
Employed	*1.55(1.03–2.32)	1.47(0.98–2.21)	*1.45(0.96–2.18)
<b>Religion (non-Hindu)</b>			
Hindu	*2.25(1.17–4.35)	**2.20(1.20–4.47)	**2.35(1.22–4.54)
<b>Marital status (never married/currently married)</b>			
Formerly married	***6.15(4.04–9.35)	***6.05(3.97–9.21)	***5.27(3.07–9.04)
<b>Micro-social predictors</b>			
<b>Agreed with any justification for domestic violence (no)</b>			
Yes		1.28(0.85–1.92)	1.28(0.85–1.92)
<b>Ever heard of HIV (no)</b>			
Yes		***2.82(1.71–4.65)	***2.87(1.74–4.75)
<b>Behavioral predictors</b>			
<b>Recent sexual activity (no sexual activity)</b>			
Recently had sex			0.91(0.55–1.46)
<b>Lifetime sexual partners (1)</b>			
2 or more			***4.38(2.11–9.10)

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

Finally, female participants who were living in states with a high prevalence of HIV (OR=3.48, CI=2.19–5.54) and were aware of the existence of HIV/AIDS (OR=2.87, CI=1.74–4.75) displayed increased odds of being HIV infected. These findings may corroborate previous bivariate and multivariate results, which suggest that living in areas with high levels of seroprevalence can increase one's susceptibility to HIV infection.

## 7. DISCUSSION

The results from this paper offer a complex and multi-layered profile of female HIV-positive participants. Bivariate results for macroenvironmental predictors of susceptibility reveal that WLHA were more likely to be older, employed in more poorly paid occupations, and have lower levels of education in comparison to women in the general population. Furthermore, many WLHA lived in regions of India with higher levels of seroprevalence and in urban areas of residence.

These findings could be indicative of wider social trends in the Indian population related to economic development, such as the possibility that many participants could belong to communities in transition that are vulnerable to various types of environmental and

social shocks (Agarwal 1990; Anyangwe et al. 2006; Devine and Wood 2010; Gota et al. 2011). These social environments could heighten women's susceptibility to the impact of HIV/AIDS by curtailing their opportunities for education or for more lucrative and stable employment.

Further bivariate analysis of macroenvironmental predictors reveals that female respondents' social status could have played a mediating role in the transmission of HIV within these social environments. There was a significantly ( $p < 0.001$ ) larger proportion of female HIV-positive participants who were widowed (23%), divorced (2%), and living separately from their partners (6%) in comparison to the general population. Although some female participants could have been widowed as a consequence of their spouses dying of HIV-related illnesses, these findings suggest that there was a possibility that some WLHA may have contracted HIV from their spouses.

Findings within the micro-social component of susceptibility indicate that there may be certain inter-relationship dynamics within WLHA marital partnerships that could have previously negatively affected their ability to avoid HIV infection. Female HIV-infected respondents were more likely to have experienced on a frequent basis controlling behavior, and emotional and physical violence on the part of their partner than the general population. These HIV-positive respondents also held more "traditional views" toward domestic violence with some believing that a husband is justified in beating his wife if she refuses to have sex with him. Hence, rather than being on the margins of society, as might be believed of those who engage in high-risk sexual behavior, most female HIV-positive participants seemed to come from "traditional" backgrounds.

In contrast, behavioral predictors had little impact on female respondents' propensity to contract HIV. The majority of HIV-positive women partook in very few high-risk sexual activities. Moreover, many female HIV-infected respondents reported that they first had sexual intercourse when they were married. These findings indicate that distal and macroenvironmental structural components of susceptibility have a stronger impact on Indian women's HIV statuses than their own sexual risk behavior.

Multivariate analysis of variables within each dimension of susceptibility further substantiated findings from the bivariate analysis. Findings within the macroenvironmental component of susceptibility indicate that female participants' level of education, employment status, awareness of HIV, and the region of India where they lived had a significant ( $p < 0.05$ ) impact on propensity to contract HIV. When the effects of extraneous variables were controlled for, it was found that predictors associated with residing in social environments with high levels of HIV prevalence had the strongest impact on female respondents' serostatus. For instance, participants living in high-prevalence states ( $OR = 3.48$ ,  $CI = 2.19-5.54$ ) and those who were aware of the existence of HIV/AIDS ( $OR = 2.87$ ,  $CI = 1.74-4.75$ ) had increased odds of being HIV infected. These results illustrate that for many women in India, it could be the environments and communities they live in, rather than their specific behavior that leaves them at greater risk of contracting HIV.

## 8. CONCLUSIONS

Findings from the NFHS-III indicate that there are concentrations of HIV infection among women in certain areas of India. Over half of the WLHA lived in southern, high-prevalence states. Moreover, there was a significantly ( $p < 0.01$ ) higher rate of HIV prevalence among women living in urban areas (0.29%) than in rural areas (0.18%). These findings were similar to those of other studies conducted in Asia, which have highlighted high-risk sexual networks clustered around areas of economic

development. For instance, Doherty (2011) illustrated through network analysis that in areas of the People's Republic of China and the Russia Federation with networks of IDUs, HIV has spread into the general population via heterosexual transmission.

This indicates that there is a temporal and communal dynamic to the transmission of HIV in these areas, perhaps as a product of the epidemic being concentrated. Ruxrungtham et al. (2004) posited that the trajectory of HIV transmission in any given area in Asia was influenced by: (i) "variations in behavioral factors," such as the predominant risk behavior in that particular population; (ii) "geographic and population differences in biological factors," like male circumcision; and (iii) "the timing of HIV introduction into populations with high behavioral risk."

A few of these factors may have influenced the course of the HIV epidemic in India, which is geographically diverse. For instance, areas in which the virus was introduced in the early 1990s have higher rates of HIV infection (e.g., Tamil Nadu) in comparison with regions that have recently experienced an increase in HIV prevalence. These findings suggest that with sufficient time, HIV may propagate throughout a community and become increasingly prevalent.

## 9. POLICY IMPLICATIONS

Experts have argued that an effective evidence-based response has been adopted in the implementation in India of programs for the prevention of HIV transmission (Wilson and Claeson 2009). One method of prevention has been the "structural intervention" model. The objective of these interventions is to address the social structural determinants of disease transmission by creating enabling environments for those most susceptible to HIV infection (Gupta et al. 2008). The best example of this type of intervention in India is the Sonagachi project (Ghose et al. 2011). CSWs in the Kolkata red light district collectivized other female sex workers to mobilize against harassment and other forms of violence. Currently, this project provides a wide range of services for around 20,000 sex workers in its local area.

Findings in this study indicate that a large proportion of WLHA are traditional housewives who have little or no history of engaging in risky sexual behavior. Currently, there are no known interventions that directly address the needs of this population at risk. This could be because these women are difficult to target. However, findings in this paper imply that some of these WLHA may live in areas that have pockets of high HIV incidence, and therefore it could be fruitful to initiate structural interventions within these communities in order to empower female members with seropositive husbands to avoid HIV infection.

## 10. LIMITATIONS

One of the main weaknesses of the NFHS-III was that it was difficult to establish causality as it was a cross-sectional survey, meaning that the data was collected for only a single point in time. Furthermore, the NFHS-III was the only survey round in which participants' blood was tested for HIV, meaning that it is not possible to measure recent historical trends in HIV transmission in India.

An additional limitation was that the achieved sample size of HIV-positive women in the NFHS-III was only 191 cases. This was due to the fact that seroprevalence in India is relatively low at 0.36% (CI=0.27%–0.47%). Moreover, when relative weights were applied to the dataset, the sample size was further reduced to around 115. This small



number of female seropositive respondents meant that it was difficult to conduct highly complex statistical analyses that would produce significant or meaningful results, such as structural equation modeling. However, it was possible to use other less complex forms of modeling to illustrate correlations between multiple variables.

## REFERENCES

- Agarwal, B. 1990. Social Security and the Family: Coping with Seasonality and Calamity in Rural India. *The Journal Of Peasant Studies* 17(3): 341–412.
- Anyangwe, S. C., C. Mtonga, and B. Chirwa. 2006. Health Inequities, Environmental Insecurity and the Attainment of the Millennium Development Goals in Sub-Saharan Africa: The Case Study of Zambia. *International Journal of Environmental Research and Public Health* 3(3): 217–227.
- Avert. 2009. *Overview of HIV/AIDS in India*. <http://www.avert.org/aidsindia.htm> (accessed 12 May 2011).
- Barnett, T., and A. Whiteside. 2002. *AIDS in the Twenty-First Century: Disease and Globalization*. Basingstoke, UK: Palgrave Macmillan.
- Basu, A. M. 1999. Fertility Decline and Increasing Gender Imbalance in India, Including a Possible South Indian Turnaround. *Development and Change* 30(2): 237–263.
- Bojko, M. J., S. L. Schensul, R. Singh, J. A. Bureson, L. S. Moonzwe, and N. Saggurti. 2010. Sexual Health, Marital Sex, and Sexual Risk in Urban Poor Communities in India. *Asia-Pacific Journal of Public Health* 22(3 Suppl.): 144S–150S.
- Booyesen, F. R., and J. Summerton. 2011. Poverty, Risky Sexual Behavior, and Vulnerability to HIV Infection: Evidence from South Africa. *Journal of Health, Population, and Nutrition* 20(4): 285–288.
- Buseh, A. G., L. K. Glass, and B. J. McElmurry. 2002. Cultural and Gender Issues Related To HIV/AIDS Prevention in Rural Swaziland: A Focus Group Analysis. *Health Care for Women International* 23(2): 173–184.
- Chhabra, T., and P. Anand. 2010. *Building Linkages and Referrals: A Step towards Sustainability: Alliance India's Experience*. International HIV/AIDS Alliance: New Delhi, India
- Cleland, J. G., M. M. Ali, and V. Capo-Chichi. 1999. Post-Partum Sexual Abstinence in West Africa: Implications for AIDS-Control and Family Planning Programmes. *AIDS* 13(1): 125–131.
- Dallabetta, G. A., et al. 1993. High Socioeconomic Status Is a Risk Factor for Human Immunodeficiency Virus Type 1 (HIV-1) Infection but not for Sexually Transmitted Diseases in Women in Malawi: Implications for HIV-1 Control. *Journal of Infectious Diseases* 167(1): 36.
- Dandona, L., S. Kumar, G. A. Kumar, and R. Dandona. 2009. Economic Analysis of HIV Prevention Interventions in Andhra Pradesh State of India to Inform Resource Allocation. *AIDS* 23(2): 233–242.
- Das, S., A. Mukhopadhyay, and T. Ray. 2009. Economic Cost of HIV and AIDS in India. In *HIV and AIDS in South Asia: An Economic Development Risk*, edited by M. Haacker and M. Claeson. Washington, DC: World Bank.
- Dean, H. D., and K. A. Fenton. 2010. Addressing Social Determinants of Health in the Prevention and Control of HIV/AIDS, Viral Hepatitis, Sexually Transmitted Infections, and Tuberculosis. *Public Health Reports* 125(Suppl 4): 1–5.
- Devine, J., and G. Wood. 2010. Extreme Poverty and the Need for a New Political Settlement. The Case Of Bangladesh. Promoting Social Inclusion In South Asia: Policies, Pitfalls And The Analysis Of Welfare/Insecurity Regimes. University of Bath, 13-14, September 2010, pp. 1-22.

- Doherty, I., 2011. Sexual Networks and Sexually Transmitted Infections: Innovations and Findings. *Current Opinion in Infectious Diseases* 24(1): 70–77.
- Firth, J., et al. 2010. HIV-1 Seroprevalence and Awareness of Mother-to-Child Transmission Issues among Women Seeking Antenatal Care in Tamil Nadu, India. *Journal of the International Association of Physicians in AIDS Care* 9(4): 206.
- Gajendra, M., et al. 2011. Spatial Distribution and Characteristics of Injecting Drug Users in Five Northeastern States of India. *BMC Public Health*, 11(64) 1–11.
- Ghose, T., D. T. Swendeman, and S. M. George. 2011. The Role of Brothels in Reducing HIV Risk in Sonagachi, India. *Qualitative Health Research* 21(5): 587–600.
- Godbole, S., and S. Mehendale. 2005. HIV/AIDS Epidemic in India: Risk Factors, Risk Behavior and Strategies for Prevention and Control. *Indian Journal of Medical Research* 121(4): 356–368.
- Goldthorpe, J., and K. Hope. 1974. *The Social Grading Of Occupations: A New Approach and Scale*. London/New York: Oxford University Press.
- Gota, R., L. L. da Corta, N. Mascie-Taylor, and J. Devine. 2011. *Quantitative and Qualitative Analysis of the Changes in Extreme Poor Households (March 2010–March 2011)*. Dhaka, Bangladesh: SHIREE.
- Gregson, S., J. Todd. and B. Zaba. 2009. Sexual Behavior Change in Countries with Generalised HIV epidemics? Evidence from Population-Based Cohort Studies in Sub-Saharan Africa. *Sexually Transmitted Infections* 85(Suppl 1): i1–i2.
- Gupta, G. R., J. O. Parkhurst, J. A. Ogden, P. Aggleton, and A. Mahal. 2008. Structural Approaches to HIV Prevention. *The Lancet* 372(9640): 764–775.
- Gupta, K., Y. Vaidehi, and N. Majumder. 2010. Spatial Mobility, Alcohol Use, Sexual Behavior and Sexual Health among Males in India. *AIDS and Behavior* 14(Suppl 1): 1–13.
- International Institute for Population Sciences (IIPS) and Macro International. 2007. *National Family Health Survey (NFHS-3), 2005–2006: India. Vol: 1*. Mumbai: IIPS.
- Jaffrelot, C.. 2006. The Impact of Affirmative Action in India: More Political than Socioeconomic. *India Review* 5(2): 173–189.
- Jejeebhoy, S. J. 1998. *Wife-Beating in Rural India: A Husband's Right? Evidence from Survey Data*. *Economic and Political Weekly*. 33(15): 855–862.
- Kalasagar, M., B. Sivapathasundharam, and T. B. Einstein. 2006. Aids Awareness in An Indian Metropolitan Slum Dweller: A KAP (Knowledge, Attitude, Practice) Study. *Indian Journal Of Dental Research* 17(2): 66–69.
- Kalpagam, U. 2008. Marriage Norms, Choice and Aspirations Of Rural Women. *Economic and Political Weekly* 43(21): 53–63.
- Kambou, S. D., V. Magar, G. Hora, and A. Mukherjee. 2007. Power, Pleasure, Pain, and Shame: Assimilating Gender and Sexuality into Community-Centred Reproductive Health and HIV Prevention Programmes in India. *Global Public Health* 2(2): 155–168.

- King, R., J. Lifshay, S. Nakayiwa, D. Katuntu, P. Lindkvist, and R. Bunnell. 2009. *The Virus Stops with Me: HIV-Infected Ugandans' Motivations in Preventing HIV Transmission*. *Social Science and Medicine* 68(4): 749–757.
- Kirunga, C., and J. Ntozi. 1997. *Socio-Economic Determinants of HIV Serostatus: A Study of Rakai District, Uganda*. *Health Transition Review* 7(Suppl): 175–188.
- Kumar, M. S., H. K. Virk, A. Chaudhuri, A. Mittal, and G. Lewis. 2008. *A Rapid Situation and Response Assessment of the Female Regular Sex Partners of Male Drug Users in South Asia: Factors Associated with Condom Use During the Last Sexual Intercourse*. *International Journal of Drug Policy* 19(2): 148–158.
- Mahajan, A. 1990a. Sources of Family Tensions in Ancient India. In *Violence Against Women*, edited by S. Sood. Jaipur, India: Arihant.
- Mahajan, A., 1990b. Instigators of Wife Battering. In *Violence Against Women*, edited by S. Sood. Jaipur, India: Arihant.
- Mahanta, J., et al. 2008. Injecting and Sexual Risk Behaviors, Sexually Transmitted Infections and HIV Prevalence in Injecting Drug Users in Three States in India. *AIDS* 22(Suppl 5): S59–S68.
- Maman, S., et al. 2002. HIV-Positive Women Report More Lifetime Partner Violence: Findings from a Voluntary Counseling and Testing Clinic in Dar Es Salaam, Tanzania. *American Journal of Public Health* 92(8): 1331–1337.
- Ministry Of Home Affairs, Government Of India. 2001. Indian Census. Available: <http://www.censusindia.gov.in>
- Moily, P. C. 2011. Empowering Rural Women: Societal Outreach, Sharing and Caring. National Conference for ISRO Women, International Women's Day 2011 Millennial Makeover – A Paradigm Shift in Perception, Values and Ideas, 8 March, Bangalore, India.
- Munro, H. L., et al. 2008. Prevalence and Determinants of HIV and Sexually Transmitted Infections in a General Population-Based Sample in Mysore District, Karnataka State, Southern India. *AIDS* 22(Suppl 5): S117–S125.
- National AIDS Control Organisation (NACO). 2010. *Country Progress Report*. Delhi, India: United Nations General Assembly Special Session on HIV/AIDS (UNGASS).
- Nagamani, P. V., and N. Sharma. 2011. Empowerment of Rural Women in India- Societal Outreach through Education and Economic Independence. National Conference for ISRO Women, International Women's Day 2011 – Millennial Makeover – A Paradigm Shift in Perception, Values and Ideas. 8 March, Bangalore, India.
- Nagelkerke, N. J. D., et al. 2002. Modelling HIV/AIDS Epidemics in Botswana and India: Impact of Interventions to Prevent Transmission. *Bulletin of the World Health Organization* 80: 89–96.
- Newmann, S., et al. 2000. Marriage, Monogamy and HIV: A Profile of HIV-Infected Women in South India. *International Journal of STD & AIDS* 11(4): 250.
- Panchanadeswaran, S., S. C. Johnson, V. F. Go, A. Srikrishnan, S. Sivaram, S. Solomon, M. E. Bentley, and D. Celentano. 2008. Using the Theory of Gender and Power to Examine Experiences of Partner Violence, Sexual Negotiation, and Risk of HIV/AIDS among Economically Disadvantaged Women in Southern India. *Journal of Aggression, Maltreatment and Trauma* 15(3): 155–178.

- Olsen, W., and S. Mehta. 2006. Female Labour Participation in Rural and Urban India: Does Housewives' Work Count? *Radical Statistics* 93: 57.
- Pandey, A., et al. 2009. Improved Estimates of India's HIV Burden in 2006. *The Indian Journal of Medical Research* 129(1): 50–58.
- Perkins, J. M., K. T. Khan, S. Subramanian, and L. Myer. 2009. Patterns and Distribution of HIV among Adult Men and Women in India. *PloS One* 4(5): 308–1813.
- Pettifor, A., K. O'Brien, C. Macphail, W. C. Miller, and H. Rees. 2009. Early Coital Debut and Associated HIV Risk Factors among Young Women and Men in South Africa. *International Perspectives on Sexual and Reproductive Health* 35(2): 82–90.
- Pettifor, A. E., et al. 2005. Young People's Sexual Health in South Africa: HIV Prevalence and Sexual Behaviors from a Nationally Representative Household Survey. *AIDS* 19(14): 1525–1534.
- Rahbar, T., S. Garg, R. Tripathi, V. K. Gupta, and M. M. Singh. 2007. Knowledge, Attitude, Behavior and Practice (KABP) Regarding HIV/AIDS among Pregnant Women Attending PPTCT Programme in New Delhi. *The Journal of Communicable Diseases* 39(3): 179–184.
- Rajesh, K., M. Sanjay, and P. Samiran. 2011. Impact of Targeted Interventions on Heterosexual Transmission of HIV in India. *BMC Public Health* 11: 549.
- Ramesh, B. M., et al. 2008. Determinants of HIV Prevalence Among Female Sex Workers in Four South Indian States: Analysis of Cross-Sectional Surveys in Twenty-Three Districts. *AIDS* 22(Suppl 5): S35–S44.
- Rehle, T., O. Shisana, V. Pillay, K. Zuma, and W. Parker. 2007. National HIV Incidence Measures New Insights into the South African Epidemic. *South African Medical Journal* 97(3): 194–199.
- Ruxrungtham, K., T. Brown, and P. Phanuphak. 2004. HIV/AIDS in Asia. *The Lancet* 364(9428): 69–82.
- Saggurti, N., S. Schensul, and R. Verma. 2009. Migration, Mobility and Sexual Risk Behavior in Mumbai, India: Mobile Men with Non-Residential Wife Show Increased Risk. *AIDS and Behavior* 13(5): 921–927.
- Saggurti, N., et al. 2008. HIV Risk Behaviors among Contracted and Non-Contracted Male Migrant Workers In India: Potential Role of Labour Contractors and Contractual Systems in HIV Prevention. *AIDS* 22(Suppl 5): S127–S136.
- Saidel, T., et al. 2008. Baseline Integrated Behavioral and Biological Assessment among Most At-Risk Populations in Six High-Prevalence States of India: Design and Implementation Challenges. *AIDS* 22(Suppl 5): S17–S34.
- Samuel, N. M., et al. 2007. Acceptance of HIV-1 Education and Voluntary Counselling/Testing by and Seroprevalence of HIV-1 among, Pregnant Women in Rural South India. *The Indian Journal of Medical Research* 125(1): 49–64.
- Shah, I. 2006. Correlation of CD4 Count, CD4% and HIV Viral Load with Clinical Manifestations of HIV in Infected Indian Children. *Annals of Tropical Paediatrics* 26(2): 115–119.

- Shrotri, A., et al. 2003. Awareness of HIV/AIDS and Household Environment of Pregnant Women in Pune, India. *International Journal of STD and AIDS* 14(12): 835–839.
- Silverman, J. G., M. R. Decker, N. Saggurti, D. Balaiah, and A. Raj. 2008. Intimate Partner Violence and HIV Infection among Married Indian Women. *Journal of the American Medical Association* 300(6): 703–710.
- Srinivas, M. N. 1952. *Religion and Society amongst the Coorgs of South India*. Oxford, UK: Clarendon Press.
- UNAIDS and WHO. 2007. *AIDS Epidemic Update*. Geneva, Switzerland: UNAIDS.
- UNAIDS and WHO. 2009. *2009 AIDS Epidemic Update*. Geneva, Switzerland: UNAIDS.
- Van Rompay, K. K. A., P. Madhivanan, M. Rafiq, K. Krupp, V. Chakrapani, and D. Selvam. 2008. Empowering the People: Development of an HIV Peer Education Model for Low Literacy Rural Communities in India. *Human Resources for Health* 6: 6.
- Venkataramana, C. B. S., and P. V. Sarada. 2001. Extent and Speed of Spread of HIV Infection in India through the Commercial Sex Networks: A Perspective. *Tropical Medicine and International Health* 6(12): 1040–1061.
- Wilson, D., and M. Claeson. 2009. Dynamics of the HIV Epidemic in South Asia. In *HIV and AIDS in South Asia: An Economic Development Risk. Directions in Development: Human Development*, edited by M. Haacker and M. Claeson. Washington, DC: World Bank.
- Ziegler, J. L., et al. 1997. Risk Factors for Kaposi's Sarcoma in HIV-Positive Subjects in Uganda. *AIDS* 11(13): 1619–1626.

## APPENDIX

**Table A.1: Measures of Agricultural Work and Serostatus of Female Participants**  
(weighted)

Measure of Agricultural Work	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
<b>Respondent works for family, others, or self</b>				
For family member	9,907	43	23	34
For someone else	9,487	42	36	53
Self-employed	3,325	15	9	13
<b>Total</b>	<b>22,719</b>	<b>100</b>	<b>68</b>	<b>100</b>
<b>Respondent works at home or away*</b>				
At home	4,884	22	8	12
Away	17,821	78	59	88
<b>Total</b>	<b>22,705</b>	<b>100</b>	<b>67</b>	<b>100</b>
<b>Respondent employed all year/seasonal</b>				
All year	1,308	61	41	62
Seasonal	7,792	34	20	30
Occasional	1,107	5	5	8
<b>Total</b>	<b>10,207</b>	<b>100</b>	<b>66</b>	<b>100</b>
<b>Respondent's type of earnings for work***</b>				
Not paid	4,963	22	2	3
Cash only	12,646	56	53	79
Cash and kind	2,706	12	11	16
In kind only	2,403	10	1	2
<b>Total</b>	<b>22,718</b>	<b>100</b>	<b>67</b>	<b>100</b>

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: International Institute for Population Sciences (IIPS) and Macro International 2007.

**Table A.2: Measures of “Controlling Behavior” and Serostatus of Female Participants**  
(weighted)

Measure of Controlling Behavior	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
<b>Husband jealous if talking with other men</b>				
Does not happen	22,911	74	61	68
Does happen	7,761	25	28	31
Don't know	144	0.47	1	1.22
<b>Total</b>	<b>30,816</b>	<b>100</b>	<b>90</b>	<b>100</b>
<b>Husband accuses her of unfaithfulness***</b>				
Does not happen	28,300	92	69	77
Does happen	2,446	8	20	22
Don't know	67	0.22	11	1.22
<b>Total</b>	<b>30,813</b>	<b>100</b>	<b>90</b>	<b>100</b>
<b>Does not permit her to meet her female friends</b>				
Does not happen	25,970	84	72	81
Does happen	4,762	15	16	18
Don't know	84	0.27	1	1
<b>Total</b>	<b>30,816</b>	<b>100</b>	<b>89</b>	<b>100</b>
<b>Husband tries to limit her contact with family**</b>				
Does not happen	27,734	90	72	81
Does happen	3,006	10	16	18
Don't know	71	0.23	1	1
<b>Total</b>	<b>30,811</b>	<b>100</b>	<b>89</b>	<b>100</b>
<b>Husband insists on knowing where she is*</b>				
Does not happen	27,178	88	70	79
Does happen	3,515	11	18	20
Don't know	119	0	1	1
<b>Total</b>	<b>30,812</b>	<b>100</b>	<b>89</b>	<b>100</b>
<b>Husband doesn't trust her with money</b>				
Does not happen	25,358	82	71	79
Does happen	5,328	17	18	20
Don't know	124	0.4	1	1
<b>Total</b>	<b>30,810</b>	<b>100</b>	<b>90</b>	<b>100</b>

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.



**Table A.3: Measures of Attitudes toward Domestic Violence and Serostatus of Female Participants**  
(weighted)

Measure of Attitude toward Domestic Violence	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
<b>Wife beating justified if she goes out without telling him</b>				
Does not agree	36,715	70	74	65
Agrees	15,421	29	39	34
Don't know	598	1	1	1
Total	52,734	100	114	100
<b>Wife beating justified if she neglects the children***</b>				
Does not agree	33,836	64	55	48
Agrees	18,325	35	58	51
Don't know	568	1	1	1
Total	52,729	100	114	100
<b>Wife beating justified if she argues with him</b>				
Does not agree	35,942	68	70	61
Agrees	15,917	30	43	38
Don't know	868	2	1	1
Total	52,727	100	114	100
<b>Wife beating justified if she refuses to have sex with him</b>				
Does not agree	43,080	82	87	76
Agrees	7,375	14	23	20
Don't know	2,253	4	4	4
Total	52,708	100	114	100
<b>Wife beating justified if she burns the food**</b>				
Does not agree	41,251	78	79	69
Agrees	10,811	21	36	31
Don't know	655	1	0	0
Total	52,717	100	115	100
<b>Justifies hitting or beating: wife is unfaithful*</b>				
Does not agree	38,048	72	69	61
Agrees	13,302	25	41	36
Don't know	1,368	3	4	4
Total	52,718	100	114	100
<b>Justifies hitting or beating: wife is disrespectful to in-laws**</b>				
Does not agree	30,357	58	50	44
Agrees	21,527	41	62	54
Don't know	847	2	2	2
Total	52,731	100	114	100

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

**Table A.4: Severity of Violence Experienced from Spouse by Serostatus of Female Respondents**  
(weighted)

Severity of Violence Experienced	Serostatus of Female Participants			
	HIV negative		HIV positive	
	% within HIV status	Total number	% within HIV status	Total number
Less severe violence	36	30,802	45	88
Severe violence***	13	30,800	26	89

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

**Table A.5: Start of Domestic Violence with Spouse by Serostatus of Female Respondents**  
(weighted)

When Domestic Violence First Started (years)	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
Before union	83	1	0	0
0	1,965	17	11	26
1–4	7,487	64	16	38
5–9	1,664	14	12	29
10 or more	523	4	3	7
<b>Total</b>	<b>11,722</b>	<b>100</b>	<b>42</b>	<b>100</b>

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

**Table A.6: Female Participants' Knowledge of the Existence of HIV/AIDS, by Serostatus**  
(weighted)

Ever Heard of AIDS	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
Yes	32,621	62	91	79
No	20,117	38	24	21
<b>Total</b>	<b>52,738</b>	<b>100</b>	<b>115</b>	<b>100</b>

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

**Table A.7: Female Participants' Knowledge of the ABC Method of HIV Prevention, by Serostatus**  
(weighted)

Knowledge of ABC Method of HIV Prevention	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
<b>Abstinence</b>				
Yes	21,637	66	63	70
No/Don't know	10,956	34	27	30
Total	32,593	100	90	100
<b>Limiting sexual partners</b>				
Yes	23,905	73	60	66
No/Don't know	8,704	27	31	34
Total	32,609	100	91	100
<b>Use condoms</b>				
Yes	19,530	60	53	58
No/Don't know	13,075	40	38	42
Total	32,605	100	91	100
<b>Count of ABC method</b>				
0	5,407	17	14	15
1	4,531	14	13	14
2	7,416	23	28	31
3	15,220	47	36	40
Total	32,574	100	91	100

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

**Table A.8: Female Participants' Serostatus and Knowledge of Ways to Avoid HIV**  
(weighted)

Ways to Avoid HIV, Spontaneously Told by Participant	Serostatus of Female Participants			
	HIV negative		HIV positive	
	% within blood test result	Total number	% within blood test result	Total number
Abstinence	9	32,613	3	91
Use condoms	22	32,612	20	91
Limiting sexual partners	21	32,612	14	90
Avoid sex with prostitutes	7	32,613	8	90
Avoid sex with homosexuals	0.2	32,613	1	91
Avoid blood transfusions	15	32,613	13	91
Avoid injections	12	32,613	11	91
Avoid kissing	67	32,613	68	91
Avoid mosquito bites	67	32,613	68	91
Avoid sexual partners with many partners	1	32,613	0	91
Avoid sex with intravenous drug users	2	32,613	1	91
Avoid sharing razor blades with AIDS patients	3	32,613	2	91
Avoid IV drip	1	32,613	1	91
Use blood only from relatives	64	32,613	62	91
Use only new/sterilized needles	18	32,612	14	91
Other responses	2	32,613	1	91
<b>Knows of ways to avoid HIV</b>				
Knows ways	49		55	
Does not know ways	51	32,618	45	91

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

**Table A.9: Female Participants' Relationship to Last Sexual Partner and Their Serostatus**  
(weighted)

Relationship to Last Sexual Partner	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
Spouse	37,742	99.8	77	95
Someone other than spouse	86	0.2	4	5
<b>Total</b>	<b>37,828</b>	<b>100</b>	<b>81</b>	<b>100</b>

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

**Table A.10: Recent Sexual Activity and Serostatus of Female Participants**  
(weighted)

Recent Sexual Activity	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
Never had intercourse	10,712	20	4	3
Active in last 4 weeks	29,059	55	55	49
Not active in last 4 weeks, postpartum abstinence	1,429	3	4	3
Not active in last 4 weeks, not postpartum abstinence	11,497	22	52	45
<b>Total</b>	<b>52,697</b>	<b>100</b>	<b>115</b>	<b>100</b>

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.

**Table A.11: Female Participants' Use of Condoms During Last Sexual Intercourse and Serostatus**  
(weighted)

Last Intercourse Used Condom	Serostatus of Female Participants			
	HIV negative		HIV positive	
	Count	%	Count	%
Yes	2,310	6	2	2
No	35,519	94	79	98
<b>Total</b>	<b>37,829</b>	<b>100</b>	<b>81</b>	<b>100</b>

Note: \*\*\* =  $p < 0.005$ , \*\* =  $p < 0.01$ , and \* =  $p < 0.05$ .

Source: IIPS and Macro International 2007.