

Appendix: HIV refusal rates

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This appendix considers the possibility that refusal rates in the DHS are driving the empirical results presented in the paper. There is a great deal of attrition due to refusal and otherwise missing data; for couples, where data is missing if at least one member of the couple does not have an HIV test result, this number is 25-37% across the five countries (presented in table 7a). For women, the rate is lower, ranging from 12-25% (presented in table 8a). Of course, in the couple data, some of the missing observations are due to absent spouses, and in both data sets failure to test may be due to equipment difficulties rather than true refusal. Still, we need be concerned about the endogeneity of refusal possibilities throughout.

Table 7a presents marginal effects from a probit of a couple missing at least one testing observation on marital tenure categories, five-year age group dummies and five-year spousal age group dummies, similar to table 7 in the main paper. In all cases, the omitted category is women married 0-5 years. Most point estimates are negative, and some are significant, suggesting that women who have been married longer are less likely to fail to jointly take the test with their spouse than women who have recently become married. However, predictive power is in general low, as revealed through fairly low Pseudo R^2 statistics. Table 8a repre-

sents marginal effects from a probit of an individually missing test result on the explanatory variables of table 8 from the main paper, while table 9a presents these probit marginal effects where the explanatory variables are those in table 9 in the main paper. Once again, some variables are significantly associated with missing test results, though the patterns are not robust across countries and explanatory power is low.

Given that the frequency of missing data is higher than the HIV prevalence in most of these countries, the worst-case scenario can destroy any correlation in the existing data. As such, the approach used here is to make some extreme assumptions and demonstrate that the data is robust to those extreme assumptions. In particular, I assume alternately that all refusers are HIV-positive, or that all are HIV-negative. This approach should reassure us if we believe that refusers' HIV status does not covary with the other explanatory variables considered here. That is, the underlying distribution of HIV-risk may be related to refusal status and may be different across, for example, women of different marital tenures. However, if they follow similar decision rules so that the fraction of refusers who are infected is similar across groups, then analysis under these extreme assumptions should be reassuring. Tables 7b and 7c present the couples analysis under these extreme assumptions. Though the predicted overall prevalence changes rather sharply, the results are extremely consistent across the two specifications and with the couples analysis in the paper. Similarly, tables 8b and 8c present the individual analysis from the paper under these alternate extreme assumptions. Here, if all missing data are imputed to be HIV positive, then the protective effect of delaying sexual initiation loses its precision; otherwise, results remain extremely similar under these strong assumptions. Finally, tables 9b and 9c present the estimation equation in Table 9 from the main paper, where we compared the effects of a long singlehood

on HIV and determined that this effect existed only for the recently married. Once again, the results from the main paper hold under either extreme assumption. We can be reassured in the analysis if we think that, though refusal rates may change with explanatory variables, those who refuse are similar with respect to them.

Similarly, since the focus of analysis is in demonstrating that couples and women with longer marital tenures are less likely to be affected (or that women who are single longer are more likely to be infected), the results in the paper are upheld if refusers resemble non-refusers in the covariance of HIV-status with marital tenure or single tenure. Moreover, they are conservative if women with longer marital tenures who refuse to take the test are less likely to be infected than their recently married peers. This could happen if, for example, women who have been married longer have more to fear from a positive result, and so refuse to take the test if they believe that they have HIV with even a low probability, while women who were more recently married only refuse to take the test if they are very likely to be infected. On the other hand, if women who refuse and who have been married longer are substantially more likely to be infected, than analysis is not robust to refusal.

Missing test: Couples Years Married	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
5-9	-0.016 (0.04)	0.026 (0.04)	-0.017 (0.04)	-0.048** (0.02)	0.014 (0.03)
10-14	-0.020 (0.04)	-0.034 (0.05)	-0.090* (0.05)	-0.047 (0.03)	-0.086** (0.03)
15+	-0.063 (0.05)	-0.024 (0.06)	-0.098 (0.07)	-0.118*** (0.03)	-0.095** (0.04)
N	1830	1810	1848	3250	3764
Pseudo R-Sq	0.009	0.012	0.033	0.021	0.046
DepVar Mean	0.322	0.246	0.414	0.265	0.372
Year	2003	2004	2004	2003	2005/06

Table 7a: Missing test: Couples

Presents probit marginal effects from the probability of at least one member of the couple having a missing test result on dummies for marital tenure categories (as these are dummies, coefficients represent a move from 0 to 1).

Refusers are Pos Yrs Married	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
5-9	0.016 (0.04)	0.016 (0.06)	0.039 (0.04)	0.094*** (0.03)	0.085*** (0.03)
10-14	0.070 (0.05)	0.150* (0.08)	0.188*** (0.05)	0.102*** (0.04)	0.194*** (0.04)
15+	0.119* (0.07)	0.169* (0.10)	0.156** (0.07)	0.218*** (0.04)	0.294*** (0.05)
N	1422	887	1587	2587	2579
Pseudo R-Sq	0.01	0.024	0.015	0.015	0.028
DepVar Mean	0.569	0.427	0.503	0.647	0.424
Year	2003	2004	2004	2003	2005/06

Table 7b: Concurrent Negative with Positive Refusers

Assumes all missing tests are HIV-positive, and presents probit marginal effects from the probability of both members of the couple being HIV-negative on dummies for marital tenure categories (as these are dummies, coefficients represent a move from 0 to 1). Dummies for 5-year age group and spousal age group are also included.

Refusers are Neg Years Married	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
5-9	0.025 (0.02)	0.017 (0.05)	0.037* (0.02)	0.035*** (0.01)	0.054*** (0.02)
10-14	0.060*** (0.02)	0.081 (0.06)	0.098*** (0.02)	0.047*** (0.01)	0.076*** (0.02)
15+	0.081*** (0.02)	0.122 (0.08)	0.090*** (0.03)	0.066*** (0.01)	0.151*** (0.03)
N	1420	883	1637	2553	2705
Pseudo R-Sq	0.048	0.032	0.042	0.029	0.058
DepVar Mean	0.923	0.709	0.892	0.934	0.821
Year	2003	2004	2004	2003	2005/06

Table 7c: Concurrent Negative and Negative refusers

Assumes all missing tests are HIV-negative, and presents probit marginal effects from the probability of both members of the couple being HIV-negative on dummies for marital tenure categories (as these are dummies, coefficients represent a move from 0 to 1). Dummies for 5-year age group and spousal age group are also included.

Missing test: Individ	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
Age 1st Sex	0.007* (0.00)	0.004 (0.00)	0.001 (0.01)	0.002 (0.00)	0.007** (0.00)
Age 1st Married	0.001 (0.00)	0.004 (0.00)	0.006 (0.01)	0.000 (0.00)	-0.001 (0.00)
Spouse Age Gap	0.000 (0.00)	0.000 (0.00)	-0.001 (0.00)	0.002*** (0.00)	-0.001 (0.00)
Mean Prev	-0.022 (0.08)	0.197*** (0.04)	-0.022 (0.06)	0.263*** (0.08)	0.085 (0.05)
N	1729	1660	1675	3221	3590
R-sq (adj. or ps)	0.005	0.025	0.002	0.009	0.004
Dep. Var. Mean	0.182	0.139	0.25	0.123	0.152
Year	2003	2004	2004	2003	2005/06

Table 8a: Missing Tests and Single duration

Presents probit marginal effects for married women where the dependent variable is a missing test result, and independent variables follow those in table 8.

Refusers are Pos	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
	Individ	Individ	Individ	Individ	Individ
Age 1st Sex	0.001 (0.00)	-0.006 (0.01)	-0.006 (0.01)	0.001 (0.00)	-0.001 (0.00)
Age 1st Married	0.009*** (0.00)	0.024*** (0.01)	0.014** (0.01)	0.003* (0.00)	0.015*** (0.00)
Spouse Age Gap	0.001 (0.00)	0.001 (0.00)	0.002 (0.00)	0.003** (0.00)	0.003* (0.00)
Mean Prev	0.235*** (0.08)	0.214*** (0.06)	0.201*** (0.06)	0.639*** (0.08)	0.199*** (0.07)
N	1729	1660	1675	3221	3590
Pseudo R-sq	0.011	0.02	0.009	0.025	0.012
Mean	0.237	0.361	0.33	0.163	0.291
Year	2003	2004	2004	2003	2005/06

Table 8b: HIV on Single Duration with Pos. Refusers

Presents probit marginal effects of HIV infection on Table 8 covariates under the assumption that all missing tests are positive

Refusers are Neg	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
	Individ	Individ	Individ	Individ	Individ
Age 1st Sex	-0.004** (0.00)	-0.009* (0.01)	-0.007** (0.00)	0.000 (0.00)	-0.007** (0.00)
Age 1st Married	0.006*** (0.00)	0.018*** (0.01)	0.006** (0.00)	0.002*** (0.00)	0.014*** (0.00)
Spouse Age Gap	0.001 (0.00)	0.001 (0.00)	0.002* (0.00)	0.000 (0.00)	0.003*** (0.00)
Mean Prev	0.181*** (0.03)	-0.003 (0.05)	0.171*** (0.03)	0.278*** (0.04)	0.113** (0.05)
N	1728	1655	1675	3221	3590
Pseudo R-sq	0.061	0.01	0.05	0.069	0.019
Mean	0.056	0.223	0.079	0.04	0.139
Year	2003	2004	2004	2003	2005/06

Table 8c: HIV on Single Duration with Neg. Refusers

Presents probit marginal effects of HIV infection on Table 8 covariates under the assumption that all missing tests are negative

Missing test: Individ	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
Years Single*	-0.007	0.009*	0.004	0.003	-0.020**
Married 0-4 yrs	(0.005)	(0.005)	(0.007)	(0.002)	(0.008)
Years Single *	-0.001	0.005	0.009	0.004**	0.006
Married 5-9 yrs	(0.006)	(0.007)	(0.009)	(0.002)	(0.004)
Years Single *	-0.002	-0.002	-0.004	0.001	-0.003
Married 10-14 yrs	(0.008)	(0.009)	(0.013)	(0.003)	(0.007)
Years Single *	0.007	0.005	0.018	-0.001	0.000
Married 15+ yrs	(0.006)	(0.009)	(0.013)	(0.003)	(0.006)
Observations	1742	2299	1868	5267	3766
Pseudo R2	0.003	0.005	0.004	0.002	0.003
Mean HIV	0.183	0.136	0.262	0.134	0.149
Year	2003	2004	2004	2003	2005/06

Table 9a: Missing tests and Years Single

Presents probit marginal effects for married women where the dependent variable is a missing test result, and independent variables follow those in table 9.

Refusers are Pos	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
Years Single*	0.003	0.042***	0.008	0.013***	0.022***
Married 0-4 yrs	(0.005)	(0.009)	(0.008)	(0.004)	(0.006)
Years Single *	0.011*	0.019	0.027**	0.009**	0.016***
Married 5-9 yrs	(0.006)	(0.014)	(0.011)	(0.004)	(0.006)
Years Single *	0.000	0.020	0.001	-0.001	0.010
Married 10-14 yrs	(0.009)	(0.013)	(0.013)	(0.006)	(0.008)
Years Single *	0.009	-0.008	0.013	-0.006	-0.001
Married 15+ yrs	(0.006)	(0.018)	(0.014)	(0.008)	(0.008)
Observations	1742	1660	1675	3219	3766
Pseudo R2	0.005	0.017	0.006	0.006	0.009
Mean HIV	0.239	0.361	0.33	0.163	0.289

Table 9b: HIV on Years Single with Pos. Refusers

Presents probit marginal effects of HIV infection on years single by marital tenure under the assumption that all missind tests are positive. Dummies for five year marital tenure categories are also included.

Refusers are Neg	Kenya	Lesotho	Malawi	Tanzania	Zimbabwe
Years Single*	0.005***	0.027***	0.008*	0.006***	0.026***
Married 0-4 yrs	(0.002)	(0.007)	(0.004)	(0.002)	(0.004)
Years Single *	0.007***	0.005	0.011**	0.006***	0.009**
Married 5-9 yrs	(0.003)	(0.012)	(0.005)	(0.002)	(0.004)
Years Single *	0.003	0.016	0.005	0.000	0.011**
Married 10-14 yrs	(0.005)	(0.010)	(0.007)	(0.003)	(0.005)
Years Single *	0.003	-0.016	0.001	0.004	-0.001
Married 15+ yrs	(0.003)	(0.017)	(0.008)	(0.003)	(0.007)
Observations	1741	1655	1675	3219	3766
Pseudo R2	0.045	0.015	0.013	0.021	0.025
Mean HIV	0.056	0.223	0.079	0.04	0.14

Table 9c: HIV on Single Duration with Neg. Refusers

Presents probit marginal effects of HIV infection on years single by marital tenure under the assumption that all missind tests are negative. Dummies for five year marital tenure categories are also included.