Circumcision, Information, and HIV Prevention

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Abstract

Despite that fact that male circumcision may be an important HIV prevention strategy, many countries have been slow at adopting or promoting male circumcision as a core HIV prevention strategy. One concern is that circumcised men may engage in riskier sex after learning that they are less at risk. Among a sample of 1250 rural circumcised and un-circumcised Malawian men ages 25 – 40, we randomly allocated the information about HIV transmission risk and male circumcision. We then sold condoms to measure the demand for safe sex in response to learning the new information. Only 41 percent of circumcised men and 22 percent of uncircumcised men have the correct prior belief regarding the link between HIV and circumcision. We find that men respond to the information by increasing the demand for safe sex but we find no evidence that circumcised men reduce their demand for condoms after learning about the differential risk. Further research is needed on the demand for circumcision and the factors that could motivate men and boys to get circumcised as well as longer-term analysis of behavioral responses. Data to be collected in September 2009 will help yield insight into this.

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1 Introduction

Despite the substantial effort in the past decade by multi-national organizations, governments and non-governmental organization, HIV/AIDS continues to spread (USAID 2005). Recently, attention has been placed on male circumcision as a potential HIV prevention strategy. Randomized control trials in three countries, South Africa, Kenya, and Uganda, provided evidence that male circumcision is up to 60 percent effective in reducing transmission risk (Auvert B 2005; NIH 2006).[1]

While the medical evidence points to male circumcision as a viable prevention strategy for reducing the spread of HIV, recent debates have resulted in inconclusive and ambiguous policy recommendations. In particular, there are several open issues: how does a country scale-up the provision of circumcision services safely? What is the demand for male circumcision and how can organizations target or alter this demand efficiently and ethically? What is the behavioral response to learning that male circumcision is protective against infection? Importantly, several countries, have made no policy recommendations and national health officials have noted the need to "proceed with caution" because of the ambiguous effect of the impact of the information about HIV and circumcision. Thus, potentially life-saving information has been systematically withheld from widespread dissemination because of the lack of understanding of the behavioral effects of providing the information. This paper attempts to address how individuals respond to the information that circumcision reduces risk of HIV infection on their demand for condoms, a proxy for the demand for safe sexual behavior.

Several theoretical models posit how information about HIV risk affects individuals' sexual behavior. One model predicts that individuals with higher beliefs of HIV risk will engage in safer sexual

[1] Several mechanisms may account for why male circumcision reduces a man's risk of HIV infection. Because the foreskin's surface has more immune cells vulnerable to HIV infection than the external surface, it may promote entry of the virus. The foreskin may also allow the HIV virus to remain on the surface of the penis for a longer period of time. In this moist environment, this could allow the virus to survive longer, potentially increasing the risk of infection. Small tears in the foreskin as a result of intercourse could also promote entry of the virus. Also, after circumcision, the penile shaft and glans develops more epithelial keratinization, a process which may make the penis less susceptible to the virus. Circumcision removes Langerhans cells from the underside of the foreskin which causes hardening of the surface and promotes rapid drying (Szabo and Short 2000).

behavior (Philipson 2000). This has been examined empirically by a number of researchers who find a general pattern supporting this model (Francis 2007; Oster 2007).[2] Related to this argument, those with lower perceived risks of infection will engage in riskier sexual behavior. *Uncircumcised* men in our study who learn (new) information about HIV and circumcision may learn that they are more at risk than they had believed; if they re-optimize their behavior, these individuals may practice safer sex. On the other hand, *circumcised* men who learn the information learn that they are at less risk and believing they are safer, may practice riskier sex. Theoretically, information may have the strongest effect when it is new. That is to say, we might expect little behavioral change among those whose prior beliefs were identical to the information provided. We discuss the initial beliefs about the relationship between HIV and circumcision among respondents in our study below as well as present analysis separately among those who had correct and incorrect prior beliefs.

We interviewed a sample of 1250 men ages 25 to 40 living in rural Malawi and then randomly allocated information about circumcision and HIV. We then sold men condoms and recorded their purchases. This paper examines how the purchase of condoms is influenced by the new information about circumcision. In our data, less than half of the men have the correct prior regarding the link between HIV and circumcision. After learning about the correct link between circumcision and HIV infection, we find an increase in the likelihood of purchasing condoms by 17 percentage points (or 65 percent). We find no difference in the behavioral response to information across circumcision status; this could indicate that men who are already circumcised will not reduce safe sexual behavior after learning they are less at

[2] Another model based in psychology or behavioral economics suggest that increasing individuals' beliefs of infection may be counter-productive for motivating safe sexual behavior (Levine and Ross 2002). Instead of encouraging people to practice safer sexual behavior, having high beliefs of risk may encourage denial and fatalism (Daoreung 1997; Stein 1999; Crain 2005). Kaler argues that sexually active men in Malawi, who believe they are already infected with HIV, use this excuse to justify risky sexual activity (Kaler 2004). Another report of teenagers in several countries across Africa found that respondents reported "little point in [changing sexual behavior] since 'we are all dead already'" (Bennell 2003). In addition, a small but growing literature on the determinants and effects of beliefs about HIV on behavior indicates that individuals' sexual choices depend crucially on subjective expectations about the HIV prevalence and transmission rates. In a recent study most similar to ours, youth in Kenya were randomly told that older men (as opposed to younger men) were more likely to be infected with HIV (Dupas 2006). This information had a large effect on reducing the reported sexual activity of adolescent school girls with older men.

risk. On the other hand, the fact that there is no differential effects may also be due to a framing or media effect that could prime all respondents (circumcised and uncircumcised) to purchase more condoms after the information campaign. In addition to examining the impact of the information campaign, we also look at who gets circumcised, when and why as well as discuss the policy implications.

We proceed as follows: Section 2 outlines the data and experiment as well as descriptive data on circumcision. Section 3 presents the main results regarding the impact of information on condom purchases. Section 4 concludes.

2 Experimental Design, Data, and Econometric Strategy

2.1 Experimental Design

Our survey was conducted in October/November 2008 in Traditional Authority Kuntumanji in the Zomba district in Malawi. This is located in the Southern Region of Malawi and was selected as the study site as it has a very diverse population with a mixture of circumcised and uncircumcised men. It is a rural area that is situated between the main road that connects Zomba City and Machinga town and Lake Chirwa to the east. A two-stage sampling strategy was implemented. First, 70 villages were randomly selected into the sample, stratified on the distance of villages to the nearest mosque and church. Within each of these villages a full enumeration of members of each household was conducted. The second stage of sampling involved randomly selecting men ages 25 to 40 from within each village. To try to balance the sample across circumcision status, and because of the high correlation between religion and circumcision status in the aggregate data in the country, we stratified men by their religious affiliation (Christian or Muslim). In each village, we selected a maximum of 20 Christian and 20 Muslim men.

The sample consists of a total of 1228 male respondents. On average we have a total of 11.03 Christian and 6.83 Muslim respondents in each village who agreed to participate. While actual respondent refusals were very low, men in the area are very mobile making it difficult to find and survey all the

selected men. We do not find significant differences in the finding rate of the two religious groups. Of those sampled we found and interviewed 69 percent of Christians and 67 percent of Muslims who were initially listed on the enumeration list and who were randomly selected for the survey.

Half of the villages (35) were randomly assigned to the treatment group. All men in treatment villages were assigned the treatment. After the baseline survey, respondents who were in the treatment group were informed that circumcision is partially protective against HIV transmission. Interviewers went through an information sheet that explained about the three randomized control trials in Uganda, South Africa, and Kenya, as well as the results from these trials. They also discussed some of the medical reasons why circumcision is partially protective. Respondents were allowed to ask the interviewers questions during this discussion.

All individuals were given 30 Kwacha (approximately 30 cents) for their participation in the study. This occurred immediately after the baseline questionnaire for the control group and immediately after the provision of information for the treatment group. Each respondent was then offered the opportunity to purchase subsidized condoms: 5 Kwacha (5 cents) for a package of three condoms or 2 Kwacha (2 cents) for one condom (approximately half the price of the most widely available condoms). The number of condoms that were purchased was then recorded by each interviewer. On average, 34 percent of the men purchased at least one condom. Among those purchasing condoms, the average number of condoms purchased was 4.9 condoms. [3]

[3] Collecting accurate outcome measures on the demand for safe sex can be challenging given the sensitive nature of discussing sexual behavior. In studies that ask respondents to report their sexual behavior, such as number of sexual partnerships or extra-marital affairs and frequency of sex or condom use, it has been suggested that respondents tend to under-report sexual encounters and over-report preventive behaviors such as condom use or abstinence (Fenton, Johnson et al. 2001). Respondents may feel social pressure to report behavior they believe is acceptable, especially given that interviewers may themselves emphasize the importance of safe sexual practices. Due to these potential biases we have opted for using condom purchase as a proxy for the demand for safe sex. This method has been used in previous work by Thornton of providing respondents with a small financial endowment to purchase condoms at a reduced rate (Thornton 2008). Because individuals must then give up a small amount of money in order to purchase condoms, the number of condoms purchased at the time of the interview is one indicator of the demand for safe sex.

It is worth noting that the villages were randomly allocated to treatment and control villages independently of village characteristics and geography. Because of this, control villages could be located in close proximity to treatment villages leading to a possibility of information spillovers about circumcision from the treatment to the control respondents. If spillover effects were large enough, our comparison of condom purchases between control and treatment groups would be a downwardly biased estimate (Miguel and Kremer 2001). For this reason, to mitigate this effect of information spillovers on our results, all control group interviews were conducted before the treatment interviews.

On average, the total time for the baseline survey and condom sales was 42.5 minutes for the control group and 47.8 minutes for the treatment group; the treatment interviews were approximately 5.22 minutes longer than control group interviews. As interviewers became more familiar with the questionnaire the speed it took to complete it was reduced. Given that all control interviews were conducted prior to the treatment interviews the actual time allocated to the information script was probably longer than the 5.22 minutes due to learning-on-the job of the questionnaire. However, this gives some indication of a lower bound estimate of the time spent on providing information to the treatment group.

2.2 Baseline Characteristics and Exposure to Circumcision Information

Table 1 provides some important background statistics of the men in our sample. The men are on average 34 years old. Most are married (89 percent) and have had sex in the past year (96 percent). The respondents have an average of 2.9 children. The two majority tribes in the area are the Nyanja – which is similar to the Chewa ethnic group (40 percent) and the Yao (37 percent). The men have only had on average 5.8 years of schooling. This has important implications for potential risk of exposure to information about HIV and circumcision prior to the study.

Because this paper examines the effects of an information intervention, it is important to consider baseline beliefs of the relationship between HIV and circumcision and potential exposure to this information from other media sources. If everyone already had an existing underlying understanding that circumcision reduces the likelihood of HIV infection, then there would be no reason to believe that there would be any effect of an informational campaign on any measures of behavior. To examine this, we first describe the availability of the information about circumcision that was available to the public and the potential effects on our study. The baseline survey was conducted in October/November of 2008. Before the baseline survey, two national meetings sponsored by the National AIDS Commission were held in Malawi to discuss a national plan in relation to circumcision. After each of these meetings, several newspaper articles appeared, discussing the findings from the randomized controlled trials as well as the outcome of the national meetings. These newspaper accounts, which numbered fewer than six, called for "caution" and for "more research and guidance". In fact, over all, the messages on the linkage of circumcision and HIV prevention emanating from the government, the National AIDS Commission, and members of the public health community have been vague, infrequent, and narrowly disseminated.[4]

Although the information that circumcision has been found to lower the chances of HIV infection has been available to individuals in Malawi via radio and newspapers in a limited manner, we have reason to believe that the effects of receiving the information directly and individually from interviewers during this study will be stronger than the effects of merely having the information available.

First, the information may not have reached the sample respondents through newspapers or the radio. Our baseline data indicates that only 75 percent of our respondents could read, and of those who were literate, only 17 percent read the newspaper more than once per month. More of the respondents had

[4] After the baseline survey (between May – September 2009) there was at least one additional national meeting on circumcision. In addition, one national family planning provider, Banja La Mtsogolo, has begun scaling up male circumcision services in clinics across the country in urban centers. Despite their efforts, the government and press has not released information in a widespread manner.

access to the radio (53 percent report listening to the radio almost daily) or to television (47 percent report watching television more than once per month).

Second, even if respondents had access to information from other sources about the relationship between circumcision and HIV infection, we have reason to believe that the effects of receiving the information directly and individually from interviewers during this study will be stronger than the effects of merely having the information available in the general media. Research suggests that even among control subjects with prior exposure to this information via the mass media, their comprehension of the information would increase after receiving it directly from an interviewer (Guadagno and Cialdina 2002; Valley, Thompson et al. 2002; Guadagno and Cialdina 2007; Valley, Moag et al. 1998).

Lastly, our baseline data indicate that individuals have different beliefs about the relationship between HIV and circumcision, with the majority having the wrong baseline prior beliefs. Respondents were asked a variety of question which elicited their beliefs about this relationship. A set of questions asked respondents to list the possible advantages or disadvantages of circumcision. One option to the question about advantages was that circumcision reduced the risk of HIV infection; one option to the question about disadvantages was that circumcision increased the risk of HIV infection. When asked this, 39 percent of men stated that HIV increased the risk of infection while 18 percent believed that circumcision decreased the risk (The remaining did not state that it had an effect one way or another).[5] In the baseline study we find that only 41 percent of the circumcised men and 22 percent of the circumcised men believed that circumcision increases the chance of a man getting HIV/AIDS. The large majority of men felt that circumcised and uncircumcised men were equally likely to contract HIV (43 percent of

[5] These baseline distribution of beliefs are similar to other available data. In a population-based survey conducted in 2001 in Malawi, 32 percent of respondents thought that circumcision increased a man's chances of getting AIDS, 8 percent thought it decreased the chances, and 53 percent thought it would have no effect (the remaining said that they did not know; author's calculations, MDICP 2001). Another survey of youth in Malawi in 2006 found that 31 percent believed that circumcision was harmful, with half of these believing the practice was harmful because it increased risk of HIV infection (UNICEF 2006).

circumcised men; and 61 percent of uncircumcised men).[6] This suggests that (to the extent that we can accurately measure prior beliefs) there is scope for information as an intervention.

2.3 Circumcision

In order to study differential responses to the media information about HIV and circumcision, we compare condom purchases by those men who are already circumcised with those who are not circumcised. However, men who are circumcised in Malawi are quite different than those who are uncircumcised and it is worth briefly mentioning the background on circumcision in Africa, Malawi, and our data specifically.

Circumcision is not only one of the oldest surgical procedures in the world, with records of the practice dating back to pre-Egyptian times, it is also one of the most commonly practiced for both religious and non-religious reasons (Marck 1997; Doyle 2005). Studies have shown that overall, 62 percent of adult males in Africa are circumcised (Drain PK 2004). There is historical evidence of circumcision as a general practice in all areas of Africa, but especially among the Bantu-Language groups (comprising the largest linguistic group in Africa). Most often among Bantu speakers, male circumcision is associated with adolescent initiation schools and is seen as a rite of passage from childhood to manhood. Among certain groups, men must become circumcised before they can marry or participate in making community decisions (Marck 1997).

In Malawi, as in other African countries, circumcision is highly correlated with religion and ethnicity. According to the Malawi Demographic Health Survey in 2004, an average of 24 percent of men

[6] We also find that people have very high perceived probabilities of the risk of HIV transmission. When asked the question: "If 100 circumcised men slept with an HIV positive women last night how many of them would become HIV positive?" A similar question was asked in reference to uncircumcised men. On average circumcised respondents thought that the probability of infection was 80 percent for circumcised men and 91 percent for uncircumcised men. Uncircumcised men perceive the rate of infection for circumcised men to be 87 percent and 92 percent for uncircumcised men. Given that people perceive very high probabilities of perceived risk, it is possible that the response to the information could be minimal.

reported being circumcised. This is highly correlated with ethnic group, with the majority (86%) of the Yao ethnic group being circumcised, as well as a significant percentage of Lomwes (33%). Other ethnic groups have much lower rates of circumcision such as among the Chewas (9%) and Tumbukas (2%). Circumcision rates are also highly correlated with religion – approximately 93 percent of Yao's in Malawi are Muslim as opposed to less than 2 percent among other ethnic groups (DHS 2004). The Yao and the Lomwe typically practice initiation ceremonies for adolescent boys that include circumcision as well as rituals involving receiving instruction for future life as a man (Stannus and Davey 1913).[7]

Despite our attempts to stratify our sample by religious affiliation in order to have a balanced sample of circumcised and uncircumcised respondents, a considerable fraction of the men in our sample had already been circumcised (73.7 percent). Most Muslims (94.2 percent) were circumcised while a surprising large percentage (60.9) of Christians were also circumcised. The circumcised men are predominantly from one of 4 ethnic groups: Yao, Chewa, Lomwe and Nyanja. While 92.8 percent of all Yao's are circumcised, the proportion of Chewa (66.67 percent), Lomwe (56.65 percent) and Nyanja (65.66 percent) that are circumcised is significantly lower (Table 2). The observed rates of circumcision are significantly higher for Christians as well as the Chewa and Nyanja tribes in our data relative to that observed in national DHS data. This could be due to spillovers within villages – that is, Christians, Chewas, and Nyanjas living in mostly villages where there are more circumcisions may be more likely to circumcise their sons. Alternatively, if respondents practiced Islam as a child and were circumcised, but later converted to Christianity, we would also see a larger number of Christians who were circumcised in the data.[8]

2.4 Econometric Strategy

[7] Other groups in Malawi practice initiation ceremonies such as the Gule wankulu or virombo among the Chewa, although this does not involve circumcision.

[8] Most of the men cite religion or culture as the reason for why they were circumcised (89 percent). Related to this, the majority (92 percent) of circumcisions took place in the bush as part of the initiation rites.

To study the impact of information on condom purchases, we utilize the fact that the information about circumcision and HIV was randomized across villages. Our main empirical specification estimates:

$$(1) \qquad Condoms_{i,j} = \alpha + \beta Treatment_j + X_{i,j}{}'\mu + \varepsilon_{i,j}$$

where we examine the determinants of condoms purchased for individual i living in village j, as a function of being assigned to a treatment village and a vector of individual controls, X. In the analysis we cluster standard errors by village. Because of the randomization of the treatment, the error term is not correlated to treatment status (due to any unobservables or selection of individuals into having the information). We compare baseline statistics across treatment status which indicate that men in the treatment and control villages are not systematically different which is reassuring for our identification strategy and randomization (Table 3). Along some aspects, there are significant differences between treatment and control men – for example, respondents assigned to the control group are slightly wealthier as indicated by logged reported expenditures and number of assets. There are no differences across ethnicity or religious composition as can be expected as we stratified the randomization across religion. In addition, there is no difference by initial beliefs about the relationship between HIV and circumcision. By conducting control village interviews before treatment interviews, we prevent information from spreading from the treatment to the control (Miguel and Kremer 2001).

In addition to our main specification (1), we are interested in differential responses by circumcision status and by prior beliefs about the relationship between HIV and circumcision. We include indicator variables and examine interactions terms between these sub-group dummies and the treatment variable.

4 Results: Behavioral Responses to Information

We first examine the overall impact of being in the treatment group and receiving the information about HIV and circumcision. All men who received the treatment – both circumcised and uncircumcised men –

were 11 percentage points more likely to purchase condoms than men who did not receive the treatment. Treatment men bought 0.56 condoms more on average.

One possible interpretation of this result is that the information provided to the treatment men led individuals to purchase more condoms due to an increase in the demand for safe sex. However, we interpret this with caution. Theory would suggest an asymmetric response to information by both circumcision status, and by prior beliefs. Ignoring beliefs momentarily, overall, we might expect circumcised men learning the information to purchase fewer condoms and uncircumcised me learning the information to purchase more (or increase their demand to get circumcised). We examine potential differential effects of learning the information among men who are circumcised and those who are uncircumcised by examining the interaction of circumcision status and treatment. We find that circumcised men who receive the treatment are no less likely to purchase condoms than the uncircumcised men. This could indicate that circumcised men are not reducing their demand for risky sexual behavior in response to the information – which has important policy implications about the fears that circumcised men will believe they are safe and will practice riskier sex upon learning about the protective effects of circumcision.

On the other hand, an alternative interpretation of our results is that our information session had a media/framing effect that increased overall condom purchases as a result of additional information about HIV/AIDS, rather than as a result of the specific information about circumcision. There is a broad literature on the effects of priming and the media (See for example Zaller and Feldman). Given our current data and the experimental design, because the treatment group received both information about circumcision and priming, we cannot separate the "treatment effect" of receiving specific information about circumcision and HIV with a "media" effect. We are currently conducting lab experiments to disentangle these effects.

On average, circumcised men were more likely (7 percentage points) to purchase condoms than uncircumcised men regardless of their treatment status. This confirms self-reported data from the baseline survey in which circumcised men report using condoms more frequently than the uncircumcised men. In general, for a number of measures of sexual behavior, circumcised men report more risky sexual behavior (Table 2). On average, circumcised men had their first sexual encounter more than 6 months earlier than the uncircumcised men, and have had more partners over their life time as well as in the last month relative to the uncircumcised men. It may be that circumcised men somewhat compensate for this riskier behavior by using condoms more frequently than the uncircumcised men. Circumcised men are more likely to have ever used a condom (43 vs 38 percent) and have purchased more condoms in the last month relative to uncircumcised men.[9]

We next examine the impact of information controlling for their prior beliefs. We define incorrect prior as all individuals who do not know that circumcision reduces the risk of HIV transmission. This set of individuals includes three types of individuals – i) believe circumcision increases HIV risk; ii) believe circumcised and uncircumcised are at equal risk; and iii) have no prior belief (Don't know). We expect this set of individuals to respond to the information as it is this group of individuals that are learning something new. One challenge and potential limitation to the analysis is in measuring beliefs about HIV status. Other studies have found high correlation to survey questions about the likelihood of HIV infection and actual HIV status (Thornton 2008, Goldstein et al. 2008, Anglewicz and Kohler 2005, Delavande and Kohler 2007). Even so, there might be measurement error, lack of comprehension by respondents, or apprehension to share this information with interviewers.

We expect that the information should have differential effects by circumcision status. For circumcised men, that learn this new information (had incorrect prior) they learn that they are *more safe.* Therefore, we expect that circumcised men should reduce the number of condoms purchased.

[9] The difference in reported sexual behavior between circumcised and uncircumcised men may also relate to the finding in the DHS Malawi, that ethnic groups in Malawi which typically circumcise are those with higher rates of HIV infection.

Uncircumcised men who learn this new information learn they are less safe, and thus should purchase more condoms.

From Table 6, men receiving the information purchase more condoms than those that did not receive this information. Circumcised men that have the initial incorrect prior in the control group tend to purchase more condoms on average – approximately half an additional condom. This is a sensible result – these men think they are at higher risk than those that have the correct prior and therefore should exhibit a higher demand for safe sex. Also, circumcised men that received the information and had an incorrect prior tend to purchase fewer condoms than those with the correct prior. It is important to note that although there is a reduction in condom purchases for those treated with the incorrect priors they still purchase more condoms than those that do not receive the treatment with incorrect priors.

For uncircumcised men we find statistically insignificant results that suggest that those individuals receiving the treatment with incorrect priors tend to purchase less than those in the control group with incorrect priors. This is counter to what theory would predict, but the results are highly insignificant. A larger sample of uncircumcised men is required to assess whether this result would persist.

5 Conclusion and Future Directions

This paper presents results from a study that randomized information about the relationship between HIV and circumcision among already circumcised and uncircumcised men in rural Malawi. From a policy perspective the first point of contention is whether an information campaign has the potential to affect behavior. A recurring theme in the results presented here is that there is scope for information as part of an HIV prevention strategy. First, we found that rural Malawian men are not well informed about the relationship between circumcision and HIV transmission risk. We then showed that by sharing this information, there was a large increase in the likelihood of purchasing condoms. This effect was similar

among both circumcised and uncircumcised men as well as across those with reported differing prior beliefs. To the extent that purchasing condoms indicates the demand for safe sex, we show that this demand increases among those who are uncircumcised, as theory might predict. We also find that there was no indication of a reduction in the demand for condoms among already circumcised men. This could be due to a framing effect of the study. We are currently conducting laboratory experiments in Malawi to address this. In short, we find no evidence that in the short run, withholding this information will result in negative behavioral responses. We will study effects of the information on the demand for adult and child circumcisions in future research with a wave of data to be collected in October 2009.

Table 1: Summary Sample Sizes and Characteristics

Panel A: Sample Description		**Total**	**Treatment**	**Control**
Villages		70	35	35
Respondents:	Total		631	619
	Christian	772	398	374
	Muslim	478	233	245

Panel B: Summary Statistics		**Obs**	**Mean**	**SD**
Demographics:	Age	1229	34.107	6.847
	Married	1250	0.888	0.306
	Years of Education	1250	0.960	3.626
	Years of Education (if any)	1250	5.781	3.082
	Circumcised	1221	0.737	0.441
	Literate in Chichewa	1228	0.750	0.433
	Literate in English	1221	0.343	0.483
Tribe:	Chewa	1228	0.050	0.219
	Lomwe	1228	0.169	0.375
	Nyanja	1227	0.409	0.492
	Yao	1228	0.355	0.479
Religion:	Christian	1228	0.539	0.499
	Muslim	1228	0.389	0.488
Wealth:	Income (logged)	1250	0.575	1.044
	Assets	1250	0.493	2.372
	Expenditures (logged)	1250	0.254	0.820
	Farmer	0	0.414	0.485
	Salaried	0	0.410	0.339
	Self-Employed	0	0.382	0.479
Sexual Behavior:	Polygamist	0	0.299	0.149
	Age at sexual debut	1189	17.116	3.403
	Had sex in the last month	1211	0.755	0.430
	Had sex in the last week	1228	0.578	0.494
	Number of sexual partners across lifetime	1214	4.294	4.542
	Number of sexual partners in last 12 months	1216	1.115	0.764
	Ever used a condom	1112	0.414	0.493
	Number of condoms bought in last month	1214	0.543	2.515
Attitudes/Beliefs:	Currently No likelihood of HIV	1228	0.581	0.494
	Have had an HIV test	1228	0.497	0.500
	Currently Low likelihood of HIV	1228	0.270	0.444
	Disadvantage of circumcision - increases HIV risk	1228	0.389	0.488
	Advantage of circumcision - decreases HIV risk	1228	0.182	0.386
	Circumcision has no adv/disadv on HIV risk	1228	0.428	0.495
	Circumcised men less likely to contract HIV	1214	0.321	0.467
	Circumcised men more likely to contract HIV	1214	0.025	0.155
	Circumcised and uncircumcised men equally likely to contract	1214	0.654	0.476
	Circumcision increases risk of contracting HIV	1228	0.126	0.332
	Circumcision decreases risk of contracting HIV	1228	0.362	0.481
	Circumcised and uncircumcised equivalent risk of HIV	1228	0.480	0.500
Outcome variable:	Bought any condoms	1212	0.344	0.475
	Number of condoms bought	1206	1.654	3.380
	Number of condoms bought (conditional on buying any)	411	4.854	4.242

Table 2: Baseline Characteristics Across Circumcision Status

		Circumcised	Uncircumcised
Demographics:	Age		
	Married	31.532	32.599
	Years of Education	0.906	0.867
	Years of Education (if any)	5.608	6.611
	Circumcised	6.446	7.366
	Literate in Chichewa	0.730	0.804
	Literate in English	0.338	0.455
Tribe:	Chewa	0.046	0.066
	Lomwe	0.129	0.277
	Nyanja	0.365	0.524
	Yao	0.446	0.108
Religion:	Christian	0.444	0.792
	Muslim	0.497	0.102
Wealth:	Income (logged)	9.135	9.112
	Assets	4.439	4.446
	Expenditures (logged)	9.165	9.215
	Farmer	0.612	0.644
	Salaried	0.128	0.142
	Self-Employed	0.368	0.321
Sexual Behavior:	Polygamist	0.023	0.021
	Age at sexual debut	16.937	17.657
	Had sex in the last month	0.759	0.738
	Had sex in the last week	0.583	0.548
	Number of sexual partners across lifetime	4.471	3.923
	Number of sexual partners in last 12 months	1.115	1.144
	Ever used a condom	0.425	0.380
	Number of condoms bought in last month	0.560	0.483
Attitudes/Beliefs:	Currently No likelihood of HIV	0.587	0.545
	Have had an HIV test	0.501	0.467
	Currently Low likelihood of HIV	0.253	0.304
	Disadvantage of circumcision - increases HIV risk	0.368	0.443
	Advantage of circumcision - decreases HIV risk	0.219	0.081
	Circumcision has no adv/disadv on HIV risk	0.413	0.476
	Circumcised men less likely to contract HIV	0.355	0.226
	Circumcised men more likely to contract HIV	0.020	0.038
	Circumcised and uncircumcised men equally likely to contrac	0.625	0.737
	Circumcision increases risk of contracting HIV	0.131	0.108
	Circumcision decreases risk of contracting HIV	0.411	0.217
	Circumcised and uncircumcised equivalent risk of HIV	0.426	0.611
Outcome variable:	Bought any condoms		
	Number of condoms bought	0.369	0.272
	Number of condoms bought (conditional on buying any)	1.795	1.245

Table 3: Balancing Tests by Treatment Status

	Treatment	Control	Difference	Standard Error
	(1)	(2)	(3)	(4)
Number of men	17.878	17.71	0.168	[1.817]
Age	31.746	31.80	-0.054	[0.406]
Married	0.904	0.900	0.004	[0.020]
Proportion of Men Circumcised	0.728	0.721	0.007	[0.044]
Had sex last month	0.723	0.765	-0.042	[0.030]
Had sex last week	0.556	0.576	-0.020	[0.039]
Ever used a condom	0.385	0.420	-0.035	[0.042]
Education	5.731	6.086	-0.355	[0.276]
Assets	4.174	4.577	-0.403**	[0.177]
Total Expenditure (logged)	9.344	9.550	-0.206***	[0.052]
Yao	5.911	6.714	-0.803	[1.412]
Muslim	6.853	7.000	-0.147	[1.232]
Christian	9.882	9.314	0.568	[1.120]
Believes Circumcision Increases HIV risk	0.382	0.374	0.008	[0.037]
Believes Circumcision Decreases HIV risk	0.198	0.173	0.025	[0.027]
Believes Circumcision has no impact on HIV risk	0.421	0.453	-0.032	[0.036]

Table 4: Impact of Information on Condom Purchases

	Bought any condoms			Number of condoms bought		
	(1)	(2)	(3)	(5)	(6)	(7)
Treatment	0.138***	0.093**	0.109**	0.474*	0.474*	0.560**
	[0.048]	[0.045]	[0.044]	[0.274]	[0.274]	[0.266]
Circumcised	0.070*	0.049	0.055	0.32	0.320	0.290
	[0.035]	[0.037]	[0.038]	[0.212]	[0.212]	[0.216]
Treatment * Circumcised	0.043	0.062	0.045	0.426	0.426	0.370
	[0.055]	[0.054]	[0.053]	[0.360]	[0.360]	[0.348]
Constant	0.206***	0.951***	1.105***	17.680***	17.680***	18.449***
	[0.032]	[0.037]	[0.077]	[0.212]	[0.212]	[0.538]
Interviewer Fixed Effects		Yes	Yes		Yes	Yes
Includes Control Variables			Yes			Yes
Observations	1195	1195	1195	1195	1195	1195
R-squared	0.04	0.086	0.097	0.095	0.095	0.107

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Notes: Standard Errors are clustered by village. Control variables included in columns 4 and 8 include: age, marital status, logged total expenditures, years of scholing, assets and a dummy for whether or not the respondent had sex in the last week.

Table 5: Impact of Information on Condom Purchase

	Circumcised		Uncircumcised	
	Any condoms	Number of Condoms	Any condoms	Number of Condoms
	(1)	(2)	(3)	(4)
Treatment	0.211***	1.057***	0.054	0.206
	[0.046]	[0.330]	[0.069]	[0.425]
Treatment * HIV positive (no likelihood)	-0.100	-0.263	0.061	0.55
	[0.068]	[0.463]	[0.103]	[0.692]
HIV positive (No likelihood)	-0.036	-0.248	-0.021	-0.259
	[0.046]	[0.318]	[0.065]	[0.480]
Constant	0.568***	16.282***	0.997***	12.097***
	[0.163]	[0.912]	[0.225]	[0.987]
Observations	884	879	317	316
R-squared	0.121	0.117	0.187	0.216

Notes: Standard Errors are clustered by village. Control variables include: age, marital status, logged total expenditures, years of scholing, assets and a dummy for whether or not the respondent had sex in the last week.