Circumcision, Information, and HIV Prevention

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Abstract

While male circumcision has been shown to significantly lower the transmission rate of HIV, some have cautioned that after disseminating the information about male circumcision and HIV, circumcised men may engage in riskier sex after learning that they are less at risk. Among a sample of approximately 900 circumcised and 300 un-circumcised men living in rural Malawi, we randomly disseminated the information about HIV transmission risk and male circumcision. We measure the behavioral response to learning this information among circumcised and uncircumcised men. We find no evidence of dis-inhibition among circumcised men in the treatment group immediately after the information campaign or one year later as measured by condom purchases and self-reported sexual behavior. Uncircumcised men in the treatment group significantly increase the likelihood of purchasing condoms immediately after the information intervention by approximately 10 percentage points and this is weakly persistent after one year. Consistent with this, we present evidence that uncircumcised men who learn about HIV and circumcision decreased risky sexual behavior.

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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 and organizations such as the WHO and UNAIDS are suggesting it as an important HIV prevention strategy (Auvert B 2005; NIH 2006).[1]

While the medical evidence points to male circumcision as a viable HIV prevention strategy, there are several open questions that have prevented the rapid scale-up of male circumcision provision among several African countries. In particular: 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 HIV infection? Importantly, some important policy makers have noted the need to "proceed with caution" because of the ambiguous effect of how people may adjust their sexual behavior upon learning about the relationship between HIV and circumcision (Daily News, 2007). In particular, there is no evidence of the best way to deliver the information about HIV and male circumcision as well as the effects of the information on sexual behavior. This paper contributes by quantifying how both circumcised and uncircumcised men respond to the information that circumcision reduces risk of HIV infection on reported sexual behavior and condom purchases.

[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. The moist environment 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).

According to economic models, individuals facing higher risks of HIV infection should optimize by engaging in safer sexual behavior (Philipson, 2000).[2] In our study, *uncircumcised* men who learn that circumcision reduces the transmission rate of HIV 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 learn they are at less risk; believing they are safer they may practice riskier sex.

To measure the response to information, we interviewed a sample of 1228 men living in 70 villages in rural Malawi and then randomly disseminated information, by village, about circumcision and HIV. The information consisted of an information sheet that was read to respondents and discussed. It contained information regarding a description of what male circumcision is, the studies that found that male circumcision is associated with lower risk of HIV infection, and the mechanisms through which male circumcision is protective. Respondents were also told that male circumcision is not completely protective. After disseminating the information to those assigned to the treatment group, interviewers then sold men condoms and recorded respondent purchases. Approximately one year after the baseline survey and information intervention, the project revisited respondents, sold condoms, and recorded reported sexual behavior in the past year.

This paper examines the effect of the information campaign on sexual behavior and condom purchases. At the baseline, less than half of the men (37 percent) have the correct prior regarding the link between HIV and circumcision. There are some differences by circumcision status where 36 percent of the circumcised men and 23 percent of the uncircumcised men have the correct prior. One year after

[2] This has been examined empirically by a number of researchers who find a general pattern of support (Francis, 2007; Oster, 2007). There is also a growing literature on how sexual choices depend on subjective expectations about likelihood of HIV infection. 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, 2010). This information had a large effect on reducing the reported sexual activity of adolescent school girls with older men. Other models based in psychology or behavioral economics could 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).

learning about the correct link between circumcision and HIV infection, we find some changes in beliefs about circumcision and HIV transmission; this is primarily driven by already circumcised men. Circumcised respondents reduced their perceived HIV transmission probability for circumcised men in response to the information treatment by approximately 10 percentage points. There was no overall impact of the information among uncircumcised men. There are also differences in the detail of information known in response to the treatment – for example, respondents in the treatment had more accurate knowledge about the scientific studies that took place in Kenya, Uganda, and South Africa.

We examine how the purchase of condoms and reported sexual behavior is influenced by learning about the link between circumcision and HIV. Both circumcised and uncircumcised men in the treatment group were significantly more likely to purchase condoms immediately after being exposed to the information. This effect of the information campaign persisted somewhat, although only among the uncircumcised men. Consistent with this pattern, we find that uncircumcised men who received the information also reported practicing safer sex after one year. Among circumcised men who received the information, we find no evidence of behavioral dis-inhibition.

We also present results on circumcisions that occurred among the adult men in the year after our information campaign. There were 2 control men and 5 treatment men who were circumcised in that year. While this is correlated to the information campaign, we discuss some of the reasons they state for getting a circumcision. In all, our results suggest no significant behavioral responses towards riskier sex after learning about male circumcision and HIV. Our findings support the dissemination of information about male circumcision and HIV.

We proceed as follows: Section 2 outlines the data and experiment. Section 3 discusses exposure to information at baseline and the effectiveness of the information treatment. Section 4 presents the economic strategy and results. Section 5 discusses subsequent adult male circumcisions and Section 6 concludes.

2 Data and Experimental Design

The data used in this paper use data collected in three waves across a twelve month period. The baseline 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 because of its diverse population of both circumcised and uncircumcised male residents. It is a rural area that is situated between the main road that connects Zomba City and Machinga town with Lake Chirwa to the east. To sample men into the study, 70 villages were first randomly selected into the sample, stratified by the distance from each village to the nearest mosque.[3] Within each of these villages a full household enumeration was conducted. The second stage of sampling involved randomly selecting men ages 25 to 40 from the household enumeration.

In this paper, we study differential responses to the media information about HIV and circumcision separately among those men who are already circumcised and those who are not circumcised. It is important to note that men who are circumcised in Malawi are quite different than those who are uncircumcised mainly due to historical and ethnic traditions of circumcision in Africa and Malawi in specific.[4] 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

[3] The process for selection and randomization included: taking a list from the 2008 census of all of the villages in TA Kuntumanji; dropping all duplicate names in that list (which may or may not indicate an exact duplicate village); merging in the locations of churches and mosques and listing each of the villages in terms of distance from a mosque (from near to far). We then divided the villages into 10 groups and randomly choose half for treatment and control.

[4] We also find important differences across circumcision status in our data as well. Circumcised men have one year less of education, were almost one year younger at sexual debut, and have approximately 0.6 more lifetime sexual partners than uncircumcised men (not shown).

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 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).[5]

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 (e.g. DHS Malawi), we stratified the selection of men by their religious affiliation (Christian or Muslim). In each village, we selected a maximum of 20 Christian and 20 Muslim men. 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 in our data (94.2 percent) were circumcised while a surprising large percentage (60.9) of Christians was also circumcised. 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, although similar to the disaggregate data from DHS and MDICP in similar areas. Appendix A presents the circumcision rates by religion and ethnicity for our data in Kuntamanji, MDICP in Balaka (a nearby and similar district) and DHS in rural Zomba.[6] Here the circumcision rate among non-Muslims is

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

[6] MDICP data were taken from 2008; more details can be found at: http://www.malawi.pop.upenn.edu/Level%203/Malawi/level3_malawi_main.html. DHS data are from their 2004

similar to the data in Kuntamanji. The reason for the higher percentage of non-Muslim circumcised men 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, however we have limited support for this mechanism.[7]

The total sample consists of a total of 1228 male respondents. Table 1 presents the summary statistics of these men, disaggregated across treatment and control men. Overall, the men are on average 32 years old. Most are married (90 percent) and have had sex in the past year (96 percent). The respondents have an average of 1.9 children (conditional on having any children). The two majority tribes in the area are the Nyanja – which is similar to the Chewa ethnic group (40 percent) and the Yao (33 percent). The men have only had on average 5.6 years of schooling (6.7 conditional on having ever attended school). On average we have a total of 11.0 Christian and 6.8 Muslim respondents in each village who agreed to participate. While respondent refusals were low, men in the area are very mobile making it difficult to find and survey all the selected men. In total we surveyed 67 percent of those who were randomly selected from the household enumeration.[8]

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

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survey.

[7] 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. In our follow-up study we asked men about their religious conversion history. Among those men who claimed to "always be Christian", 56 percent were circumcised. Similarly, 58 percent of men whose mother was always Christian or father was always Christian were circumcised (not shown). This suggests that religious conversions are not likely to explain all of the discrepancy between the circumcision patterns in this area and that in Malawi overall.

[8] We do not find significant differences in the finding rate across basic demographics or treatment status. For example, 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. Across treatment and control villages we found 79 and 76 percent, respectively. Across circumcision status, we found 80 (uncircumcised) and 77 percent (circumcised).

went through a standardized 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 encouraged to ask the interviewers questions during this discussion.

It is worth noting that the villages were randomly allocated to treatment and control groups 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 for condom purchases at baseline, all control group interviews were conducted before the treatment interviews.

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 (Chishango) 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.

Approximately one year after the baseline survey, we attempted to re-interview all men interviewed at baseline and ask them about their sexual behavior in the past year, their circumcision status, and again offer them the opportunity to purchase condoms. Approximately 70 percent of the men who were interviewed at baseline were found at the follow-up. Because the sample included only men

who were often participating in small businesses and casual labor, they were especially mobile and often were temporarily away. Attrition was not significantly associated independently with the treatment status, nor across circumcision status and treatment assignment (Table 2). Attrition was also not significantly associated with other factors such as age; education; marital status; nor perceptions about HIV and circumcision (results not shown).

3 Knowledge and Learning about Circumcision and HIV Transmission Risks

3.1 Baseline Exposure to Circumcision Information and Beliefs

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. First, at the time of the baseline survey in October/November of 2008, there had been several national meetings sponsored by the National AIDS Commission 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. However, there was no accepted national policy regarding male circumcision for HIV prevention

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 at the time of the baseline survey, 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 in Chichewa, and of those who were literate, only 17 percent read the newspaper more than once per month. More of the respondents had 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 the majority of individuals had the wrong baseline prior beliefs about the relationship between HIV and circumcision. We measure beliefs of HIV infection in two ways. Respondents were asked whether they believed that circumcision increased, decreased, or had no effect on the risk of HIV infection. When asked this, 12 percent of men stated that circumcision increased the risk of infection while 36 percent believed that circumcision decreased the risk (The remaining did not state that it had an effect one way or another).[10] Figure 1 graphs these responses. Importantly, this figure shows the differences in beliefs by baseline circumcision status. Circumcised men are more likely to believe they face a lower risk than uncircumcised men.

[10] Specifically, respondents were asked: "What is the likelihood of getting HIV if you are circumcised (rather than uncircumcised)? Increased, Decreased, Same, or Don't know". This baseline distribution of beliefs is 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).

Respondents were also 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. These distributions are presented in figures 2A and 2B and indicate that overall people have very high perceived probabilities of the risk of HIV transmission. On average circumcised respondents thought that the probability of infection was 81 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. To the extent that the questions about transmission probability were accurate, the fact that people perceive very high probabilities of perceived risk, it is possible that the response to the information could be minimal, especially in moving perceived likelihood for uncircumcised men to become infected – this is already quite high and close to the limit of 100 percent transmission.

3.2 Effectiveness of the Information Treatment

Before analyzing the behavioral responses of the respondents to the information provided it is worth examining the delivery of the information treatment by the enumerators and whether the message was understood by the respondents. Table 3 presents some indication of the effectiveness of the information campaign. At baseline, on average, the total time for the baseline survey and condom sales was 44 minutes for the control group and 48 minutes for the treatment group; the treatment interviews were approximately 4 minutes longer than control group interviews (Table 3, Panel A). As interviewers became more familiar with the questionnaire the speed it took for completion 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 4.38 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.[11] This is also indicated in Figure 3 which graphs the time of interview by day by treatment and control groups. Overall, treatment interviews lasted longer, consistent with the fact that the protocol called for the information to be disseminated. Also note that the time for the circumcised interviews also took longer overall (due to additional questions asked to circumcised men) although the uncircumcised men in the treatment group took even longer due to the additional discussion that was reported to take place at the time of the information dissemination. An alternative explanation is that the interviewers skipped more questions over time or created more missing values. We find no evidence that there was an increase in non-response or missing values correlated with either day of interview or treatment status.

Even 12 months later during the follow-up survey we have evidence that those in the treatment group recalled additional information about circumcision. Because the survey asked many questions about circumcision itself, it is not surprising that there is no difference in recall of being told about circumcision, however, the details about the scientific study were only told to those in the treatment group. Circumcised men in the treatment group were significantly more likely to recall being told about a scientific study about HIV and circumcision during the baseline.[12] Circumcised men in the treatment villages were 9.7 percentage points more likely to say that circumcision decreases HIV transmission rates (Table 3, Panel B). While the majority of respondents (across both treatment and control) reported knowledge of a scientific study on circumcision, control respondents had more trouble recalling correct details provided to them such as the countries in which the studies took place. The treatment respondents were less likely to state that the trials were conducted in Malawi and Nigeria.[13]

[11] In fact, controlling for day fixed effect increases the estimated difference.
[12] Interestingly, the control group respondents report fairly high rates of reported knowledge about a scientific study at the baseline. One possible explanation is that given the nature of the consent form and in-depth questionnaire at baseline regarding HIV and circumcision it is possible that the respondents thought this question referred to this study in which they are respondents.
[13] All respondents (whether or not they recalled hearing about a scientific study) were asked this set of questions. If they reported that they had never heard about such a scientific study about HIV and circumcision they were encouraged to predict where they think such a study would be conducted and what it would show.

Table 4 provides further evidence of the effectiveness of the information treatment. Here we present the difference between the treatment and control groups with answer from questions on HIV transmission risk and circumcision based on the categorical and continuous questions of perception of risk, described above. We find our effects mainly among circumcised men who were responsive to the information treatment. Circumcised men in the treatment group were 6.5 percentage points more likely to state that circumcision was related to a decreased HIV risk, substituting from believing that there was no impact on HIV risk. In addition, circumcised men in the treatment group believed that circumcised men had a 10 percentage point lower transmission rate than those in the control group.

That fact that we see no significant differences between treatment and control uncircumcised men may suggest that the information they received was not believed or that it wasn't salient. On the other hand, Table 3 presented the effects of the treatment on uncircumcised men on beliefs and knowledge using alternative questions that yielded differences, suggesting that the measured responses may be dependent on the type of question asked.

Figure 4 presents the CDF of the perceptions of HIV transmission probabilities among circumcised men. This figure graphs baseline perceptions (averaged between treatment and control which were balanced at baseline), as well as graphing perceptions at follow-up (separately among treatment and control men). There are two main points to take away from this graph. Note first the difference in the CDF between the treatment and control at the follow-up. This difference, mainly driven by circumcised men, illustrates the effect of the treatment on moving the distribution of beliefs. Second, note that both the treatment and the control group distributions are different from the distribution at baseline. This could indicate an increase in media exposure about circumcision and HIV among both treatment and control groups between the baseline and follow-up survey. Alternatively, this also could be an indication of spillovers from the treatment to the control group between the time of the baseline and follow-up survey.

4 Results: Responses to Information Campaign

4.1 Econometric Strategy

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

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

where we examine the effects of individual i living in village j, as a function of being assigned to a treatment village and a vector of individual controls, X. We examine present several main outcome variables. First, purchases of condoms as recorded either immediately after the baseline survey or one year later, after the follow-up survey. Second, self-reported sexual behavior recorded at the time of the follow-up survey.[14] In addition to examining behavioral responses as measured by individual answers to questions on sexual behavior, we also construct a measure of risky sexual behavior (RSM) which we construct by averaging over normalized values of each of the individual measures of sexual behavior. In the analysis we cluster standard errors by village. 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. In addition to asking respondents about their sexual behavior direction, we have opted for using condom purchase as a

[14] These measures include: an indicator that the respondents wife was pregnant at follow-up, that he had sex in the previous month, the number of times of sex in the last month (for one partner or for multiple partners), number of condoms used last month, the fraction of times he had used a condom, the number of total partners in the last month and last year, the number of condoms purchased in the previous month and the number of condoms received for free in the past month.

proxy for the demand for safe sex. This method has been used in previous work by 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. Moreover, in our sample of men, the majority are sexual active with 75 percent having had sex in the previous month at baseline.

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). Our baseline statistics compared across treatment status indicate that men in the treatment and control villages are not systematically different which is reassuring for our identification strategy and randomization (Table 1). 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. In our main specification (1), we are interested in differential responses by circumcision status. We separate our regressions by baseline circumcision status for the analysis because we expect asymmetric responses. Note that baseline characteristics are generally balanced even when we split the sample into circumcised and circumcised men (Appendix B).[15] By conducting control village interviews before treatment interviews, we try to limit the extent to which information could have spread from the treatment to the control respondents (Miguel and Kremer, 2001). We discuss further possibilities of spillovers below.

[15] Our results are robust to running a fully interacted model circumcision status and treatment status (not shown). The results are also generally consistent when running specifications with religious status (Muslim vs. Christian) although those results yield smaller point estimates (not shown).

4.2 Condom purchases

On average, circumcised men were more likely (7.2 percentage points) to purchase condoms at the baseline than uncircumcised men regardless of their treatment status. This is consistent with self-reported data from the baseline survey in which circumcised men report using condoms more frequently and report more risky sexual behavior than uncircumcised men (not shown).[16]

In terms of the response to receiving the information, we present the results in Table 5 Panel A and Panel B among the baseline sample of all men interviewed in the baseline (Columns 1 and 2) and on condom purchases one year after treatment among men who were interviewed at the follow-up (Columns 3 and 4). Circumcised men who were in the treatment group were 14.8 percentage points more likely to purchase condoms (Panel A, Column 1) and purchased 0.86 more condoms (Panel A, Column 2).[17]

Among uncircumcised men, we see similar although slightly smaller effects on condom purchases in which treatment men are 9.6 percentage points more likely to purchase condoms and purchase approximately 0.5 more condoms (results are also somewhat larger among the restricted sample). These results are robust to including interviewer fixed effects as well as other control variables.

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. Overall, we might expect circumcised men learning the information to purchase fewer condoms and uncircumcised men learning the information to purchase more (or increase their demand to get circumcised). There are several possible interpretations. The fact that circumcised men who receive the treatment are no less likely to purchase condoms could indicate that

[16] 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.

[17] The treatment effect at baseline (for both circumcised and uncircumcised men) is somewhat higher in a restricted sample of men who were those interviewed at the follow-up (not shown).

circumcised men are not reducing their demand for risky sexual behavior in response to the information; this 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, 1992).

At the follow-up, the treatment effects on condom purchases among circumcised men have disappeared (Columns 3 and 4). Among the uncircumcised men, the general pattern on the effect of the treatment on purchase of condoms persists. Because any effects after one year are unlikely to also contain any media or framing effects, these longer term effects on condom purchases suggest a behavioral response among uncircumcised men, but no evidence of dis-inhibition among the circumcised men.

4.3 Self-reported sexual behavior

At the follow-up survey we asked respondents a number of questions related to their sexual behavior. We report the effects of the media campaign on reported sexual behavior in Table 6. Panel A presents the results for the circumcised men. Along almost every dimension, there was no significant difference in reported behavior between circumcised men in the treatment and control groups. To address the issue of multiple inference we also create an index of risky sexual behavior which is the mean of the standardized value for each of the nine listed self-reported measures of sexual behavior, as described above (Kling, Liebman and Katz, 2007).[18] There is no impact of the treatment on engaging in riskier, or less risky sexual behavior among circumcised men. In all, this provides further evidence that there no large

[18] The nine measures used in constructing this index are: Whether wife is pregnant; Had sex in last month; Number of sexual interactions in last month; Total number of condoms used in last month; Fraction of sexual encounters that used a condom; Number of sexual partners in last month; Number of partners in the last year; Number of condoms purchased in the last month and the number of condoms that respondent received free in the past month.

responses in terms of behavioral dis-inhibition among the circumcised men learning about the relationship between circumcision and HIV.

Among the uncircumcised men, the results indicate that those exposed to the information intervention are practicing safer sex. Table 6, Panel B presents these results. Along several dimension, we find large and significant differences between the treatment and control uncircumcised men. Treatment men were less likely to report having sex in the past month and having it fewer times. They were more likely to report using condoms, and purchasing condoms. These results are consistent with our initial findings of positive effects of the information on condom purchases at baseline and the positive coefficient at the follow-up (Table 5). Moreover, the results are strong in terms of the composite index of risky sexual behavior (Column 11). These results are robust to including baseline controls or measuring treatment effects on differences (results not shown).

5 Adult Male Circumcisions

One year after the information campaign, in addition to asking men about their sexual behavior, we asked men who reported being uncircumcised at the baseline their circumcision status again. In all, we identified 7 men who were circumcised between the time of the baseline and follow-up survey. Five men were in the treatment group and two were in the control group. We present some summary results on circumcision in Table 7. Panel A present regressions predicting whether uncircumcised men were likely to get circumcised based on their treatment status. There is a positive effect of being in the treatment group on getting a male circumcision, although this is not statistically significant at traditional levels. We also present several descriptive statistics about the type of men who did get circumcised (Panel B). These men were slightly younger than average, slightly poorer (although more likely to be self-employed). Notably, all of the respondents were married. This is relevant to some of the reasons why the men stated that they received a circumcision which was related to health, to please their wife, or to set an example to

others. Only one out of the seven men was circumcised in the clinic, the remaining were either circumcised at home, or in the bush.

6 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 adult men in rural Malawi. From a policy perspective, one concern is that already circumcised men will practice riskier sex upon learning that circumcision reduces the transmission rate of HIV.

First, we found that rural Malawian men are not well informed about the relationship between circumcision and HIV transmission risk. In other words, there is scope for information as part of an HIV prevention strategy to provide this information. We then showed that by sharing this information, circumcised men reported changes in in beliefs about male circumcision and HIV transmission. We also show that there was a large increase in the likelihood of purchasing condoms immediately after the baseline survey. This effect was similar among both circumcised and uncircumcised men. 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. Moreover, after one year we find positive coefficients on purchasing condoms and evidence that uncircumcised men in the treatment group reported practicing safer sex along a number of dimensions. We also find that there was no indication of a reduction in the demand for condoms among already circumcised men or changes in self-reported behaviors.

In short, we find no evidence that in the short to medium run, disseminating information about the lower HIV transmission risk from male circumcision will result in negative behavioral responses. We also find modest, although not statistically significant effects on adults in the treatment group receiving a circumcision.

References

Anglewicz, P. and H.-P. Kohler (2005). "The construction of self-assessed likelihood HIV/AIDS infection: an examination from rural Malawi." Meeting of the International Union for the Study of Population.

Associated Press, 2010. Malawi rules out circumcision for Aids prevention RAPHAEL TENTHANI | BLANTYRE, MALAWI - Sep 16 2010 16:15

Auvert B, T. D., Lagarde E, Sobngwi-Tambekou J, Sitta R, et al. (2005). "Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: The ANRS 1265 trial." PLoS Med 2: e298.

Bennell, P. (2003). "The Impact of the AIDS Epidemic on Schooling in sub-Saharan Africa." Background paper for the Biennial Meeting of the Association for the Development of Education in Africa.

Crain, C. (2005). "Chicken Little scare tactics won't stop HIV." Washington Blade.

Crowley, I. P. and K. M. Mesner (1990). "Ritual circumcision (Umkhwetha) among the Xhosa of the Ciskei." British J of Urology 66: 318-21.

Daoreung, P. (1997). "THAILAND-AIDS: No More Scare Tactics." InterPress News Service.

DHS, M. (2004). "Demographic and Health Surveys, Malawi."

Doyle, D. (2005). "Ritual Male Circumcision: A Brief History." J R Coll Physicians Edinb 35: 279-285.

Drain PK, S. J., Hughes JP, Halperin DT, Holmes KK (2004). "Correlates of national HIV seroprevalence: An ecologic analysis of 122 developing countries." J Acquir Immune Defic Syndr 35: 407-420.

Dupas, P. (2006). "Relative Risks and the Market for Sex: Teenagers, Sugar Daddies, and HIV in Kenya." Dartmouth college working paper.

Francis, A. M. (2007). "The Economics of Sexuality: The Effect of HIV/AIDS on Homosexual Behavior, Desire, and Identity in the United States."

Guadagno, R. E. and R. B. Cialdina (2002). "Online persuasion: an examination of gender differences in computer mediated interpersonal influence." Group Dynamics: Theory Research and Practice 6(38-51).

Guadagno, R. E. and R. B. Cialdina (2007). "Persuade him by email, but see her in person: Online persuasion revisited." Computers in Human Behavior 23: 999-1015.

Kaler, A. (2004). "AIDS-talk in everyday life: the presence of HIV/AIDS in men's informal conversation in Southern Malawi." Social Science & Medicine 59: 285-297.

Levine, S. and F. Ross (2002). "Perceptions of and attitudes to HIV/AIDS among young adults at the University of Cape Town." CSSR Working paper 14.

Marck, J. (1997). "Aspects of male circumcision in sub-equatorial African culture history." Health Transition Review Supplement to Volume 7: 337-359.

Miguel, E. and M. Kremer (2004). "Worms: Identifying Impacts of Education and Health in the Presence of Treatment Externalities." Econometrica 72(1): 159-217.

NIH (2006). "Adult Male Circumcision Significantly Reduces Risk of Acquiring HIV." National Institutes of Health.

Oster, E. (2007). "HIV and Sexual Behavior Change: Why not Africa?"

Philipson, T. (2000). "Economic epidemiology and infectious diseases." Handbook of Health Economics.

Stannus, H. S. and J. B. Davey (1913). "The Initiation Ceremony for Boys Among the Yao of Nysaland." The Journal of the Royal Anthropological Institute of Great Britain and Ireland 43: 119-123.

Stein, J. (1999). "Scare-tactics don't work with HIV/AIDS." Sunday World News.

Szabo, R. and R. V. Short (2000). "How does male circumcision protect against HIV infection?" BMJ 320: 1592-1594.

Thornton, R. L. (2008). "The Demand for and Impact of Learning HIV Status: Evidence from a Field Experiment." American Economic Review. 98(5): 1829 – 63.

UNAIDS (2004). "Report on the global HIV/AIDS epidemic." World Health Organization and UNAIDS.

UNICEF (2006). "What Children and Youth Think in Malawi: A Statistical Presentation of Opinions and Perceptions of Children and Youth in Malawi 2006."

USAID (2005). "USAID/WHO AIDS Epidemic Update."

Valley, K., J. Moag, et al. (19981996). "'A matter of trust': Effects of communication on the efficiency an ddistribution of outcomes." Journal of Economic Behavior and Organization 34: 221-238.

Valley, K., L. Thompson, et al. (2002). "How Communication Improves Efficiency in Bargaining Games." Games and Economic Behavior 38: 127-155.

Zaller, J. and Feldman, S. (1992), “A Simple Theory of the Survey Response: Answering Questions versus Revealing Preferences”, American Journal of Political Science, Vol. 36, No. 3, pp. 579-616

Figure 1: Baseline Beliefs of Circumcision and HIV Risk by Respondent's Circumcision Status

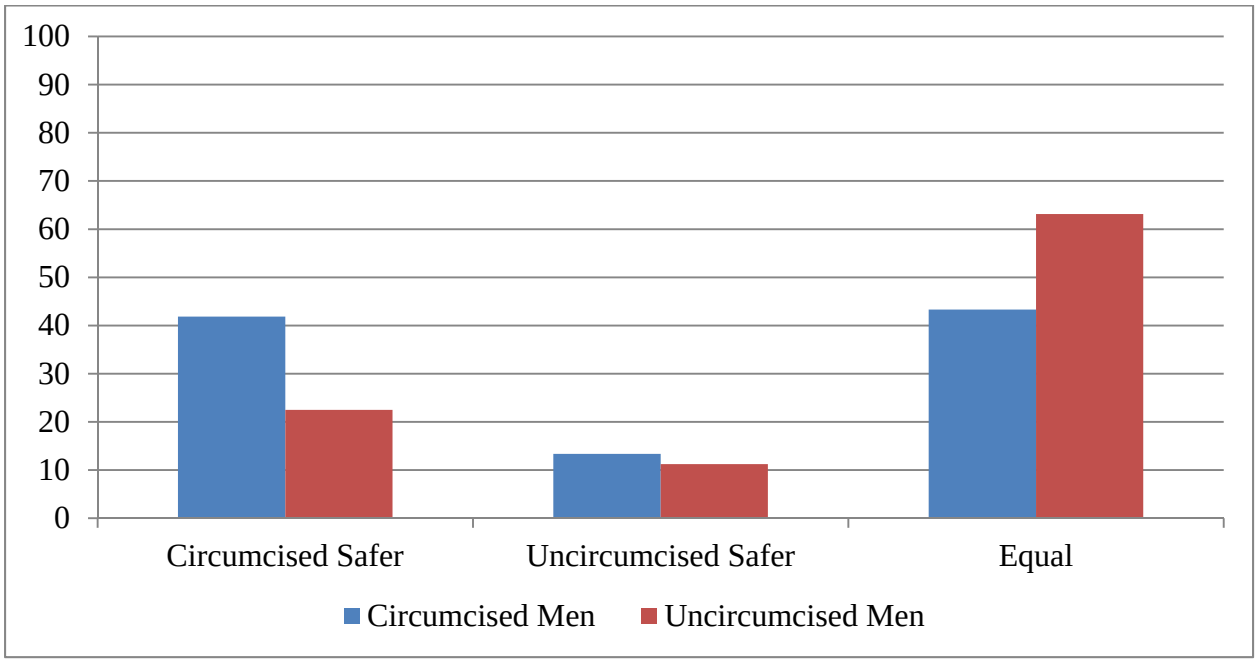
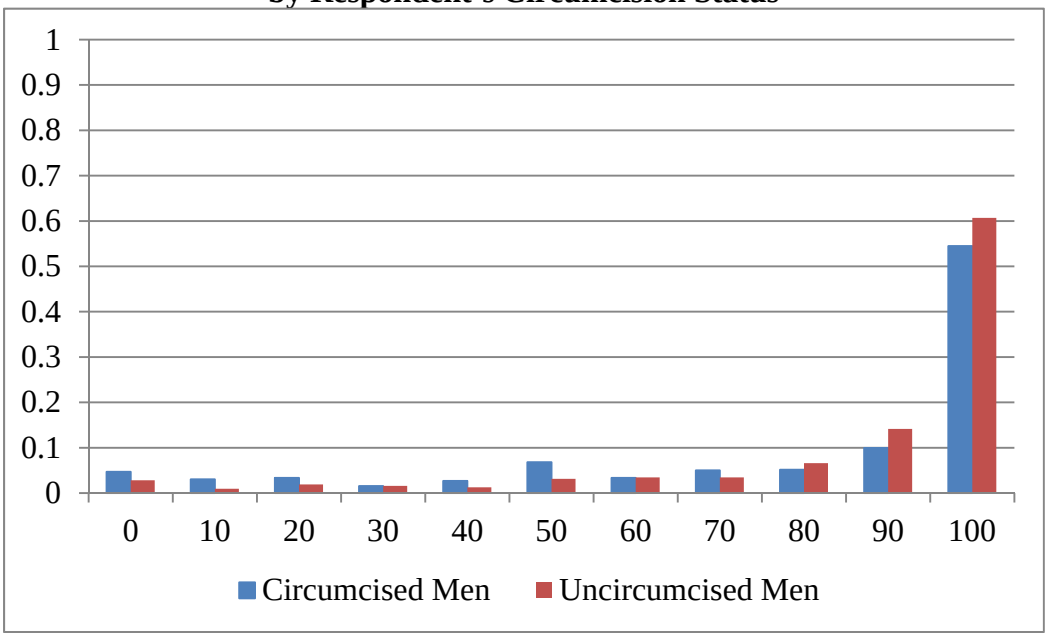
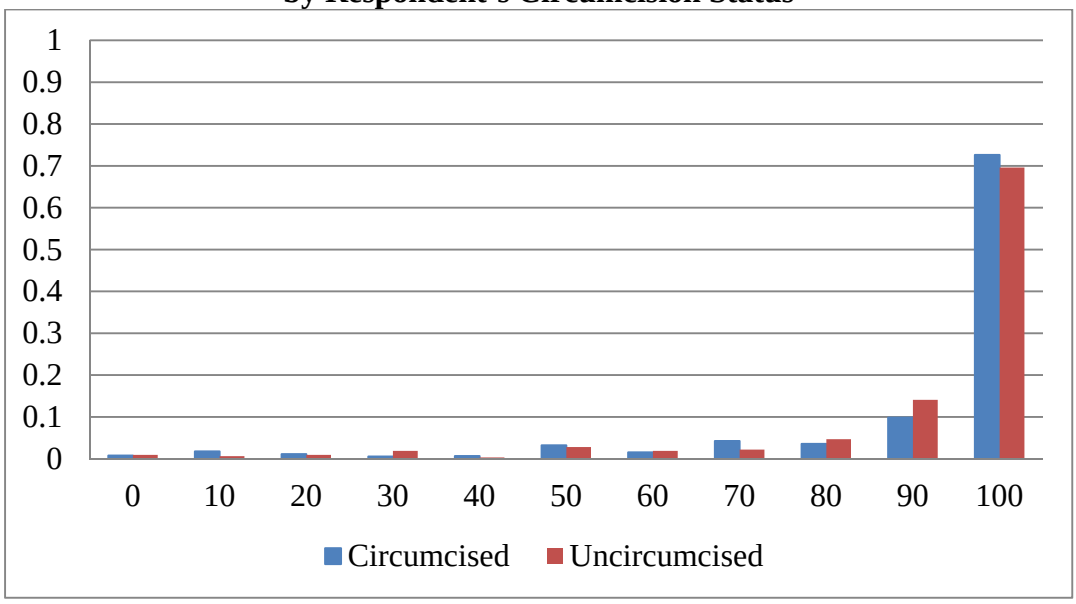


Figure 2A: Perceived Circumcised Men Transmission Rate by Respondent's Circumcision Status



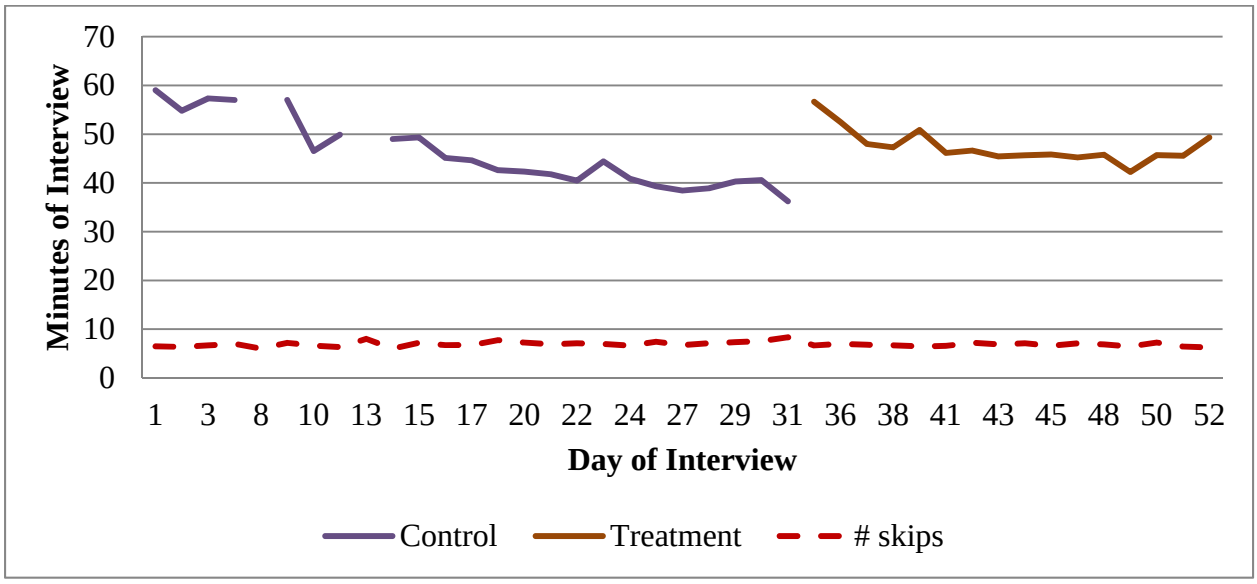
Notes: This figure presents the distribution of the question: *"If 100 circumcised men each had unprotected sex with a woman who was HIV positive last night, how many of them would become infected?"*

Figure 2B: Perceived Uncircumcised Men Transmission Rate by Respondent's Circumcision Status



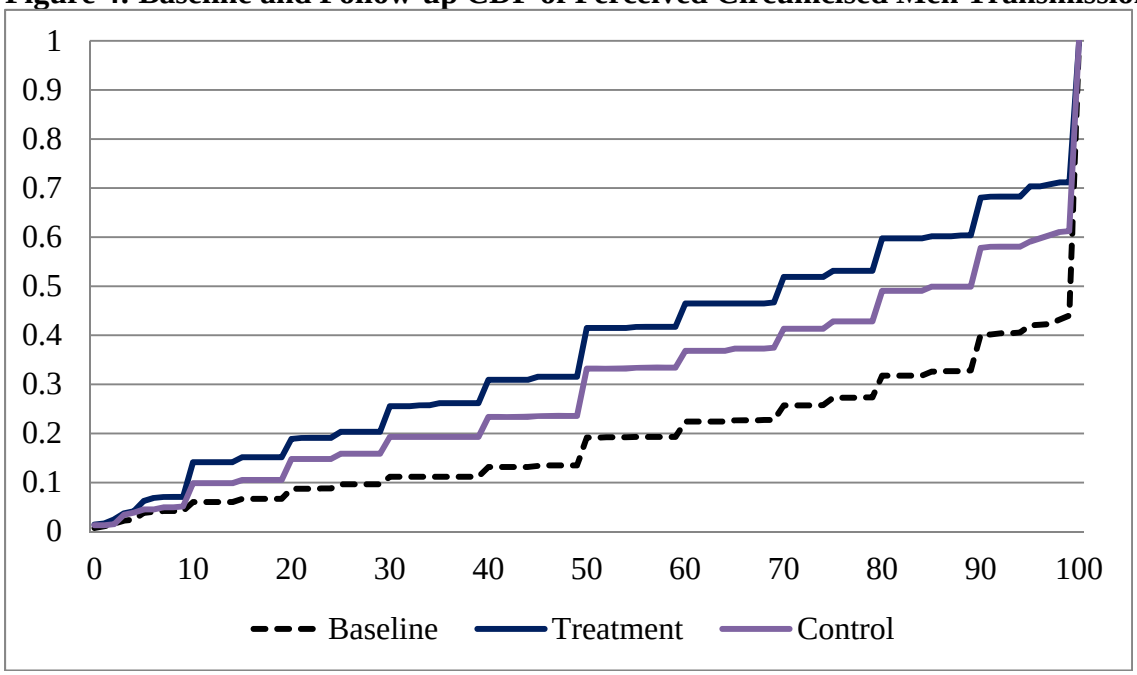
Notes: This figure presents the distribution of the question: *"If 100 uncircumcised men each had unprotected sex with a woman who was HIV positive last night, how many of them would become infected?"*

Figure 3: Length of Baseline Interview by Treatment Status (Minutes)



Notes: This figure presents the average length of interview in minutes by treatment status. It also presents the number of skips the interviewer did on that interview. There were a total of 19 possible skips in a questionnaire.

Figure 4: Baseline and Follow-up CDF of Perceived Circumcised Men Transmission Rate



Notes: This figure presents the distribution of the question at baseline and follow-up survey: *"If 100 circumcised men each had unprotected sex with a woman who was HIV positive last night, how many of them would become infected?"*

Table 1: Sample Size and Baseline Characteristics

Panel A: Male Sample Description		**Treatment**	**Control**		
Villages		35	35		
Respondents:	Total	609	619		
Panel B: Male Summary Statistics		**Treatment**	**Control**	**Difference**	
Demographics:	Age	31.718	31.838	-0.121	
	Married	0.903	0.889	0.015	
	Years of Education	5.629	6.123	-0.494	*
	Circumcised	0.745	0.728	0.017	
	Literate in Chichewa	0.744	0.756	-0.012	
	Literate in English	0.355	0.384	-0.030	
Tribe:	Chewa	0.051	0.050	0.001	
	Lomwe	0.207	0.131	0.076	**
	Nyanja	0.401	0.417	-0.017	
	Yao	0.330	0.380	-0.050	
Religion:	Christian	0.553	0.525	0.028	
	Muslim	0.383	0.396	-0.013	
Wealth:	Income	9.129	9.136	-0.007	
	Assets	4.207	4.661	-0.454	***
	Farmer	0.621	0.621	0.000	
	Salaried	0.094	0.170	-0.076	***
	Self-Employed	0.371	0.342	0.029	
Sexual Behavior:	Age at sexual debut	17.211	17.022	0.189	
	Had sex in the last month	0.744	0.765	-0.021	
	Number of sexual partners across lifetime	4.239	4.348	-0.109	
	Number of sexual partners in last 12 months	1.078	1.151	-0.073	
	Ever used a condom	0.397	0.430	-0.033	

Notes:

The main sample consists of 1228 men residing in Zomba district in Malawi that agreed to participate in the baseline survey conducted in 2008.

Table 2: Follow-up Sample of Men

Panel A: Male Follow-up Sample	Treatment	Control	Difference
	(1)	(2)	(3)
Respondents:	484	469	
Finding rate	0.795	0.758	0.037

Panel B: Correlates of Finding Men	Interviewed in 2009		
	(1)	(2)	(3)
Treatment	0.035		0.027
	[0.032]		[0.050]
Treatment*Circumcised			0.02
			[0.050]
Circumcised		-0.034	-0.045
		[0.025]	[0.039]
Constant	0.758***	0.803***	0.790***
	[0.022]	[0.025]	[0.039]
Observations	1226	1216	1216
R-squared	0.002	0.001	0.004

Notes:

Robust standard errors clustered by village, additional controls used in Panel B include: age, marital status, years of education, assets and logged income.

Table 3: Effectiveness of delivery of information

	Circumcised Men			Uncircumcised Men		
	Treatment	**Control**	**Diff**	**Treatment**	**Control**	**Diff**
Panel A: Baseline Time of Interview	**N = 446**	**N = 440**		**N = 151**	**N = 167**	
Time taken to complete interview	48.531	45.352	3.179 ***	46.748	41.293	5.455 ***
Time for entire interview (incl pre-interview time)	54.602	50.818	3.784 ***	52.821	46.958	5.863 ***
Panel B: Follow-up Indicators (1 year after baseline):	**N = 349**	**N = 332**		**N = 123**	**N = 132**	
Recalls interview taking place	0.983	0.994	-0.011	0.951	1.000	-0.049 **
Was told about HIV	0.943	0.922	0.021	0.919	0.909	0.010
Was told about circumcision	0.977	0.955	0.022	0.976	0.939	0.036
Recalls being told about scientific study about circumcision	0.886	0.794	0.092 ***	0.772	0.769	0.003
Study said that circumcision leads to:						
Increased HIV risk	0.073	0.135	-0.062 **	0.120	0.083	0.037
Decreased HIV risk	0.711	0.614	0.097 ***	0.448	0.470	-0.022
No impact on HIV risk	0.143	0.621	-0.477 ***	0.360	0.417	-0.057
Don't know	0.073	0.033	0.040	0.072	0.030	0.042
Thinks study was conducted in:						
Egypt	0.499	0.503	-0.004	0.415	0.489	-0.074 *
Ethiopia	0.393	0.423	-0.030	0.390	0.466	-0.075
Ghana	0.479	0.446	0.033	0.374	0.450	-0.076
Kenya	0.521	0.479	0.043	0.569	0.519	0.050
Malawi	0.690	0.816	-0.127 ***	0.650	0.802	-0.151 ***
Nigeria	0.447	0.495	-0.048	0.415	0.534	-0.120 **
Senegal	0.335	0.360	-0.024	0.341	0.374	-0.033
South Africa	0.708	0.705	0.003	0.650	0.649	0.002
Uganda	0.602	0.557	0.044	0.496	0.565	-0.069
Zambia	0.479	0.526	-0.047	0.504	0.511	-0.007
Number of correctly recalled countries (max = 3)	1.795	1.731	0.064	1.688	1.720	-0.032
Number of incorrectly "recalled" countries (max = 7)	3.253	3.542	-0.289 *	3.040	3.598	-0.558 **

Notes:

The sample used for the baseline indicators is data collected during the baseline survey conducted in 2008.

The sample used for the audit indicators is data collected during an audit survey conducted in March 2009.

The sample used for the follow-up indicators is data collected during the follow-up survey conducted in September through November 2009.

Robust standard errors clustered by village.

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

Table 4: Responses to information: Subjective HIV transmission perceptions at Follow-up Survey

	Circumcised Men				Uncircumcised Men			
	Treatment N = 349	**Control N = 332**	**Diff**		**Treatment N = 123**	**Control N = 132**	**Diff**	
	(1)	(2)	(3)		(4)	(5)	(6)	
Believes circumcision is related to:								
Increased HIV risk	0.121	0.121	0.000		0.192	0.153	0.039	
Decreased HIV risk	0.732	0.668	0.065		0.488	0.466	0.022	
No impact on HIV risk	0.132	0.193	-0.061	*	0.304	0.359	-0.055	
Don't know	0.006	0.003	0.003		0.008	0.008	0.000	
Perceived HIV transmission rate								
Circumcised men	58.540	68.755	-10.216	***	77.500	75.762	1.738	
Uncircumcised men	86.822	88.817	-1.995		91.137	90.538	0.599	

Notes:

Robust Standard Errors are clustered by village. Perceived HIV transmission probabilities are measured by the following: i) "If 100 HIV negative circumcised men were to sleep with an HIV positive woman last night, how many of them would become HIV positive?"; and ii) "If 100 HIV negative uncircumcised men were to sleep with an HIV positive woman last night, how many of them would become HIV positive?"

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

Table 5: Impact of Information on Condom Purchases

Panel A: Circumicsed Men	**2008 Baseline**		**2009 Follow-up Sample**	
	Any Condoms	**Number of Condoms**	**Any Condoms**	**Number of Condoms**
	(1)	(2)	(3)	(4)
Treatment	**0.148*** **	**0.860*** **	0.058	0.175
	[0.036]	[0.229]	[0.041]	[0.402]
Constant	1.162***	18.815***	0.646***	4.618***
	[0.090]	[0.582]	[0.156]	[1.416]
Interviewer Fixed Effects	Yes	Yes	Yes	Yes
Includes Control Variables	Yes	Yes	Yes	Yes
Observations	879	879	672	672
R-squared	0.097	0.114	0.089	0.047
Average of dep var	0.37	1.77	0.418	2.52
Panel B: Uncircumicsed Men	**2008 Baseline**		**2009 Follow-up Sample**	
	Any Condoms	**Number of Condoms**	**Any Condoms**	**Number of Condoms**
	(1)	(2)	(3)	(4)
Treatment	**0.096***	**0.527** **	**0.108** **	0.209
	[0.051]	[0.261]	[0.052]	[0.588]
Constant	1.254***	12.796***	1.213***	4.129**
	[0.136]	[0.815]	[0.209]	[2.005]
Interviewer Fixed Effects	Yes	Yes	Yes	Yes
Includes Control Variables	Yes	Yes	Yes	Yes
Observations	316	316	251	251
R-squared	0.144	0.189	0.215	0.13
Average of dep var	0.27	1.26	0.392	2.678

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

Robust standard errors in brackets

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

Table 6: Impact of Information on Sexual Behavior

Panel A: Circumcised Men

	Wife Pregnant	Had sex last month	# Sex per month	# Sex per month (all partners)	# condoms used past month	Fraction safe sex in past month	# partners last month	# partners last year	# condoms purchased last month	# condoms received free last month	RSM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Treatment	-0.019	0.013	0.259	0.143	0.221	0.021	0.096	0.05	0.775	-0.429	-0.002
	[0.027]	[0.032]	[0.631]	[0.616]	[0.398]	[0.032]	[0.088]	[0.080]	[0.552]	[0.692]	[0.037]
Constant	0.419***	0.510***	6.849***	7.056***	3.991***	0.499***	0.911*	0.731**	0.937	7.265***	-0.316**
	[0.121]	[0.114]	[2.414]	[2.441]	[1.049]	[0.114]	[0.507]	[0.334]	[1.512]	[1.639]	[0.133]
Observations	644	673	673	673	524	524	673	673	673	673	673
R-squared	0.031	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.027
Average of dep var	0.153	0.771	7.648	7.871	2.082	0.234	0.890	1.126	1.589	4.585	0.000

Panel B: Uncircumcised Men

	Wife Pregnant	Had sex last month	# Sex per month	# Sex per month (all partners)	# condoms used past month	Fraction safe sex in past month	# partners last month	# partners last year	# condoms purchased last month	# condoms received free last month	RSM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Treatment	-0.043	**-0.096***	**-1.608***	**-1.875****	**1.107***	**0.087***	**-0.161****	-0.003	**0.993****	0.788	**-0.179*****
	[0.053]	[0.050]	[0.934]	[0.909]	[0.603]	[0.048]	[0.070]	[0.099]	[0.432]	[1.045]	[0.055]
Constant	0.186*	0.163	0.369	1.266	0.474	0.358**	0.436*	0.583*	1.618	1.099	-0.457***
	[0.107]	[0.192]	[2.240]	[2.261]	[1.071]	[0.164]	[0.220]	[0.309]	[1.287]	[3.591]	[0.151]
Observations	224	252	252	252	182	182	252	252	252	252	252
R-squared	0.029	0.193	0.082	0.081	0.029	0.062	0.079	0.037	0.019	0.011	0.185
Average of dep var	0.147	0.720	6.696	7.035	1.683	0.172	0.833	1.111	1.184	3.820	0.000

Notes: Robust 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. RSM is a composite measure of 8 sexual behavior indicators: Wife is currently pregnant; Whether respondent had sex last month; Number of times had sex last month (all partners); Number of partners in the last month; Number of partners in the last year; Number of condoms used in the past month; Fraction of safe sexual encounters in the last month; Number of condoms purchased in the last month; Number of condoms received free in the last month. This is measured as the mean of the standardized value for each of these measures of sexual behavior.

Robust standard errors in brackets

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

Table 7: Impact of Information on Circumcisions

Panel A: Circumcision by Treatment Group	**Got circumcised**	
	(1)	(2)
Treatment	0.021	0.021
	[0.017]	[0.018]
Constant	0.012	0.054*
	[0.008]	[0.032]
Includes Control Variables	No	Yes
Observations	320	319
R-squared	0.005	0.03
Average of dep var	0.022	0.022

Panel B: Summary Statistics of those who got circumcised

	Circumcised in past year N=7	Not circumcised N = 312	Diff	
	(1)	(2)	(3)	
Age	29.714	32.540	-2.826	*
Married	1.000	0.863	0.137	***
Years of Education	6.143	6.655	-0.512	
Chewa	0.143	0.061	0.082	
Lomwe	0.143	0.284	-0.141	
Nyanja	0.714	0.530	0.184	
Yao	0.000	0.099	-0.099	***
Income	70.012	107.375	-37.363	**
Assets	5.286	4.406	0.880	
Farmer	0.857	0.641	0.216	
Self-Employed	0.857	0.312	0.545	***
Age at sexual debut	16.833	17.638	-0.805	
Had sex in the last month	0.667	0.745	-0.078	
Number of sexual partners across lifetime	3.333	3.804	-0.471	
Number of sexual partners in last 12 months	1.000	1.118	-0.118	*
Ever used a condom	0.333	0.382	-0.049	

Panel C: Reasons for getting circumcised:	**Treatment N=5**	**Control N=2**
Health	0.4	0.5
Cultural reasons	0.2	0
Please wife	0.2	0
Reduce HIV/Aids risk (and STI risk)	0.2	0
Set example for younger relative/child	0.2	0.5

Notes: Robust Standard Errors are clustered by village. Control variables included in column 2 in Panel A include: age, marital status, total expenditures, years of scholing, assets and a dummy for whether or not the respondent had sex in the last week.

Robust standard errors in brackets

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

Appendix A: Religion, Ethnicity and Circumcision

Panel A: Fraction Circumcised		TA Kuntamanji 2008 N = 1214 (1)	MDICP 2008 (Balaka) N = 391 (2)	MDHS 2004 (Zomba, Rural) N = 167 (3)
Religion:	Christian	0.606	0.587	0.319
	Muslim	0.939	0.994	0.906
Ethnicity:	Chewa	0.667	0.720	0.160
	Lomwe	0.561	0.459	0.370
	Ngoni	0.400	0.368	0.167
	Nyanja	0.657	0.737	0.242
	Yao	0.928	0.992	0.830

Panel B: Religion and conversions (N=1214)		%Circumcised (1)	Age at Circumcision (2)
Parent's religious history:			
	Mother always Christian	0.580	13.469
	Mother at some point Christian	0.618	13.524
	Mother always Muslim	0.938	11.775
	Mother at some point Muslim	0.915	12.116
	Father always Christian	0.583	13.676
	Father at some point Christian	0.615	13.597
	Father always Muslim	0.931	11.704
	Father at some point Muslim	0.908	11.976
Respondent's religious history:			
	Always Christian	0.557	13.624
	Always Muslim	0.945	11.743
	Christian then Muslim	0.900	15.185
	Muslim then Christian	0.879	11.250
	Other	0.872	13.561

Notes:

For Panel A: The TA Kuntumanji sample constitutes all men in the baseline sample conducted in 2008 for which their circumcision status is known (1216 respondents in 70 different villages); there are 21 observations excluded as these respondents did not report their circumcision status. The MDICP sample (2008) constitues all male respondents in the Balaka district for which a VCT questionnaire and survey was administered totalling 391 observations. The Malawi DHS sample constitutes only those men in rural Zomba district totalling 167 respondents. For Panel B: The sample of respondets is limited to only those men that were found at the 2009 follow-up data collection as the religious histories were conducted at that time.

Appendix B: Balancing Statistics by Circumcision Status

Panel A: Male Sample Description		**Circumcised**		**Uncircumcised**	
		T	**C**	**T**	**C**
Respondents:	Total	448	448	153	167

		Circumcised				**Uncircumcised**			
Panel B: Male Summary Statistics		**T**	**C**	**Diff**		**T**	**C**	**Diff**	
Demographics:	Age	31.179	31.770	-0.592		33.059	31.946	1.113	
	Married	0.906	0.906	0.000		0.889	0.844	0.045	
	Years of Education	5.484	5.728	-0.243		6.072	7.168	-1.096	**
	Literate in Chichewa	0.721	0.739	-0.018		0.817	0.796	0.021	
	Literate in English	0.333	0.344	-0.011		0.425	0.491	-0.066	
Tribe:	Chewa	0.045	0.045	0.000		0.072	0.054	0.018	
	Lomwe	0.167	0.089	0.078	**	0.320	0.246	0.075	
	Nyanja	0.368	0.365	0.004		0.503	0.563	-0.060	
	Yao	0.413	0.480	-0.067		0.078	0.114	-0.035	
Religion:	Christian	0.471	0.420	0.051		0.810	0.808	0.002	
	Muslim	0.482	0.509	-0.027		0.072	0.096	-0.024	
Wealth:	Income	103.771	109.868	-6.097		102.272	110.503	-8.230	
	Assets	4.167	4.696	-0.529	***	4.307	4.533	-0.226	
	Farmer	0.614	0.611	0.004		0.641	0.651	-0.010	
	Salaried	0.099	0.159	-0.060	***	0.078	0.205	-0.126	***
	Self-Employed	0.381	0.358	0.023		0.355	0.295	0.060	
Sexual Behavior:	Age at sexual debut	17.027	16.809	0.219		17.636	17.610	0.026	
	Had sex in the last month	0.752	0.770	-0.019		0.728	0.758	-0.029	
	Number of sexual partners across lifetime	4.297	4.563	-0.266		3.781	3.808	-0.027	
	Number of sexual partners in last 12 months	1.063	1.146	-0.083	*	1.125	1.108	0.017	
	Ever used a condom	0.397	0.454	-0.057		0.399	0.365	0.034	

Notes:

The main sample consists of 1228 men residing in Zomba district in Malawi that agreed to participate in the baseline