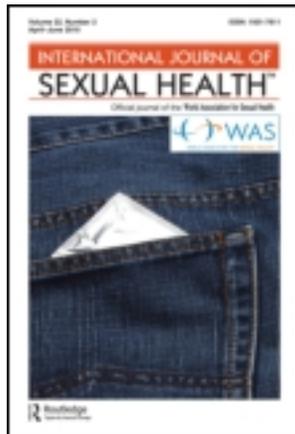


This article was downloaded by: [141.211.139.149]

On: 12 May 2014, At: 07:38

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## International Journal of Sexual Health

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/wijs20>

### Prevalence of and Factors Associated with Oral Sex Among Rural and Urban Malawian Men

Jason T. Kerwin<sup>a</sup>, Rebecca L. Thornton<sup>a</sup> & Sallie M. Foley<sup>b</sup>

<sup>a</sup> Department of Economics, University of Michigan, Ann Arbor, Michigan, USA

<sup>b</sup> Graduate School of Social Work, University of Michigan, Ann Arbor, Michigan, USA

Accepted author version posted online: 16 Aug 2013. Published online: 25 Feb 2014.

To cite this article: Jason T. Kerwin, Rebecca L. Thornton & Sallie M. Foley (2014) Prevalence of and Factors Associated with Oral Sex Among Rural and Urban Malawian Men, *International Journal of Sexual Health*, 26:1, 66-77, DOI:

[10.1080/19317611.2013.830671](http://dx.doi.org/10.1080/19317611.2013.830671)

To link to this article: <http://dx.doi.org/10.1080/19317611.2013.830671>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

## PREVALENCE OF AND FACTORS ASSOCIATED WITH ORAL SEX AMONG RURAL AND URBAN MALAWIAN MEN

Jason T. Kerwin<sup>1</sup>, Rebecca L. Thornton<sup>1</sup>, Sallie M. Foley<sup>2</sup>

<sup>1</sup>Department of Economics, University of Michigan, Ann Arbor, Michigan, USA

<sup>2</sup>Graduate School of Social Work, University of Michigan, Ann Arbor, Michigan, USA

**ABSTRACT.** *Objectives:* Despite medical evidence that female-to-male oral sex (fellatio) carries a lower risk for HIV transmission than unprotected vaginal intercourse, little research exists on the practice of fellatio in Africa. The objective of this study was to document the prevalence of oral sex in Malawi, and to provide the first evidence on factors associated with the practice in sub-Saharan Africa. *Methods:* We used two samples of men from Malawi—one rural and one urban—to examine the prevalence of oral sex, as well as factors that were associated with the knowledge and practice of oral sex. *Results:* While 97% of the rural sample and 87% of the urban sample reported having had vaginal sex, just 2% and 12%, respectively, said they had ever received oral sex. Only half of the rural sample, and less than three quarters of the urban sample, reported having heard of oral sex. Education, exposure to newspapers and television, and condom use significantly predicted oral sex knowledge after controlling for other confounding factors, while exposure to radio did not. *Conclusions:* The large gap between sexual activity and oral sex prevalence suggests that fellatio should be taken into consideration as a potential component of an HIV prevention strategy, but further quantitative and qualitative research that includes women as well as men is needed to understand potential benefits and drawbacks.

**KEYWORDS.** HIV prevention, sexual behavior, oral sex, sub-Saharan Africa, Malawi

### INTRODUCTION

Epidemiological research suggests that fellatio (female-to-male oral sex) carries a low risk for HIV transmission. The most cited study estimates the rate of transmission is 4 out of 10,000 unprotected oral sex acts between men in the United States (Vittinghoff et al., 1999). This compares to a transmission rate of 9 out of 10,000 acts of unprotected vaginal intercourse in the United States (Padian, Shiboski, Glass, & Vittinghoff, 1997). The rate estimated by Vittinghoff et al. (1999), however, is likely to be an overestimate, as no sero-conversions were observed for individuals whose only potential exposure was via unprotected oral sex. In a study that isolated only exposures via oral sex, measured transmis-

sion rates were far lower: del Romero et al. (2002) recorded 19,000 unprotected oral sex acts among 135 sero-discordant couples and found no sero-conversions. One review of the literature concluded that “the risk of transmission of HIV via oral sexual practices is very low” (Campo et al., 2006, p. 219), while a more recent review argued that unprotected oral sex has an HIV transmission risk comparable to, and possibly lower than, that from condom-protected vaginal intercourse (Kerwin, Foley, Thornton, Basinga, & Chinkhumba, 2011).

Despite the low HIV transmission risk of oral sex and extensive research on other safer-sex strategies in sub-Saharan Africa, there is limited evidence on the prevalence of oral sex in the region. We are aware of only three previously

Received 13 March 2013; revised 23 July 2013; accepted 28 July 2013.

Address correspondence to Jason T. Kerwin, Department of Economics, University of Michigan, 611 Tappan Street, Ann Arbor, MI 48106, USA. E-mail: jtkerwin@umich.edu

published studies on the topic, as well as one unpublished study, all of which focus on students or youth populations. Feldman, O'Hara, Baboo, Chitalu, & Lu (1997) found a 25% prevalence rate of oral sex among Zambian adolescents, despite 77% having had vaginal intercourse. A study of students in Nigeria revealed that 78% reported vaginal sex, but only 13% reported having oral sex (Bamidele, Abodunrin, & Adebimpe, 2009). Peltzer and Pengpid (2006) found that among 16- and 17-year-olds in South Africa, one quarter of the respondents reported receiving oral sex and one fifth reported performing oral sex. Unpublished work by Umuhoza and Basinga (2011) revealed that 27% of Rwandese college students reported having oral sex. By means of comparison to these studies in Africa, a study of American men aged 20 to 39 years old revealed that more than three quarters had engaged in oral sex, while 95.4% had ever had sex (Billy, Tanfer, Grady, & Klepinger, 1993). In developed countries, oral sex is even more common relative to vaginal sex for younger individuals: A survey of ninth graders in the United States revealed that 19.6% engaged in oral sex versus just 13.5% having had vaginal intercourse (Halpern-Felsher, Cornell, Kropp, & Tschann, 2005).

The reasons for the sharp difference in the prevalence of oral sex between the United States and sub-Saharan Africa are currently unknown; further exploration of which factors are associated with the knowledge and practice of oral sex is important to evaluate its potential as a safer-sex strategy in the region. In this article, we use the results of two surveys—one urban, one rural—conducted in Malawi, to study the extent of, and factors related to, the knowledge and practice of oral sex in that country. To the best of our knowledge, this article presents the first data on oral sex in Malawi and the first exploration of factors correlated with oral sex in Africa.

## METHODS

### Study Setting and Study Population

Our analysis of the prevalence and correlates of oral sex is based on two surveys conducted among distinct samples of men in

Malawi—one rural and one urban. The rural sample of 1,228 men was collected in Traditional Authority Kuntumanji in Zomba District, located in the Southern region of Malawi. Sixty-nine villages were randomly selected, stratified by the distance to the nearest mosque. Within each village, a full household enumeration was conducted and men ages 25 to 40 years old were randomly selected from the household enumeration; only 1 man was selected per household. Men were asked questions about their knowledge and experience with oral sex. More information on this study of rural men can be found in Godlonton, Munthali, and Thornton (2012).

The urban sample consists of a representative sample of uncircumcised men living in urban Lilongwe. This survey was conducted within the catchment area of a private family planning clinic. Neighborhoods were randomly selected, and, within those neighborhoods, a household census was conducted to identify eligible men between the ages of 18 and 30 years old. As in the rural sample, if a household had multiple male residents in that age range, one was selected at random. The goal of the underlying survey was to study the take-up of medical male circumcision, so only uncircumcised men were eligible. See Chinkhumba, Godlonton, and Thornton (in press) for further details of the urban sample.

Out of those men in the urban and rural data who were interviewed (1,787 and 1,228, respectively), we restricted our analytical sample to men who answered questions about oral sex and who had a complete set of covariates: ethnic group, religion, age, measures of sexual activity,<sup>1</sup> circumcision status, years of education, literacy, and total spending in the past 3 months. For the rural sample, we also required complete data on marital status and income in the past 3 months. This yielded final analytical samples of 1,216 for rural men and 1,537 for urban men.

<sup>1</sup>Measures of sexual activity included whether the respondent has ever had sex, years of sexual activity, lifetime sex partners, whether he has ever used a condom, condom use at last sex, sex partners in the past month, and sexual encounters in the past month.

### Ethical Considerations

Prior to commencing each survey, subjects granted their informed written consent to participate in the study. The studies received approval from the Health Sciences and Behavioral Sciences Institutional Review Boards (IRB-HSBS) at the University of Michigan (HUM0001206); the National Health Sciences Research Committee at the Ministry of Health (#406) and the College of Medicine Research and Ethics Committee (P.09/09/825) provided in-country oversight for the rural and urban samples, respectively.

### Measures of the Key Outcome

The respondents in the rural sample answered questions on four sexual practices: anal sex, fellatio, cunnilingus, and masturbation. For each practice, they were asked, "Have you ever heard of [practice]?" If they answered yes, they were asked: "Do you know of any friends who have done this?" and "Have you ever done this?" The urban sample was only asked about fellatio. They were asked, "Have you ever heard of receiving oral sex from a woman?" Answering yes led to two follow-up questions: "Do you know of any of your friends who have received oral sex from a woman?" and "Have you ever received oral sex from a woman?" We tabulated the responses to these questions to examine the overall extent of these practices and how the knowledge and practice of oral sex varies across rural and urban areas.

Respondents in the rural sample were also asked additional questions about ways in which they believed HIV could be transmitted. For example, the first of these questions was, "Do you think that people contract HIV by having vaginal sex?" Ten other similar questions were also asked for other activities, replacing "vaginal sex" with the activity in question. This means that the questions were not mutually exclusive: A respondent could (correctly) believe that people contract HIV through both vaginal sex and mother's milk. These questions allow us to measure the extent of knowledge about HIV transmission, and in particular, whether they understand the risk benefits of oral sex. All surveys for both samples were conducted in Chichewa

using translated versions of the survey instruments. These translations were cross-checked during enumerator training.

### Statistical Approach

Our analytic strategy comprised two broad components: First, we present the basic frequencies for the sexual behavior variables described, as well as the HIV transmission belief questions (for the rural sample only). Second, we examine factors that may be associated with individual knowledge of oral sex, as well as practice of oral sex for the urban sample.

Our analysis of factors related to oral sex takes advantage of the fact that the rural data have a rich set of covariates, including media exposure and beliefs about HIV risk factors. Using the rural data, we examined simple bivariate relationships between whether a man has heard of oral sex and his exposure to various forms of media as well as his HIV risk factor beliefs. This was done using bivariate logistic regressions as well as Pearson's chi-squared tests of association. We then conducted multivariate analyses of factors related to knowledge of oral sex using logistic regressions. We began with a full model that included a wide range of covariates including many that are only available in the rural data. We then reduced the model to only include the covariates available in the urban data. We checked this reduced model for major changes in the coefficient estimates and checked the drop in model fit as measured by the pseudo- $R^2$ . All specifications included indicators of village or neighborhoods to control for localized heterogeneity in knowledge and practices.

Finally, we analyzed factors associated with the practice of oral sex. Oral sex is so rare in rural Malawi that studying factors associated with its practice is infeasible for the rural sample. However, given its higher prevalence in urban Malawi, we were able to run logistic regressions of whether a respondent had tried oral sex among the urban sample. Comparing the results of the regression models, we explored how the factors associated with knowledge of oral sex varied across rural and urban Malawi and how they differ from the factors associated

TABLE 1. Demographic Characteristics

	Rural Sample			Urban Sample		
	Mean/Percent (1)	Median (2)	Std. Dev. (3)	Mean/Percent (4)	Median (5)	Std. Dev. (6)
Marital Status						
Married	89.56%			—		
Separated/divorced/widowed	4.85%			—		
Never married	5.59%			—		
Ethnicity						
Chewa	4.93%			32.79%		
Yao	35.61%			3.90%		
Tumbuka	0.41%			13.01%		
Lomwe	16.69%			14.25%		
Ngoni	0.82%			24.33%		
Nyanja	41.12%			0.78%		
Other <sup>†</sup>	0.41%			11.00%		
Religion						
Muslim	51.97%			0.78%		
Catholic	7.89%			23.36%		
Pentecostal	19.49%			14.38%		
Church of Central Africa, Presbyterian	4.11%			32.73%		
Seventh-Day Adventist	0.33%			9.30%		
African-Initiated Church	6.33%			5.01%		
Other Christian	9.38%			12.36%		
Other/no religion	0.49%			2.08%		
Age	31.87	31.00	6.65	26.46	26.00	6.63
Ever had sex	97.12%			86.86%		
Years sexually active	15.41	15.00	7.54	8.66	8.00	7.00
Total lifetime sex partners	4.27	3.00	4.55	6.80	3.00	29.55
Ever used a condom	35.61%			76.12%		
Used a condom at last sex	13.57%			45.48%		
Total sex partners in last month	0.85	1.00	1.22	0.66	1.00	0.94
Sexual encounters in last month	9.24	6.00	10.03	4.10	1.00	7.15
Circumcised	73.19%			0.00%		
Years of education	5.88	6.00	3.63	11.14	12.00	2.39
Literate in English, Chichewa, or Both	78.29%			98.18%		
Last 3 months spending (1,000s of MK)	13.03	10.15	11.03	21.45	15.04	23.76
Last 3 months income (1,000s of MK)	15.03	9.05	18.13	—		

Note. The rural sample includes 1,216 men from rural Malawi who answered questions about oral sex and covariates. The urban sample includes 1,537 uncircumcised men from urban Malawi who answered questions about oral sex and covariates.

<sup>†</sup>For the urban sample, "other" ethnicities include Tonga (3.34%), Mang'anja (2.54%), Sena (1.63%), Ngonde (1.69%), and other smaller tribes (1.69%).

with the practice of oral sex. All analyses were done using Stata (Version SE 12; StataCorp LP, College Station, TX).

## RESULTS

### Sample Characteristics

Table 1 presents summary statistics for the urban and rural samples. The majority of rural men were married (89%), with 97% reporting having had sex at least once. Slightly more than a third had ever used a condom during

intercourse. Among the urban men, 87% had ever had sex, with 76% ever having used a condom. Due to the age-based sampling strategies, the urban sample was younger than the rural sample, with an average age of 26 years as compared with 32 years, and the urban men had been sexually active for 8.7 years versus 15.4 years for the rural sample. The urban men reported having more sex partners (6.8) on average compared with the rural men (4.3), and this difference was statistically significant ( $p < .01$ ), but the medians were equal (3). The rural respondents had completed an average of

6 years of education, whereas the urban respondents had finished 11 years on average, just 1 year short of completing primary and secondary school. The literacy rate was 78% for the rural men and 98% for the urban men.

Ethnically, the rural respondents consisted primarily of the Nyanja and Yao tribes, representing 41% and 36% of the sample, respectively. Five percent were Chewa. Roughly half of the men in the rural sample were Muslim. The urban sample differs sharply from the rural one both in terms of ethnic and religious composition. It contains virtually no Nyanjas (1%) and decidedly fewer Yaos than the rural sample (4%), while nearly a third of the sample self-identified as Chewa. A much larger share of the sample was Ngoni (24% vs. 1%), while the proportion that was Lomwe was roughly the same—14% as opposed to 17% of the rural men. In terms of religion, the most notable difference was that there were nearly no Muslims. The share of respondents that were Catholic (23%) and from the Church of Central Africa, Presbyterian (CCAP; 33%) was notably higher than in the rural sample. Although the two samples are representative of the local urban and rural areas that they were drawn from, they were not designed to be representative of the entirety of urban or rural Malawi, respectively. Hence, they will likely differ from other parts of the country in terms of demographics.

One useful analysis is to consider how our samples compare to the overall characteristics of urban and rural Malawi based on the 2010 Malawi Demographic and Health Survey. Considering all men in urban Malawi aged 18 to 30 years old, the average is 8.3 years of education; the main ethnic groups are Ngoni (20%), Chewa (19%), and Lomwe (18%); and the major Christian denominations are Catholic (21%) and CCAP (25%), with 11% practicing Islam. Among all men in rural Malawi aged 25–40, the average is 5.8 years of education; the leading ethnic groups are Chewa (31%) and Lomwe (19%); 9% of the population is Muslim, with the leading Christian denominations being Catholic (21%) and CCAP (14%); and 77% of men in that age range are married (National Statistical Office [NSO] & Malawi National Statistical Organi-

zation & Opinion Research Company's Macro International, 2010). Although the rural sample is very similar to the overall average in terms of educational attainment, in general, the two regions targeted for this study are fairly different from the country as a whole in terms of mean characteristics. This reflects the substantial geographic heterogeneity in Malawi's socioeconomics.

### Prevalence of Sexual Practices

Our first set of results examines the knowledge and practice of oral sex in rural and urban Malawi. Table 2 presents the percentage of respondents who have heard of each sex practice, who have a friend who has tried each sex practice, and who have tried each practice themselves. Among rural men and urban men, respectively, 56.4% and 73.2% reported ever having heard of fellatio, while only 1.7% of the rural sample and 11.7% of the urban sample reported having personally tried oral sex. Among the rural sample, rates for cunnilingus were comparable to those for fellatio, but slightly lower. In contrast, slightly more men had heard

**TABLE 2.** Sexual Practices

	Rural Sample Percent (1)	Urban Sample Percent (2)
<b>Fellatio</b>		
Heard of it	56.41%	73.19%
Friend tried it	9.29%	29.47%
Respondent tried it	1.73%	11.71%
<b>Cunnilingus</b>		
Heard of it	50.66%	—
Friend tried it	6.09%	—
Respondent tried it	1.15%	—
<b>Anal Sex</b>		
Heard of it	62.83%	—
Friend tried it	5.43%	—
Respondent tried it	0.25%	—
<b>Masturbation</b>		
Heard of it	70.81%	—
Friend tried it	37.42%	—
Respondent tried it	22.12%	—

*Note.* The rural sample includes 1,216 men from rural Malawi who answered questions about oral sex. The urban sample is from Chinkhumba et al. (in press) and includes 1,537 uncircumcised men from urban Malawi who answered questions about oral sex and covariates.

**TABLE 3.** Beliefs About HIV Transmission

Believes That HIV Can Be Spread Through	Rural Sample <sup>†</sup> Percent (1)
Vaginal sex	99.18%
Mother's milk	82.32%
Having a child	75.58%
<b>Oral sex</b>	<b>55.18%</b>
<b>Swallowing sperm</b>	<b>59.21%</b>
Needles in the hospital	73.77%
Kissing	46.46%
Mosquitoes	38.82%
Getting circumcised	83.39%
Touching an open wound on someone	62.66%

<sup>†</sup>The rural sample includes 1,216 men from rural Malawi who answered questions about oral sex.

of anal sex, but only two men out of the entire rural sample said they had tried it themselves.

**Beliefs About HIV Transmission Risks**

One issue of interest with respect to the prevalence of oral sex is people's beliefs about its HIV transmission risk. Table 3 presents the percentage of respondents who believe that HIV can be spread through a variety of actions. Virtually all the men in the sample were aware that vaginal sex is a transmission risk, and many were aware of the risk for vertical transmission through breast milk. More than half believe that both oral sex and swallowing sperm are risks.

**Factors Associated With Oral Sex Knowledge and Practice**

Future research on the possibility of oral sex as a safer-sex strategy requires an understanding of how knowledge about oral sex is acquired and what factors predict this knowledge. One hypothesis is that more media exposure is positively associated with more knowledge about oral sex. To explore this, Table 4 presents bivariate logistic regressions of having heard of oral sex through media exposure as well as whether the men believe that HIV could be transmitted through vaginal sex, oral sex, or swallowing sperm, for the rural sample. Higher levels of exposure to newspapers, radio, and television were associated with higher rates of

**TABLE 4.** Bivariate Logistic Regression Results for Whether Respondent Has Heard of Fellatio, Rural Sample

	Rural Sample <sup>†</sup> (1)	
	AOR	95% CI
Newspaper Reading Frequency		
More than once per month	2.17***	[1.58, 2.97]
Less than once per month	referent	
Radio Listening Frequency <sup>a</sup>		
More than once per month	1.72***	[1.24, 2.38]
Less than once per month	referent	
TV Watching Frequency <sup>a</sup>		
More than once per month	2.18***	[1.63, 2.89]
Less than once per month	referent	
Believes HIV Can Be Spread Through: <sup>b</sup>		
Vaginal Sex		
Yes	0.32	[0.07, 1.53]
No	referent	
Oral Sex		
Yes	1.18	[0.92, 1.52]
No	referent	
Swallowing Sperm		
Yes	1.05	[0.83, 1.34]
No	referent	

<sup>†</sup>The rural sample includes 1,216 men from rural Malawi who answered questions about oral sex.

<sup>a</sup>Men with missing data were excluded (one for radio use and three on TV use).

<sup>b</sup>HIV transmission belief categories are not mutually exclusive.

knowledge, and we can reject the hypothesis that the likelihood of having heard of oral sex is unrelated to levels of media use at the .01 level for all three media categories.<sup>2</sup> In contrast, beliefs about how HIV is transmitted were not statistically significantly related to knowledge of oral sex. As an alternative approach, we also examined simple Pearson's chi-squared tests of association between "heard of oral sex" and the media exposure and HIV transmission beliefs (not shown). This yielded *p* values close to those found via the presented logistic regressions.

These bivariate relationships could be confounded by omitted variables such as

<sup>2</sup>This analysis collapses the underlying variables, which recorded media use as "daily or almost daily," "one to three times per week," "one to three times per month," "less than once per month," and "not at all." The results were qualitatively similar when using the fine categories instead of the collapsed versions: Newspaper and television use were significantly associated with knowledge of oral sex at the .01 level, while the radio use relationship was significant at the .1 level.

**TABLE 5.** Multivariate Logistic Regression Results for Whether Respondent Has Heard of Fellatio, Rural and Urban Samples

Variables	Rural Sample Expanded Model <sup>a</sup> (1)		Rural Sample Reduced Model (2)		Urban Sample Reduced Model (3)	
	AOR	95% CI	AOR	95% CI	AOR	95% CI
Age	0.95	[0.80, 1.14]	0.95	[0.80, 1.13]	0.97	[0.90, 1.06]
(Age) <sup>2</sup>	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Years Sexually Active	1.05*	[1.01, 1.10]	1.06**	[1.02, 1.11]	1.01	[0.98, 1.05]
Total Lifetime Sex Partners	1.05	[1.00, 1.10]	1.05*	[1.00, 1.11]	1.02*	[1.00, 1.04]
Respondent Has Ever Used a Condom						
Yes	1.58***	[1.23, 2.04]	1.61***	[1.24, 2.08]	2.48***	[1.80, 3.43]
No	referent		referent		referent	
Respondent Is Circumcised						
Yes	1.21	[0.89, 1.66]				
No	referent					
Respondent Is Literate						
Yes	1.00	[0.62, 1.59]				
No	referent					
Years of Education	1.03	[0.98, 1.09]	1.06**	[1.02, 1.11]	1.12***	[1.07, 1.17]
Ln (Income in last 3 months)	1.03	[0.93, 1.13]				
Ln (Spending in last 3 months)	1.01	[0.87, 1.18]	1.09	[0.94, 1.27]	1.17*	[1.03, 1.33]
Married						
Yes	1.02	[0.67, 1.57]				
No	referent					
Reads the Newspaper:						
More than once per month	1.62*	[1.11, 2.36]				
Less than once per month	referent					
Listens to the Radio:						
More than once per month	1.34	[0.86, 2.10]				
Less than once per month	referent					
Watches TV:						
More than once per month	1.70**	[1.23, 2.36]				
Less than once per month	referent					
Believes HIV can be spread through:						
Vaginal Sex						
Yes	0.28	[0.05, 1.49]				
No	referent					
Oral Sex						
Yes	1.14	[0.81, 1.59]				
No	referent					
Swallowing Sperm						
Yes	0.98	[0.70, 1.37]				
No	referent					
Observations		1,213		1,216		1,537
Pseudo-R <sup>2</sup>		0.12		0.10		0.08
Total Village/Area Dummies		68		68		29
AOR > 1, Significant at 0.05 Level		35		35		11
AOR < 1, Significant at 0.05 Level		18		23		12
Mean of Dependent Variable		0.56		0.56		0.73
Std Dev of Dependent Variable		0.50		0.50		0.44

Note. Reported estimates are adjusted odds ratios. Regressors omitted from table: categorical dummy variables for 69 different villages (rural sample) and 30 different areas (urban sample). Heteroskedasticity-robust standard errors in brackets, clustered by village (rural sample) and area (urban sample).

\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.1$ .

<sup>a</sup>Three men with missing data on radio use and/or TV use were excluded.

geography, socioeconomics, and age. To account for these potential confounders, as well as to explore factors potentially related to having heard of oral sex, we move to the multivari-

ate logistic regression analysis described in the Methods section. Column 1 of Table 5 presents the full model for the rural sample. Notably, radio use was not significantly associated with

knowledge of oral sex once we controlled for other factors that predict both media exposure and oral sex knowledge. In contrast, frequency of exposure to newspapers and television remained statistically significant at the .1 and .05 levels, respectively, although the magnitudes of the adjusted odds ratios (AORs) were sharply reduced relative to the bivariate analysis. This implies that much of the apparent relationship between knowledge of oral sex and media exposure is due to other omitted factors. Moving from Column 1 to Column 2, there are negligible changes in the estimated effects of the remaining controls. The model fit is also relatively unaffected by this change: The pseudo- $R^2$  decreased only slightly, from .12 for the full model to .10 for the reduced model. For the urban sample, the reduced model pseudo- $R^2$  was .08. This suggests that our results are robust when restricting our set of covariates to the reduced model.

The reduced model, shown in Columns 2 and 3 for the rural and urban samples respectively, reveals a set of robust predictors of knowledge of oral sex. Ever having used a condom has a strong positive effect on the likelihood of knowing about oral sex in both the rural sample (AOR = 1.61, 95% CI [1.24, 2.08]) and the urban sample (AOR = 2.48, 95% CI [1.80, 3.43]). This indicates that those with greater exposure to risk and knowledge of safer sex in general are those who tend to learn about oral sex. Years of education, in comparison, has a smaller but still statistically significant impact in both samples (rural, AOR = 1.06, 95% CI [1.01, 1.12]; urban, AOR = 1.12, 95% CI [1.07, 1.17]). Years of sexual activity and lifetime sex partners have positive effects: at a 10% level of statistical significance, both were significant in the rural sample while "lifetime sexual partners" was significant in the urban sample.

All regressions presented in Table 5 control for local region (village for the rural sample and census enumeration area for the urban sample). The bottom panel of Table 5 shows the total number of village/area dummies in each regression and the number with AORs significantly greater than and less than 1. In both the full and reduced models, a substantial fraction

of the village/area dummy variables are also significant. These are distributed both above and below the reference value, which was picked as the area with the unconditional median value of having heard of oral sex. For example, in Column 3 of Table 5, 58 of the 68 included village dummy variables are statistically significant at the 95% level, with 35 of those having AORs greater than 1 and 23 having AORs less than 1. This implies substantial geographic variation in knowledge of oral sex, even after accounting for potential confounding.

These correlations paint two broad pictures. The first is that general information exposure matters, as indicated by the positive and significant effects of years of education and newspaper and television exposure with having heard of oral sex. The second, and less intuitive, is that knowledge of oral sex appears to diffuse through networks, a story supported by the clustering of oral sex knowledge by local area and the importance of sexual experience. Also lending credence to the diffusion story is the effect of years of education, because in addition to formal classroom sexual education, students may learn about sex practices from their school peers.

We also ran the reduced model with having tried oral sex as the dependent variable. We did this only for the urban sample, because the low numbers of rural men who reported having tried oral sex (just 21 out of the 1,216 rural men) made statistical inferences difficult. Table 6 presents the results of this analysis, with AORs and standard errors for each potential associated factor. The fit of the reduced model for this outcome variable is quite good, with a pseudo- $R^2$  of .17. The urban regression for trying oral sex matches the same general pattern as the regressions for having heard of oral sex presented in Table 6. The information exposure and sexual experience patterns are still evident; more years of education were associated with a higher likelihood of having tried oral sex, albeit not statistically significantly (AOR = 1.07, 95% CI [0.98, 1.17]), and sexual experience is still important through lifetime sex partners (AOR = 1.04, 95% CI [1.02, 1.06]). Moreover, as in the regressions for having heard of oral sex,

**TABLE 6.** Probit Regression Results for Whether Respondent Has Tried Fellatio Himself, Urban Sample

Variables	Urban Sample Reduced Model (1)	
	AOR	95% CI
Age	0.96	[0.90, 1.02]
(Age) <sup>2</sup>	1.00	[1.00, 1.00]
Years Sexually Active	1.02	[0.99, 1.06]
Total Lifetime Sex Partners	1.04***	[1.02, 1.06]
Respondent Has Ever Used a Condom		
Yes	3.16**	[1.47, 6.80]
No	referent	
Years of Education	1.07	[0.98, 1.17]
Ln (Spending in last 3 months)	1.94***	[1.55, 2.42]
Observations		1537
Pseudo-R <sup>2</sup>		.17
Total Area Dummies		29
AOR > 1, significant at .05 level		18
AOR < 1, significant at .05 level		6
Mean of dependent variable		0.12
Standard deviation of dependent variable		0.32

Note. Reported estimates are adjusted odds ratios. Regressors omitted from table: categorical dummy variables for 69 different villages (Rural Sample) and 30 different areas (urban sample). Heteroskedasticity-robust standard errors in brackets, clustered by area.

\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.1$ .

many of the area fixed effects are statistically significant at the .05 level, with some indicating lower-than-average and some higher-than-average levels of oral sex practice in the area. This is consistent with our finding that knowledge of oral sex varies considerably based on location, and with the overall pattern of higher levels of oral sex practice in the urban sample versus the rural sample.

One pattern within the urban sample, for both “heard of” and “received” oral sex, is a positive and significant impact of expenditures. We also found that several covariates that one might expect to be important had statistically insignificant effects. Perhaps most notable is age, which had no impact (entered either linearly or quadratically) once we controlled for years of sexual activity.

### POTENTIAL LIMITATIONS

The most important potential limitation of our analysis is in terms of the external validity of the results. As noted in the Sample Charac-

teristics section, our two samples, although representative of the local urban and rural areas from which they were drawn, were not necessarily designed to be representative of the entire country. As a result, we caution against generalizing our findings to Malawi more broadly. One particular potential issue for the generalizability of our results is the fact that our urban sample relied solely on men who were uncircumcised at the time of the survey. However, this issue is unlikely to significantly affect our results for two reasons. First, both in urban Lilongwe and nationwide, fewer than one in four men are circumcised. A focus on uncircumcised men is hence consistent with the nationwide prevalence of circumcision, which was measured at just 21.6% by the 2010 Malawi Demographic and Health Survey, leaving nearly four in five men uncircumcised (NSO & ORC Macro, 2011).<sup>3</sup> This ensures that our results are representative of the preponderance of males in the country. Second, the results from the rural sample show no statistically significant relationship between circumcision status and the practice of oral sex, and no evidence that circumcision status is a significant omitted variable in our analysis of other factors associated with oral sex.

Our analysis is also limited by the scope of the questions available on the urban survey, which omits certain factors available on the rural survey. However, in our analysis of the rural survey, the main results from the reduced model are qualitatively identical to those from the full model that includes these other factors, mitigating the concern that they might be important omitted variables in the urban sample.

Another significant limitation relates to potential biases and reporting errors in the data collection process. One limitation facing any in-person survey on sexual practices is social acceptability bias, which is the tendency of

<sup>3</sup>Although the practice is fairly uncommon across Malawi as a whole, the prevalence of circumcision varies greatly not only with ethnic background and religion, but also by region. The same ethnic and religious groups often differ in whether they practice male circumcision depending on their specific location. See Godlonton et al. (2012) for a more detailed discussion.

respondents to report, instead of the truth, either what they are socially expected to do or what they think the interviewer wants to hear. Similarly, there may have been limitations in the translation of questions on oral sex. In particular, it is possible that the phrases used to ask about oral sex in Chichewa were not understood, either due to issues with translation or because respondents know the practice by slang terms rather than a more technical name. Because no previous quantitative research had addressed the prevalence of oral sex in Malawi, no preexisting validated questions were available and so it was necessary to develop new Chichewa-language questions on the topic. The set of questions used was extensively field-tested against other alternatives, including ones that used slang, and was broadly understood by test participants who were familiar with oral sex. However, we cannot rule out the possibility that to some extent, the low knowledge and practice of oral sex are the result of poor understanding of our survey questions. Mitigating this possibility somewhat is the positive correlation between knowledge of oral sex and sexual experience, which is consistent with what we would expect in a setting where knowledge of the practice is limited.

## DISCUSSION

Consistent with the existing literature on oral sex in Africa, our analysis documents that oral sex is rare in Malawi. Moreover, despite the fact that the risk for HIV infection through oral sex is quite low, more than half of respondents reported oral sex as a possible HIV transmission risk. Beliefs about whether HIV can be transmitted through oral and vaginal sex were not significantly associated with knowledge of oral sex, but both formal education and exposure to newspapers and television were, which suggests that people may be learning about oral sex through HIV education programs. Knowledge of oral sex was also correlated with having ever used a condom, which is also consistent with that pattern.

An alternative pathway suggested by the data is that people may learn about oral sex

through sexual experience and through friend and sex partner networks. Both knowledge and practice of oral sex are positively associated with number of lifetime sex partners, and both vary strongly by local geographic area, even after adjusting for possible confounders.

We also found a significant association between total spending and having heard of or tried oral sex. It is possible that this effect will have the opposite sign for women, as increased income may lead to financial capacity to choose not to have sex (Kohler & Thornton, 2012). Although this is consistent with a model of sexual power dynamics in which money enables men to buy a wider variety of sex partners and sexual experiences, in the Malawian context, the interpretation of this result is considerably more complex. Poulin (2007) documents the important role of cash and in-kind gift giving from men to women in all sexual relationships, with increased gift exchange often signifying a more serious rather than a less serious relationship. However, this does not mean that spending power is unimportant for men's access to sex: Poulin noted that lower male earnings lead to high female bargaining power. Oral sex may therefore be similar to sexual behavior more generally, in that male access to money is necessary to facilitate the relationship but does not guarantee sexual experiences.

These results have several important implications for the potential use of oral sex as part of a broader HIV prevention program in Malawi. First, there may be scope for promoting the adoption of oral sex through providing information about risks. Not only are the knowledge and prevalence of oral sex low, but many people report the practice as an HIV transmission risk factor. Moreover, the positive association of oral sex with media exposure and formal education suggests that these may be viable pathways for promoting the practice. Second, any potential promotion campaign should take into account the potential diffusion of oral sex knowledge and practice through social and sexual networks, which could generate misleading results if not considered. Researchers analyzing the impact of a promotion campaign need to be aware of this potential diffusion.

Third, prior to any promotion campaign, it is important to consider the extent to which oral sex serves as a substitute for, rather than a complement to, risky sexual behaviors. The literature on oral sex among American teens implies that oral sex does substitute for vaginal sex to a significant degree. Remez (2000) reported that one study showed college-aged virgins were just as likely as nonvirgins to have had oral sex, while another revealed that one quarter of virgin teens in that sample used oral sex as a substitute for vaginal intercourse. Studying a sample of adolescents aged 15 to 19 years old, Lindberg, Jones, and Santelli (2008) reported that although oral sex correlated strongly with vaginal sex, more than 25% of virgins have had oral sex. Beyond considering the role of oral sex as a means of postponing sexual debut, we can also consider the physiological substitution between acts; fellatio to completion necessarily leads to a refractory period and a longer-term decline in sexual desire on the part of the male. Although we cannot draw any causal inferences from this observational study, the positive association we observe between having ever used a condom and having tried oral sex is consistent with oral sex substituting for risky behaviors as opposed to serving as a complement to them. Additional research is needed to examine this issue from a causal perspective.

Fourth, and most importantly, a detailed understanding of the gender dimensions of oral sex is critical for understanding whether it would be a beneficial addition to an HIV prevention program. This is highlighted by the positive association between spending power and oral sex among the men in our sample: Without detailed qualitative work on the topic, it is not possible to determine whether this is related to simple transactional sex or the more nuanced gift exchange that typifies many sexual relationships in Malawi. Furthermore, Kerwin et al. (2011) noted that to the extent that fellatio is a substitute for vaginal sex, this may either benefit women (by forestalling riskier activities that they wish to avoid) or harm them (by denying them sexual satisfaction). The present work studied only men, and only in a quantitative setting, and hence cannot answer critical

questions such as how women (or for that matter, men) perceive oral sex. Detailed qualitative work, as well as quantitative work that includes women, is necessary to understand these issues.

Oral sex may have promise as a component of HIV risk reduction campaigns in Malawi. However, further qualitative and quantitative empirical work, studying women as well as men, is needed to explore its potential benefits and drawbacks and to understand how best to structure a campaign to promote it.

### ACKNOWLEDGEMENTS

Many thanks to Susan Godlonton for input on the processing and analysis of the data. Three anonymous referees provided invaluable comments. We are grateful for research assistance from Jessica Kraft, Arija Jarvenpaa, and Jennifer Hesse.

### FUNDING

We acknowledge support from the Eva L. Mueller New Directions in Economics and Demography Fund Grant through the University of Michigan Population Studies Center. The authors gratefully acknowledge use of the services and facilities of the Population Studies Center at the University of Michigan, funded by National Institute of Child Health and Human Development Center Grant R24 HD041028. Funding for the data collection of this study was provided by Michigan Center for Demography of Aging (MiCDA), OVPR and Rackham at the University of Michigan as well as the Institute for Research on Women and Gender.

### REFERENCES

- Bamidele, J. O., Abodunrin, O. L., & Adebimpe, W. O. (2009). Sexual behavior and risk of HIV/AIDS among adolescents in public secondary schools in Osogbo, Osun State, Nigeria. *International Journal of Adolescent Medicine and Health, 21*, 387–394.
- Billy, J. O. G., Tanfer, K., Grady, W. R., & Klepinger, D. H. (1993). The sexual behavior

- of men in the United States. *Family Planning Perspectives*, 25, 52–60.
- Campo, J., Perea, M. A., del Romero, J., Cano, J., Hemando, V., & Bascones, A. (2006). Oral transmission of HIV, reality or fiction? An update. *Oral Diseases*, 12(3), 219–228.
- Chinkhumba, J., Godlonton, S., & Thornton, R. L. (in press). Demand for medical male circumcision. *American Economic Journal: Applied Economics*.
- del Romero, J., Marincovich, B., Castilla, J., García, S., Campo, J., Hernando, V., & Rodríguez, C. (2002). Evaluating the risk of HIV transmission through unprotected orogenital sex. *AIDS*, 16(9), 1296–1297.
- Feldman, D. A., O'Hara, P., Baboo, K. S., Chitalu, N. W., & Lu, Y. (1997). HIV prevention among Zambian adolescents: Developing a value utilization/norm change model. *Social Science & Medicine*, 44(4), 455–468.
- Godlonton, S., Munthali, A., & Thornton, R. (2012). *Behavioral response to information? Circumcision, information, and HIV prevention*. (Working Paper). Ann Arbor, University of Michigan.
- Halpern-Felsher, B. L., Cornell, J. L., Kropp, R. Y., & Tschann, J. M. (2005). Oral versus vaginal sex among adolescents: Perceptions, attitudes, and behavior. *Pediatrics*, 115(4), 845–851.
- Kerwin, J. T., Foley, S. M., Thornton, R. L., Basinga, P., & Chinkhumba, J. (2011). Missing safer sex strategies in HIV prevention: A call for further research. *African Population Studies*, 25(2), 286–297.
- Kohler, H.-P., & Thornton, R. L. (2012). Conditional cash transfers and HIV/AIDS prevention: Unconditionally promising? *The World Bank Economic Review*, 26, 165–190.
- Lindberg, L. D., Jones, R., & Santelli, J. S. (2008). Non-coital sexual activities among adolescents. *Journal of Adolescent Health*, 42(Suppl. 2), S44–S45.
- Malawi National Statistical Office & Opinion Research Company's Macro International (2010). *Malawi Demographic Health Survey 2010*. Calverton, MD: MEASURE DHS.
- Padian, N. S., Shiboski, S. C., Glass, S. O., & Vittinghoff, E. (1997). Heterosexual transmission of human immunodeficiency virus (HIV) in northern California: Results from a ten-year study. *American Journal of Epidemiology*, 146(4), 350–357.
- Peltzer, K., & Pengpid, S. (2006). Sexuality of 16- to 17-year-old South Africans in the context of HIV/AIDS. *Social Behavior and Personality*, 34, 239–256.
- Poulin, M. (2007). Sex, money, and premarital partnerships in Southern Malawi. *Social Science & Medicine*, 65, 2383–2393.
- Remez, L. (2000). Oral sex among adolescents: Is it sex or is it abstinence? *Family Planning Perspectives*, 32, 298–304.
- Umuhiza, S., & Basinga, P. (2011). *An exploratory study on sexual practices among the youths in Rwanda: A case study of NUR students* (Working Paper). Butare, Rwanda: National University of Rwanda.
- Vittinghoff, E., Douglas, J., Judon, F., & McKimman, D. (1999). Per-contact risk of human immunodeficiency virus transmission between male sexual partners. *American Journal of Epidemiology*, 150(3), 306–311.