Sex Work as a Response to Risk in Western Kenya*

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Abstract

Formal and informal commercial sex work is a way of life for many poor women in developing countries. Though sex workers have long been identified as crucial in affecting the spread of HIV/AIDS, particularly in sub-Saharan Africa, the nature of sex-for-money transactions remains poorly understood. This paper investigates sex worker behavior using daily self-reported data on sexual behavior, income shocks, expenditures, and labor supply for a sample of 237 women in Western Kenya. We find significant day-to-day fluctuations in sex worker decisions, and that women engage in sex-for-money transactions in part to deal with unexpected non-labor income shocks. Riskier sex is better compensated in Western Kenya, and we find that women increase their supply of riskier, better compensated sex on days in which a household member falls ill. In particular, women are 23.6% more likely to have unprotected sex, 16.8% more likely to have anal sex, and increase the number of unprotected sexual acts by 21.7% on such days. These increases in risky sexual behavior have important health consequences for these women and on the spread of HIV/AIDS. While not denying the need for interventions that encourage women to leave the commercial sex industry, our research suggests that important opportunities exist to reduce the health risks of sex work within sex work beyond HIV education and condom distribution.

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1 Introduction

Sex work is a way of life for many poor women in developing countries. In fact, the number of women involved in commercial sex work has been estimated to be as high as 10-20 sex workers per 1,000 men aged 15-59 (Morison et al., 2001). Given the large number of women engaged in commercial sex and the number of partners that they have, sex work has long been identified as a key factor influencing HIV/AIDS transmission (UNAIDS, 2002; Hawken et al, 2002; Plummer et al., 1991). And indeed, the HIV prevalence among commercial sex workers (CSWs) has been estimated at rates as high as 25 to 75 percent in some areas (National AIDS Control Council, 2005; UNAIDS, 2004; Morison et al., 2001). According to the 2003 Kenya Demographic and Health Survey (KDHS), the HIV prevalence rate among women that have exchanged sex for money or favors in the past 12 months is estimated at 11.2%, compared to 8.7% among all women aged 15-49 across Kenya.

Even these numbers are likely understated, however, as substantial research suggests that other, more informal types of sex-for-money exchange in which women typically do not self-identify as commercial sex workers or prostitutes are also prevalent, particularly in Sub-Saharan Africa (Luke, 2006; Schoepf, 2004; Hunter, 2002; Wojcicki, 2002a; Caldwell et al., 1989). While not counted as formal sex workers, these women face similar health risks and have a similar impact on HIV transmission as do formal commercial sex workers. For instance, a study in South Africa found that informal sex workers were 54% more likely to be HIV positive than other women (Dunkle et al., 2004).

Given these substantial health risks, economic theory suggests that women must be compensated to supply sex for money. Indeed, several studies have shown that CSWs receive a wage premium of 30-40% over other women with similar levels of education (Rao et al., 2003; Gertler, Shah, and Bertozzi, 2005). In fact, commercial sex is often the most best compensated available to poorly educated women; for instance, the women in our sample earn approximately 770 Kenyan shillings per day, roughly 7 times as much as other daily income earners in the area (Robinson, 2006).

In contrast to other studies of the commercial sex market, this paper is concerned with the extent to which sex workers choose to adjust their supply of sex (either protected or unprotected)

to cope with income shocks. As is the norm in developing countries, the women in our sample generally do not have access to formal credit or savings, and instead must rely upon informal methods to cope with risk. A large body of research has shown that these informal strategies are typically inefficient, either across households (Townsend, 1994; Fafchamps and Lund, 2003) or intertemporally for a single household (Paxson, 1992).

Since sex workers are free to set their own hours (unlike many workers in developed countries), they may choose to adjust their labor supply if other risk-coping strategies prove inefficient (as in, for instance, Kochar, 1999). In addition, these women are able to adjust the sexual activities they choose to provide. As with the wage premium between sex workers and other women, there exists a significant premium to supplying riskier sex: on average, each unprotected sexual act earns a premium of 35 Kenyan shillings, or 7.4% of the total average price paid.

We find that women are 23.6% more likely to have unprotected sex, 22.7% more likely to have unprotected vaginal sex, 16.8% more likely to have anal sex, and provide 21.7% more unprotected sexual acts on days in which a household member falls sick. These choices entail significant health risks, given the 9.8% HIV rate in the area (KDHS), especially since the shocks studied in this paper are transitory and relatively small compared to the lifetime budget constraint. Since these shocks are relatively small, they should not significantly affect the lifetime marginal utility of wealth and so should not induce large changes in behavior. That they do suggests that other risk-coping strategies fail dramatically for these women.

To our knowledge, the relationship between sex work and risk-coping has not been formally studied in an economics context, although Ahlburg and Jensen (1998) do consider the possibility that rural families may reduce their exposure to income risk through the migration of a family member into urban commercial sex work. In the sociology and anthropology literature, qualitative evidence has suggested that women have sex with multiple partners or develop sexual networks for financial support and income security (Swidler and Watkins, 2006; Schoepf, 2004; Hunter, 2002; Wojcicki, 2002b). Researchers have also examined the types and amounts of gifts received from partners in informal or transactional sex relationships (Luke, 2006; Dunkle et al., 2004; Luke, 2003), but not the effect of income shocks or income risk on those transfers.

Two reasons for the limited research on sex work are that commercial sex is often illegal and

that it is difficult to identify women that works as CSWs. This is even more of a problem in Africa, where sex work can be rather informal and fluid – "clients" may be boyfriends, sex work may occur out of homes, payment may be through goods and services rather than cash, and women may hold outside jobs and move in and out of sex work frequently (Luke, 2005; UNAIDS, 2002; Wojcicki, 2002a; Ngugi et al., 1996). To obtain a relatively representatively sample of women engaged in sex work, this paper identified women through a peer group network which was originally started by the Strengthening STD/HIV Control Project in Kenya (SHCP), a Kenyan organization that worked with thousands of sex workers.

We identified sex workers by asking peer group members to name any women they knew in the area who had multiple partners. In this manner, we identified 1,205 formal and informal sex workers[1] in Busia, Kenya, a semi-urban town in a rural area of Western Kenya. Busia is located along a major trucking route to Kampala from Mombasa via Nairobi and has been identified as a "hot spot" for commercial sex work (National Aids Control Council, 2005). The total estimated population of Busia is 44,196 (Central Bureau of Statistics, 1999), which suggests that at least 11.6% of the female population aged 15-49 in Busia earns income from sex work. The women involved in this project are therefore not as atypical of the general population as might be CSWs in developed countries.[2]

2 Theoretical Framework

In this section, we present a simple model of sex work. The sex worker is assumed to maximize lifetime utility over consumption c_t, number of clients in the sex sector k_t, and risk h_t of the form:

$$\max_{\{c_t,k_t,h_t\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} [\delta * \partial(h_t)]^t u(c_t, k_t, h_t) \tag{1}$$

[1] We do not focus on the distinction between formal and informal sex workers for the purposes of this paper as our main focus is on the sexual behaviors and associated health risks among these women. For simplicity, we will refer to our sample population as sex workers in the rest of the paper.

[2] The figure of 11.6% is calculated using the proportion of females age 15-49 in rural Kenya from the KDHS 2003.

where δ is the discount rate and $\partial(h_t)$ is the probability that the woman will be alive.[3] Health risk h_t influences lifetime utility in two ways: through the utility function and through the probability that the woman is alive. We assume that $\partial'(h_t) < 0$, so that as the level of health risk increases (or the number of unprotected sexual acts increases), the probability that the woman will be alive decreases. We assume a specific functional form of the type

$$u(c_t, k_t, h_t) = \alpha(c_t) + \beta(k_t) - d(h_t) \tag{2}$$

The first 2 terms indicate simply that the utility function is separable in consumption and leisure, and we assume that $\alpha'(c_t) > 0$, $\alpha''(c_t) < 0$, $\beta'(k_t) < 0$, and $\beta''(k_t) < 0$. The last term reflects the disutility associated with accepting health risk of level h_t. The $d(h_t)$ term can be thought of as the negative health and socioeconomic consequences of being infected with HIV or an STI through unprotected sex.[4] We assume that $d'(h_t) > 0$ and that $d''(h_t) > 0$, so the disutility associated with riskier sex is increasing.

The woman's 1-period budget constraint (with the price of the consumption good normalized to 1) is:

$$c_t + A_t = k_t p(h_t) + r A_{t-1} - S_t \tag{3}$$

where A_t are assets, r is the available interest rate (which is likely 0 in this part of Kenya), $p(h_t)$ is the price paid for activities with risk level h_t, and S_t is a transitory income shock. We assume that $p'(h_t) > 0$ and that $p''(h_t) > 0$: extremely risky sex is particularly highly compensated, an assumption which can be justified if men derive increasing utility from unprotected sex. We assume that $E(S_t) = 0$ and that the shocks are small relative to lifetime wealth. The latter assumption is likely valid, especially since we focus on daily shocks.

Denoting the marginal utility of lifetime wealth λ, the first-order conditions are:

$$\alpha'(c_t) = \lambda \tag{4}$$

[3] Hours worked would generally be included in a labor supply model, but unfortunately, number of hours worked is difficult to measure. Sex workers often spend all night with a client, and it is unclear whether all the hours should be counted as working.

[4] The $d(h_t)$ term can also be thought of as the costs associated with becoming pregnant. For simplicity, we assume that pregnancy only has a cost (with no benefits) for a sex worker. Costs may be lost time in sex work during pregnancy or child rearing costs.

$$\beta'(k_t) = -\lambda p(h_t) \tag{5}$$

$$\frac{-d'(h_t)}{p'(h_t)} = -\lambda k_t \tag{6}$$

Thus if a woman experienced an exogenous change in non-labor assets A_t so that the marginal utility of wealth λ were to increase, we would expect consumption to decrease, from (4). Furthermore, from (5), number of clients and accepted health risk must move in the same direction: an increase in clients should be accompanied by an increase in accepted health risk. Therefore, so long as c_t does not adjust by the full amount of the change in assets (so that both clients and accepted health risk increase), we expect to see a decrease in consumption, an increase in the number of clients, and an increase in accepted health risk in response to permanent changes in wealth.

In this paper, however, we are interested in the effect of a transitory shock S_t. Since $E(S_t) = 0$, these small, transitory shocks should not affect the lifetime budget constraint (though they might if savings and credit were completely unavailable so that the 1-period budget constraint always binds).[5] As a result, these transitory shocks should not affect the marginal utility of lifetime wealth λ and should have no effect on the amount of health risk that is taken. We will test these implications in the empirical analysis.

3 Research Design

3.1 Identifying Commercial Sex Workers

Studies of sex work are rare because sex work is typically illegal, making it difficult to identify the women involved and to recruit women to participate in a study. Identifying sex workers is even more of a problem in Sub-Saharan Africa, where sex work is rather informal and fluid. For instance, "clients" may be boyfriends or lovers, sex work may occur out of homes, payment may be made through goods and services rather than cash, and women may hold jobs outside of

[5] Few women in our sample have formal savings accounts or access to bank credit, but most have access to informal savings or credit (Table 1).

sex work and move into and out of sex work frequently (Luke, 2005; UNAIDS, 2002; Wojcicki, 2002a; Ngugi et al., 1996).

To overcome this problem, we have been working with a peer group network, formerly of the Strengthening STD/HIV Control Project in Kenya (SHCP), and the University of Nairobi Institute for Tropical and Infectious Diseases (UNITID) to identify and collect data from a population of sex workers in Busia, Kenya. SHCP was associated with the University of Manitoba and the University of Nairobi and worked with thousands of commercial and informal sex workers across Kenya. SHCP began working in Western Kenya in 1999 by organizing women into peer groups of 15 to 30 women each. Each group is led by a peer educator, and the peer groups within each district are supervised by a trained nurse who serves as a field coordinator. Though SHCP was phased over to the government in October 2005, the peer groups within a district continue to operate essentially as community-based organizations.

Our study takes place in Busia District, a rural area in Western Kenya with a semi-urban center, Busia Town. Busia Town is located on the Ugandan border, along one of two major trucking routes from the port of Mombasa to Kampala (via Nairobi). Truck stops are often where sex workers congregate, and SHCP identified Busia as a "hot spot" for commercial sex activity due to the high volume of trucks overnighting. A GIS-based study conducted by SHCP found that Busia received approximately one-quarter of the trucks overnighting at the Kenya-Uganda border (National Aids Control Council, 2005).[6] Unlike sex workers in many developed countries and in urban areas of developing countries, however, many of the sex workers in Busia do not self-identify as commercial sex workers (CSWs). Many of the women are orphans, widowed, divorced, or separated, and identify themselves as "survivors": women who engage in sex work in order to survive.

Unfortunately, the health risks of transactional sex in this area are high, and the HIV prevalence has been estimated at 9.8% in Busia District, compared to the national average of 6.7% (KDHS, 2003). Figure 1 compares the HIV prevalence among women and men age 15-49 estimated from the Kenya Demographic and Health Survey (KDHS) 2003 across Kenya and in

[6] In Kenya, the other major border town is Malaba, which receives about three times the number of overnight trucks.

several regions near and encompassing our study population.[7] Busia District is located within Western Province, which has a slightly lower HIV prevalence of 4.9% than the national average. When we look specifically at the HIV prevalence in Busia District, however, the HIV prevalence is higher than in Western Province, which may be a result of the high volume of commercial trucking activity and the large sex worker population. In addition, Busia Town is on the trucking route that passes through Kisumu in Nyanza Province, which has the highest HIV prevalence among all regions in Kenya.[8] Figure 1 also shows that, in general, women have a higher HIV prevalence than men. Interestingly, this trend does not hold true for Busia District, which may be a result of sample selection, since the HIV prevalence figures were meant to be representative at a national and provincial level (and not necessarily at the district level).[9]

At the start of the study in 2005, approximately 400 women had been recruited into 30 peer groups in Busia. The field coordinator for the district was employed as an enumerator for this project and was assisted by one of the peer educators. To construct a list of all sex workers in Busia, we asked each woman in a peer group to provide a list of women that she knew to be involved in formal or informal sex work. As the line between commercial sex work and informal transactional sex is quite unclear, the women sampled for this study were drawn from a list identified by women in the peer groups of all single, widowed, divorced, or separated women, age 18 and older, living within Busia Town with multiple concurrent sexual partners.[10] This "snowball" technique identified 1,205 sex workers from a population of 44,196 in Busia Town (Central Bureau of Statistics, 1999). Assuming an equal gender ratio, this amounts to 1 sex worker for every 18 men in Busia Town, a much higher ratio than that found by Morison et al. (2001).[11] If we compare our sample with the female age 15-49 population, the estimated proportion of women earning income from transactional sex is even higher: an estimated 11.6%

[7] The KDHS does not have data at a geographical level below the district level.

[8] Traveling through Malaba bypasses Kisumu, and anecdotal reports suggest that many truck drivers choose the Malaba route to save time and avoid the Kisumu detour.

[9] Busia District is one of 12 districts where the HIV prevalence is greater for males than for females in the KDHS 2003. There are 69 districts total in Kenya.

[10] SHCP used the same definition (single, widowed, divorced, or separated women with multiple concurrent sexual partners) to define a sex worker for recruitment into its peer groups.

[11] Using the KDHS 2003, the actual gender ratio of women to men in rural areas is approximately 1.04:1.

of the female age 15-49 population in the town earns income from sex work.[12] The women involved in this project are not as atypical as CSWs in developed countries, and since we have likely not identified every woman that engages in transactional sex, the results of this study are generalizable to a large proportion of the female population in Busia Town.

Working with a sample identified by women in SHCP-organized peer groups has both advantages and disadvantages. One advantage is that women in the peer groups know other single women in their community with multiple concurrent sexual partners, which is especially important given the informal nature of sex work and that sex work is illegal in Kenya. Furthermore, the structure of the peer groups allows peer educators and peers to better locate the sex workers whom they identify. Finally, SHCP has had a long, stable relationship with sex workers in Western Province, which increases the likelihood of project participation and may improve the quality of data collected. The major disadvantage is that the women identified in this way may not be fully representative of the sample of sex workers in Busia Town. As in any snowball sampling technique, the sample identified in this way will include fewer women right at the margin of participation in transactional sex. In addition, the sample may not be generalizable to formal and informal sex workers in other parts of Kenya and sub-Saharan Africa, since our population has been exposed to HIV/AIDS and STI education through SHCP.[13]

3.2 Data Collection

Of the 1,205 women that were identified, a stratified random sample of 251 women were selected for project participation, stratified by peer group. The data collection took place in two rounds: the first round between October and December, 2005, and the second round between July and October, 2006. To measure the effect of shocks on behavior, we asked each woman to keep a daily diary (or logbook) in which she self-reported the shocks she encountered (own illness or injury, illness or injury of another household member, death of a friend or family member, menstruation,

[12] The figure of 11.6% is calculated using the proportion of females age 15-49 in rural Kenya from the KDHS 2003.

[13] That women have received HIV training will, however, only strengthen any finding of a price differential for unprotected sex, as the primary alternative explanation for such a result would be that women are unaware of the risks that they face.

and incidence of a sexually transmitted infection), her sexual behavior with up to 3 partners each day, her income, and her expenditures. Round 2 diaries were slightly more detailed to collect additional information on client characteristics and unprotected vaginal and anal sex, separately. The diaries were extensively pre-tested and were refined for privacy, confidentiality, to meet norms of cultural sensitivity, and to ensure that respondents were able to understand the diary questions. The respondents filled in the diaries every day, and two enumerators conducted diary checks about once a week for data quality purposes. Literacy levels in the sample were relatively high - 96% of the sample could read Swahili, and 87% could write Swahili. In an effort to keep the sample as representative as possible, a special effort was made to keep illiterate women in the sample. Each illiterate woman was assigned a peer educator who would meet with her daily to read the diary questions and fill in the answers for her. In each round, a woman maintained a diary for a period of 3 months.

In addition to the diaries, a background questionnaire in the style of the World Bank Living Standards Measurement Surveys was also administered by enumerators. This survey included questions on family background, household characteristics, education, migration, land and durable good ownership, access to credit and savings, HIV knowledge, and transactional sex. Respondents in Round 1 (October - December, 2005) were compensated 1,000 Kenyan shillings (US$14), and respondents in Round 2 (July - October, 2006) were compensated 1,500 Kenyan shillings (US$21) for participating in the study.[14] Sample attrition was extremely low, as only 7 women either declined to participate or stopped filling out the diaries in Round 1, and 7 women left the sample in Round 2. The final sample consists of 237 women, over 21,000 daily observations, and over 37,000 client-level observations.[15]

In this study, we have identified four major shocks that confront sex workers. The first is sickness, either for the sex worker herself or for her household. The second is the death of a friend or family member, which affects behavior both because women are expected to contribute money to the funeral and because they may be required to reduce their hours to attend the funeral

[14] Round 2 participants were compensated slightly more because the diaries were more detailed and took more time to complete.

[15] The breakdown of the final sample by round is 114 women in Round 1 and 143 in Round 2, with 40 women in both rounds. The actual number of observations in each regression differs depending on available data.

itself. The third is menstruation, as women may not engage in sex work during menstruation. Finally, the fourth is the occurrence of sexually transmitted infections (STIs). We will use these four shocks to conduct most of the tests in this paper. In addition, as the latter two shocks are arguably exogenous shocks to labor income, we will use these to identify the responsiveness of expenditures to income risk.

The data collected from the diaries represent an extremely unique dataset. To our knowledge, this is the first panel dataset of sex work behavior with income and expenditure that has been collected in sub-Saharan Africa. Second, it includes much more longitudinal data than other studies of sex work, such as Gertler, Shah, and Bertozzi (2005).[16] Third, and more generally, most risk-coping studies focus on large, seasonal shocks to income, such as those caused by rainfall (for instance, Paxson, 1992 and Kochar, 1999). This paper instead concentrates upon daily income shocks and studies behavior on a much finer scale than is typically possible. Finally, our sample of sex workers are free to set their own hours without the influence of pimps or brothel owners, so they are able to adjust hours as they find necessary. This is particularly useful in that the commercial sex market appears to be one of the few functioning labor markets in developing countries.

3.3 Descriptive Statistics

3.3.1 Sex Worker Background Statistics

Background statistics for our sample of sex workers are presented in Table 1. All sample means are weighted to be representative of the overall sex worker population in Busia Town. Panel A shows that 18% of the sample is widowed, 24% is divorced or separated, 12% are currently cohabitating, and 45% are never married and not currently cohabitating. None of the women are currently married. About 44% of the sample are previously widowed, divorced, or separated (some of the cohabitating women are widowed, divorced, or separated), which is a much higher proportion than that found among women age 15-49 in Kenya (8.2% according to the KDHS 2003). This high proportion of widowed, divorced, separated women is consistent with sex workers found in rural areas according to sociology and anthropology studies (Swidler and Watkins,

[16] Gertler, Shah, and Bertozzi (2005) collect quasi-panel data on the last 3 to 4 client transactions.

2006; Wojcicki, 2002a). Many of the previously married women are likely to be HIV widows.

Panel B separates women into previously married and never married groups. In the full sample, the average sex worker is 28 years old, has completed over 9 education grades, and has 1.9 children and 2.7 dependents. Comparing the subsamples, the previously married women are older (on average 9 years older), have about half a year less educational attainment, and have a little over 2 more children and dependents. Among the previously married sample, about half were in a polygamous marriage. Their spouses were well educated on average, with over 11 years of educational attainment, and employed in a wide-variety of occupations.

Table 2 shows descriptive statistics related to commercial sex work. The average sex worker began seeing clients at age 19 and currently has 2.3 regular clients and 4.5 casual clients. The women report that 85% of all regular clients are currently married. The never married women begin seeing clients at a much younger age (16.9 years old), but have similar numbers of regular and casual clients. The never married sample of women also appear to be more attractive (as judged by the enumerators). Thirty-three percent of the sample participates in SHCP peer groups, and among those women, the average length of time in a peer group is 1.7 years.[17] Many of the women do not self-identify as commercial sex workers, and indeed there is some evidence that they are not full-time sex workers. Eighty-six percent of women hold some sort of outside job, and 39% self-report that they would like to stop seeing clients if they were able. On the other hand, prices are generally negotiated with clients before any sexual activities, which is more similar to commercial sex work than informal sex-for-money exchange. Payment may occur anytime, before or after, however.

3.3.2 HIV and Attitudes Toward Sex Work

HIV-related characteristics are shown in Table 3. In general, HIV knowledge and education is quite high. Sixty-three percent of our sample has ever-been tested, which is much higher than the 14.7% of women age 15-49 that have ever-been tested across Kenya (KDHS 2003).[18] The women also scored extremely high (average score of 93 out of 100) on a test of HIV knowledge

[17] We do not focus on differences between women in the peer groups and and not participating in the peer groups in this paper, but future work will evaluate the effectiveness of SHCP.

[18] In Western Province, 14.6% of women have ever-been tested for HIV.

that covered HIV transmission pathways, the relationship between HIV and AIDS, risk reduction methods, and misconceptions surrounding HIV/AIDS. Almost all women were aware of anti-retroviral (ARV) drugs, and the majority believed that they were effective and obtainable. Perceived (and actual) access to ARVs in Busia Town may be higher than in other parts of Kenya because Médecins Sans Frontières (MSF), an international humanitarian organization, has run an HIV/AIDS program providing ARV treatment in Busia since 2000.

In the background questionnaire, respondents were asked to self-report their known HIV status or their estimated HIV status. 34% of the sample did not respond because they were either uncomfortable with the question or did not want to disclose their HIV status. Of the women that did respond, however, 4% self-report being HIV positive, and 12% believe that there is a greater than 50% chance that they are HIV positive.[19] The proportion of women that are HIV positive is similar among previously married and never married women, but more never married women believe that there is a greater than 50% chance that they are HIV positive (15% as opposed to 9%), although this difference is not significant.

In comparing with the entire female population age 15-49 in the KDHS 2003, Figure 2 shows that HIV prevalence is much higher among widowed, divorced, and separated women across Kenya. Unfortunately, limited sample sizes within marital status categories do not allow similar HIV prevalence tabulations within Western Province and Busia District, but the same trend appears to exist. It is likely that many of the widowed, divorced, and separated women had spouses that were HIV positive, thus leading to the high HIV prevalence among this subgroup. If we believe the self-reported HIV status data that the HIV prevalence is similar among previously married and never married sex workers, the KDHS data suggests that previously married women who are HIV negative are more likely to be selected into sex work.

Table 4 presents attitudes toward commercial sex work. Only 28% of the sample self-identifies as a commercial sex worker (CSW), whereas 70% self-identify as a "survivor", which is a term commonly used in Busia to describe women who engage in sex work in order to "survive". A greater proportion of never married women identify as CSWs, although the difference is not statistically significant. Among the never married women, 87% believed they would be married

[19] Unfortunately, we did not test our sample for HIV, and one should be wary of self-reported HIV status.

before they began seeing clients, and interestingly, 62% believe sex work has increased their marriage likelihood. Among previously married women, slightly more women believe that sex work has decreased the likelihood of another marriage. In response to the question, "why did you begin seeing clients?", over 70% responded with love (54% among previously married and 83% among never married). Money and financial reasons were the second most common response overall, although being widowed, divorced, and separated was a reason provided by 36% of the previously married women. When asked why they continued to see clients, the overwhelming majority of women in both the previously married and never married subgroups responded with money and love. Stigma may also be a concern for continuing in sex work, particularly in rural Western Kenya, which can be quite conservative and religious. Thirty-seven percent of women report that there is no negative stigma from sex work, while 53% responded that the stigma is somewhat negative.

3.3.3 Shocks, Savings, and Credit

Background questionnaire statistics in Table 5 show that shocks are common – 62% of women have paid medical costs for a friend or relative in the past month, while 71% have paid funeral costs in the past month. Though income shocks are common, Table 5 also shows that these women, like many people in developing countries, lack formal mechanisms to cope with income risk: while 41% of sex workers report having a savings account, almost all of these savings accounts are group arrangements that do not easily allow for withdrawals. For example, Table 5 shows average savings withdrawals of only 70 shillings in the past month among women who report having savings accounts. Moreover, just 5% of women received a formal loan from a bank in the past year. Without formal mechanisms, women tend to save by buying livestock and tend to receive loans from friends, relatives and clients, rather than from banks. Of particular interest, however, is the number of women that participate in Rotating Savings and Credit Associations (ROSCAs): 55% of women participate in ROSCAs, and contributions were quite substantial – the average amount contributed in the past year was about 3,400 Kenyan shillings (about US $50).

Summary statistics from the sex worker diaries in Table 6 provide additional support to

these conclusions. Panel A reports the frequency of our various shock measures. Notable is the fact that each shock is relatively common: respondents report a household member being sick on 38% of the sample days, they report being sick themselves 34% of the time, they report suffering from a sexually transmitted infection 3% of the time and they report a death of a friend or family member 5% of the time. Virtually every woman reported an illness for both herself and some other member of her household at least once over a 3-month sample period; in addition, 60% of women had experienced the death of a friend or family member[20] and 40% had experienced symptoms of an STI over the sample period. Panel B of Table 6 reports other summary statistics from the diaries. As expected, women are very unlikely to receive any formal credit,[21] and instead are much more likely to receive gifts or loans from family or friends or, more likely, gifts from clients themselves.

3.3.4 Labor Supply and Sexual Behavior

Table 7 presents summary data from the diaries on labor supply and sexual behavior. As mentioned previously, some of the women in this sample do not self-identify as commercial sex workers but instead might be thought of as casual or informal sex workers. Despite this difference in characterization, however, the majority of women in our sample appear to behave very much like full-time commercial sex workers – the average women makes about 658 Kenyan shillings per day in sex work, compared to just 116 shillings from other sources.[22] The average woman engages in sex work on 3 out of every 4 days and sees an average of 1.58 clients per day.[23] Thirty-seven percent of the clients are regular clients. Similar to other studies, the average income of 773 shillings is high when compared to other individuals with similar levels of

[20] Though this figure seems high, as noted above, HIV prevalence in Busia District has been estimated at 9.8%, and social networks are generally quite large in Sub-Saharan Africa.

[21] Those that do receive bank loans largely receive it from a micro-finance institution called the Kenya Rural Enterprise Program Development Agency (KDA), which has a credit program in the area geared exclusively to sex workers through group lending.

[22] Common other sources of income include farm income, small business, or salaried work at bars or restaurants.

[23] While we do have data on hours in sex work and hours in other work, we do not report the hours here as the hours do not always reflect hours worked. For example, a woman may spend all night with one client, but part of the time may be spent sleeping.

education.[24] Robinson (2006) reports that other daily income earners (such as bike taxi drivers or market vendors) in the area make roughly 20% as much as these women.

Column 1 of Table 7 also presents some daily averages of various sexual activities. Over all the days covered (including those in which they did not work), women have vaginal sex on 70% of days, anal sex on 22% of days, and oral sex on 17% of days. The women engage in at least one risky sex act (defined as unprotected anal or vaginal intercourse) on 14% of days and have unprotected sex (either vaginal or anal) 0.35 times on an average day.

Panel B of Table 7 provides more detail on sexual behaviors and shows that most of the unprotected sex is unprotected vaginal sex. Unfortunately, the Round 1 diaries collected information only on total unprotected sex (vaginal and anal sex combined). The diaries were revised in Round 2 to collect more detailed information to distinguish between unprotected vaginal and anal sex. In Panel B, women in Round 2 have unprotected vaginal sex at least once on 7% of days and unprotected anal sex on 2% of days.[25] Overall, 84% of women had anal sex at least once during the sample period, a figure much higher than that presented in other sources.[26] Brody and Potterat (2003) review a wide variety of public health and anthropological studies with anal sex prevalence figures as high as 42.8% in self-reported recalled data. The authors argue, however, that most anal sex figures are likely underestimates, as respondents are much more likely to admit to having anal sex in a diary or in a computer questionnaire, neither of which are commonly used in Africa. Among a very similar group of sex workers in Kenya, Ferguson and Morris (2003) find that 20% of CSWs in the Kenyan Highlands responded that they had ever had anal sex, but this was only after considerable time revising wording and language.

As mentioned previously, roughly 33% of the women in this sample participated in peer groups sponsored by the Strengthening STD / HIV Control Project in Kenya and received

[24] Gertler, Shah, and Bertozzi (2005) report that Mexican CSWs make 56% more per week and get a wage 34% higher than non-CSWs. Rao et al. (2003) show that CSWs in Calcutta receive 37% higher wages.

[25] The amount of unprotected sex is lower in Round 2. This may be because more unprotected sex occurs during the holiday month of December, which was part of Round 1, or the women increased their condom usage over time. This difference may also be the result of changes in diary questions. Round controls are included in all regressions to control for any differences between rounds. In addition, when the regressions are run separately by round, the magnitude and significance of all coefficients are fairly similar.

[26] We thank Damien de Walque for pointing this out to us.

education about HIV and other STIs, as well as increased access to condoms. Compared to the marginal sex worker, these women should be more aware of the risks of unprotected sex, so these figures are likely to be lower bounds on the frequency of unprotected sex among sex workers in Kenya or East Africa.

Column 2 presents averages of the same sexual behaviors at the client-transaction level. In the diaries, women could list sexual activities and sex work earnings for up to 3 clients per day. Over all transactions, women have vaginal sex in 84% of the client transactions, anal sex in 23%, and oral sex in 15%. In 13% of all client transactions, a woman has unprotected sex with the client, and the average number of unprotected sexual acts with a client is 0.18.

One important distinction between clients is those that are considered regulars and those that are considered casuals. Though this distinction is not completely clear, regular clients have had repeated encounters with a given sex worker and may be considered a boyfriend, lover, or partner. In focus group discussions, the women often cited emotional support and love as characteristics associated with a regular client. In contrast, casual clients are often not known to the sex worker before the transaction. Since casual clients can become regular clients over time, and many women have multiple regular clients, the definition of a regular and casual client can be hard to define. SHCP had already been using the regular and casual client terminology, so we allowed the respondents to determine on their own if a particular client should be classified as a regular or casual client. Columns 3 and 4 provide transaction level data on services provided to regular and casual clients. Though regular and casual clients are similar in the probability of engaging in vaginal, anal, or oral sex, regular clients are less likely to use condoms: 83% of regular clients used condoms for all sex acts, compared to 90% of casual clients. Similarly, the number of unprotected sexual acts was higher for regular clients (0.29 times) than for casual clients (0.16 times). While the incidence and level of unprotected anal sex is similar for both regular and casual clients, both the incidence and level of unprotected vaginal sex is higher among regular clients in Panel B.

Client characteristics were collected in the Round 2 diaries. Unfortunately, the client information was not filled out for all clients that were seen during Round 2 for a variety of reasons ranging from confidentiality concerns to not remembering to fill it out. Available client infor-

mation is presented in Table 8. Characteristics of regular clients were collected only once for each regular client, and the Round 2 diaries attempted to track each regular client using a client ID. In contrast, information from casual clients were collected each time (since casual clients are presumably previously unknown to the sex worker), so a repeat casual client is treated as a new casual client. The women report that about 25% of regular and casual clients are uncircumcised, which corresponds to slightly less than the proportion of clients that are Luo and Teso, neither of whom traditionally circumcise. Casual clients appear to be slightly more wealthy than regular clients, whereas regular clients are cleaner (66% of regular clients are reported to be clean compared to 47% of casual clients). More regular clients are reported to be handsome. The majority of clients are government officials, businessmen, and truck drivers, but at 16-17%, the proportion of truck drivers among regular and casual clients is perhaps lower than expected. About half of regular and casual clients are thought to be at high risk of HIV infection. There does not appear to be a clear trend in the estimated amount of unprotected sex for a client, but with the number of sexual partners, respondents tend to report that they believe casual clients have more partners.

4 Risk Premium

4.1 Estimation

In Section 2, we argued that the price paid for a given health risk level, $p(h_t)$ is increasing in health risk h_t. This must be true if health risk brings disutility to the woman, as in (2) – if she is not compensated for the disutility $d(h_t)$, she will of course accept no health risk. For the price to be increasing, then, it must be the case that at least some men derive greater utility from unprotected sex than from protected sex and so are willing to pay more. We are interested in estimating this price differential or risk premium for unprotected sex.

The difficulty in estimating such an equation is that women will differ in the compensating differential they require, due to differences in willingness to accept health risk. We will therefore lay out a very simple example that illustrates this. From (2), we can write female utility as $u_i(c_t, k_t, h_t) = \alpha(c_t) + \beta(h_t) - d_i(h_t)$, where we now allow $d_i(h_t)$ to differ by individual. Let

male utility be:

$$v_j(c_t, h_t) = \alpha(c_t) + e_j(h_t) \tag{7}$$

where $e_j(h_t)$ is utility from health risk h_t. This utility can be thought of as, for instance, pleasure from unprotected sex. Assume that there are only 2 health risk levels available, h_0 and h_1, and that $h_0 < h_1$ (equivalent to using a condom and not using a condom). To simplify, assume that there are no savings, so that consumption for the male is $c_t^j = y_t^j - p_t$ and consumption for the female is $c_t^i = y_t^i + p_t$. Assume also that k_t is fixed, and that $\alpha(c_t) = c_t$. Thus the female receives a surplus of $p(h_0) - d_i(h_0)$ from not using a condom and $p(h_1) - d_i(h_1)$ from using a condom; the male receives a surplus of $e_j(h_0) - p(h_0)$ from using a condom and $e_j(h_1) - p(h_1)$ from not.

If we always assume that $e_j(h_0) > d_i(h_0)$ then transactions will always occur. Furthermore, if $e_j(h_1) > d_i(h_1)$, then a condom will not be used and the price will be between $d_i(h_1)$ and $e_j(h_1)$. If, however, $e_j(h_1) < d_i(h_1)$, then a condom will be used and the price will be between $d_i(h_0)$ and $e_j(h_0)$. If we assume that the price is bargained between partners and the bargaining weight for the female is μ, then we get that:

$$p_t(h_0) = e_j(h_0) + \mu_i d_i(h_0) \tag{8}$$

$$p_t(h_1) = e_j(h_1) + \mu_i d_i(h_1) \tag{9}$$

These equations depend on individual-specific utility from unprotected sex $e_j(h)$ and individual-specific disutility from risk $d_i(h)$, so that we should use individual characteristics for estimation. However, assuming that the functions $e_j(h)$ and $d_i(h)$ are constant for each individual, then we will never observe both (8) and (9) for the same couple. For a given woman, we will see such a result only across different partners (say j and k). Therefore the risk premium to unprotected sex will be

$$p_t(h_1) - p_t(h_0) = e_j(h_1) - e_k(h_0) + \mu_i d_i(h_1) - \mu_i d_i(h_0) \tag{10}$$

To estimate this equation, we should control for both female and male characteristics. However, we do not have panel information on clients so we will have to assume homogeneity on the

demand side. This leaves us with an estimating equation of the type

$$P_{it} = \alpha_i + \sum_{r=1}^{R} \beta_h X_{hit} + \sum_{a=1}^{A} \rho_a X_{ait} + \nu_t + \varepsilon_{it} \tag{11}$$

for sex worker i at date t. This is an equation relating the price P_{it} to the performance of risky sexual activities X_{hit} and other activities X_{ait}, which will be estimated by fixed effects.[27] Assuming homogeneity in demand on a particular date, the individual fixed effect α_i will pick up differences across women in both bargaining power and in the willingness to accept risk. Other time-varying effects will be captured with date controls ν_t (such as changes in demand over time or on particular days), and ε_{it} is a random disturbance term. If this setup is specified properly, β_h will reflect the risk premium to the risky activity X_{hit} (which will consist largely of unprotected vaginal or anal sex).[28] X_{ait}, meanwhile, will primarily consist of other activities such as stripping and massage.

4.2 Results

The results from estimating Equation (11) are presented in Table 9. Regressions in Columns 1-4 are conducted on the entire sample, while analyses in Columns 5-8 are restricted to the Round 2 sample to look separately at the risk premium for unprotected vaginal and unprotected anal sex. In addition to the variables shown, all regressions also include a control for the round of data collection as well as an "other sexual activity" category, and standard errors are clustered at the individual level.[29]

In both Columns 1 and 2, there appear to be significant and precise risk premiums estimated for all sexual activities except for vaginal sex in Column 1. The other estimated coefficients remain stable in both specifications. While the insignificant coefficient on vaginal sex in Column 1 might seem strange, it should be noted that there is little variation in this variable, as approximately 84% of all transactions involve vaginal sex. When the unprotected sex variable is

[27] Random-effects regressions were also conducted, but we rejected the random-effects specification using Hausman tests.

[28] Protected anal sex may be considered risky as well because of the increased likelihood of tearing a condom during anal intercourse.

[29] The incidence of "other sexual activity" is quite low, and although we asked women to specify what the "other sexual activity" was, many women failed to fill in this information.

changed from whether a condom was used for all sexual acts (an indicator of 0 or 1) to the number of episodes of unprotected sex during a transaction (a discrete variable 0, 1, 2, ...), the coefficient on vaginal sex increases and the standard errors decline. The number of episodes of unprotected sex provides more variation so we focus on this variable in Columns 2 through 5, but both columns show a risk premium to unprotected sex, ranging from 20 to 36 Kenyan shillings. Regular clients pay about 36 to 40 Kenyan shillings less than casual clients. Together Columns 1 and 2 suggest that a risk premium exists for unprotected sex and for each sexual activity, particularly for anal sex and company. The risk premium for anal sex can be explained partially through the increased health risk[30], and the company risk premium may be associated with wealthier clients that specifically request company at a bar or restaurant.

Columns 3 and 4 run the same specification in Column 2 among the regular client sample and casual client sample, respectively. Interestingly, casual clients tend to pay more for sexual activities such as vaginal sex, anal sex, and sex in thighs, but they do not appear to pay more than regular clients for each episode of unprotected sex. While the smaller risk premium for unprotected sex is puzzling, the substantially higher risk premium on different types of sexual activities (about double that for regular clients) suggests that the sex workers may believe that casual clients carry a higher health risk since they do not know them as well.

In Columns 5-8, we restrict the sample to those in Round 2 to examine the risk premium separately for any unprotected vaginal sex and any unprotected anal sex. Column 5 replicates the specification in Column 2 with the Round 2 sample to examine changes in the risk premium over time. It appears as though the risk premium increases for most activities, particularly for anal sex and oral sex. Regular clients pay even less than before, now 63 Kenyan shillings less than casual clients. The risk premium for episodes of unprotected sex is slightly smaller at 23 Kenyan shillings, but the estimated coefficient is not longer precise as the standard errors have more than doubled. Unfortunately, since the standard errors are rather large, separating out unprotected vaginal sex and unprotected anal sex does not lead to precise coefficient estimates in Columns 6-8. The results are suggestive, however, that the compensating differential on unprotected sex

[30] Studies on HIV transmission through male-to-female anal sex are rare, but anal sex (either protected or unprotected) has been associated with a 1.4- to 5.1-fold increase in HIV infection risk among sex workers in South Africa (Karim and Ramjee, 1998).

is associated with both unprotected vaginal and anal sex. Furthermore, casual clients appear to pay a higher premium for both unprotected vaginal and anal sex, and as before, they pay a higher premium for all sexual activities, particularly for anal sex. The results appear stable even with the inclusion of client characteristics in Appendix 1. Adding client characteristics greatly reduces the sample size, however, and the results are subject to bias in terms of the women who filled in the client information, so we do not use client characteristic controls in the rest of this paper.

Overall, Table 9 estimates a compensating differential for unprotected sex of between 23 to 48 Kenyan shillings. Given that the average amount paid is approximately 472 shillings, this amounts to roughly a 5-10% increase in the total price, which is rather low when compared with the risk premium of 23% calculated by Gertler, Shah, and Bertozzi (2005). However, the market for sex work in Mexico, where sex work is legal and regulated and where the HIV prevalence is only 0.35% among sex workers, is likely to differ greatly from the Kenya context. The lower risk premium may be the result of differences in data – Gertler, Shah, and Bertozzi (2005) collect recalled data on the last three to four client transactions so the incidence of unprotected sex that they are able to measure might be much lower, accounting for the higher risk premium. In addition, only 11.7% of their sample has variation in condom usage with clients, while 76% of our sample has variation in condom usage. Finally, we might expect the higher HIV prevalence in Kenya to have an ambiguous effect on the estimated risk premium. The risk of HIV infection is higher, so we might expect the risk premium to be higher, but the risk or belief of a sex worker already being infected with HIV is also higher (as shown in Table 3), which might reduce the risk premium. We investigate some of these possibilities in the next subsection.

4.3 Robustness

In Appendix 2, we conduct the same specifications as in Columns 1, 2, 5, and 6 of Table 9 except for excluding women who always use a condom. There are no women that never use a condom, so the remaining sample are women that vary their condom usage over the data collection period. As described in Gertler, Shah, and Bertozzi (2005), we may be concerned that sex workers who never vary their condom usage have different risk preferences and attract

different types of clients. The magnitude and precision of the point estimates in Appendix 2 are fairly similar, although the coefficients on the sexual behaviors are slightly smaller than in Table 9. The coefficients on both whether a condom was used for all sexual acts and the number of episodes of unprotected sex are both slightly larger. In general, the results are similar, and it does not appear as if women who always use a condom have different risk preferences or attract different types of clients. Although not shown here, the risk premium results also do not change among subsamples of previously married and never married women, suggesting that their risk preferences and client types are also fairly similar.

In Table 10, we examine the effect of self-knowledge or self-expectation about HIV infection on the risk premium for unprotected sex. We separate our sample of women into the three HIV status categories that are presented in Table 3: women that have been tested and know they are HIV positive, women who believe they have a greater than 50% chance of being HIV positive (does not include women who have been tested and know they are HIV positive), and women who believe they have a less than 50% chance of being HIV positive. The specifications in Columns 1-3 are the same as in Column 1 of Table 9, and the specifications in Columns 4-6 are the same as in Column 2 of Table 9. We do not replicate the Round 2 analysis due to sample size concerns.

Since these hedonic price regressions represent the equilibrium prices between supply and demand, we cannot distinguish between whether higher or lower prices are the result of women making choices based on knowledge of their own health risk or of clients making choices based on some information or intuition about a sex worker's HIV status. Still, Table 10 provides some interesting results. The premium for sexual behaviors appears to be higher for women that are HIV positive or believe they are HIV positive (greater than 50% belief), particularly on the incidence of vaginal sex and incidence of anal sex. The premiums on all sexual behaviors are much lower for women who believe they have a less than 50% chance of being HIV positive. The risk premium for unprotected sex is insignificant and close to zero in both Columns 1 and 2, but highly significant in Column 5. Thus, the risk premium results for women who believe they have a greater than 50% chance of being HIV positive are unclear, but the estimates in Table 10 do show that the premium for unprotected sex is lowest in Columns 1 and 4 for women who know

they are HIV positive. Perhaps the knowledge that they are already HIV positive means they are more willing to accept the risk of further HIV or STI infection, or if the client had knowledge of the woman's HIV status (that she were HIV positive), one might think that he would rather have protected sex, further reducing the premium on unprotected sex. The risk premium for unprotected sex is lowest among women who believe they have a less than 50% chance of being HIV positive. This evidence suggests that these women may be more concerned with preventing future HIV infection, requiring a higher risk premium to engage in riskier sexual behavior.

Finally, Table 11 examines nonlinearities in the risk premium for unprotected sex. Column 1 of Table 11 is the same regression as shown in Column 2 of Table 9, but in Column 2 of Table 11, the number of unprotected sexual episodes is broken out flexibly using dummy variables. The coefficients on all sexual activities as well as on regular client remain stable in the second specification. While the standard errors grow considerably with unprotected sexual episodes of 4 and above (due to small sample sizes), the coefficients on 1, 2, and 3 episodes of unprotected sex suggest that the risk premium is increasing and convex, which is consistent with our assumption of the shape of $p(h_t)$ in Section 2.[31]

Overall, the risk premiums for vaginal sex, anal sex, and unprotected sex (vaginal and anal) remain relatively stable through various specifications and samples. In the next section, we examine whether women switch to these riskier sexual activities in response to shocks to earn the additional premium.

5 Effect of shocks on Expenditures and Labor Supply

5.1 Estimation

From Equations (4)-(6), we expect consumption to decrease, labor supply to increase, and risky sexual behavior (conditional on labor supply) in response to shocks to permanent income. We do not expect transitory shocks to have any impact on outcomes, however. As these shocks do not affect the lifetime budget constraint, they should have no effect on outcomes. To test this,

[31] While 6 repetitions with one client in one day might not seem plausible, the women said that some of them used drugs to enhance their abilities. Others said that the definition of a round or repetition to them would not necessarily mean that the client ejaculated.

we will estimate equations of the type

$$k_{it} = \alpha_i + \beta S_{it} + + \nu_t + \varepsilon_{it} \tag{12}$$

$$c_{it} = \widetilde{\alpha}_i + \widetilde{\beta} S_{it} + \widetilde{\nu}_t + \widetilde{\varepsilon}_{it} \tag{13}$$

where k_{it} represents labor supply, c_{it} represents household consumption, and the fixed effects ν_t and $\widetilde{\nu}_t$ are meant to proxy for individual-specific variables, notably preferences and the marginal utility of lifetime wealth. S_{it} is an indicator variable equal to 1 if the household encountered a health shock with $E(S_{it}) = 0$, and ε_{it} is an iid error term. To capture individual heterogeneity, these equations will be estimated by fixed effects.

5.2 Results

5.2.1 Labor Supply

Table 12 presents fixed effects estimates of the impact of health shocks on labor supply with an additional control for the round of data collection and standard errors clustered at the individual level. All labor supply variables are aggregated at the day level. In this and most of the remaining tables, we concentrate on 4 types of shocks: (1) whether a women is suffering from symptoms of an STI, (2) whether a woman is menstruating, (3) whether a friend or relative of the woman had died that day, and (4) whether either the respondent or another member of her household was sick that day. The dummy variable for sickness is coded as 1 if the respondent reported any of the following: cough, fever, malaria, typhoid, diarrhea, burns and cuts, or any other illness. As reported in Table 6, women reported own sickness on 34% of days and household sickness on 38% of days.

Table 12 presents 7 different labor supply measures for sex workers. Panel A (STI) and Panel B (menstruation) are the 2 types of shocks that will affect labor supply directly, as both measures directly affect the ability to provide sexual services. Indeed, both cause large decreases in labor supply: having an STI reduces the probability of working in the sex sector by 17.2 percentage points and menstruating reduces the probability by 42.3 percentage points. The number of clients seen on a particular day declines for both shocks, and about two-thirds of the decline in clients is a reduction in casual clients. These shocks cause losses of income from sex work of

189 and 401 shillings, respectively, which make up almost all of the loss in income during these shocks. Panel C shows that the death of a friend or family member also has an effect on labor supply, although the magnitude is more modest.[32] The probability of working in the sex sector decreases by 5.2 percentage points and the number of clients decreases by 0.1. The change in sex work income is negative and consistent with the changes for STI and menstruation shocks when accounting for the magnitude of change in the number of clients seen. Panel D shows the effect of own sickness on labor supply. As expected, women work less when they are sick, though the effect is smaller than that of having an STI or during menstruation: women are only 7.6 percentage points less likely to work and make an average of 95 fewer shillings from sex work on days when they are sick. In general, the decrease in labor supply is remarkably consistent across the various measures in this table.

Panel E shows the effect of household sickness, controlling for own sickness, on female labor supply decisions. The sample here is restricted to women that have dependents. Note that these effects are likely an understatement of the true effect, as women might actually be inclined to work less if they need to care for sick children or other dependents. The results are modest and show that when a household member is sick, women are 2.9 percentage points more likely to work in the sex sector, see 0.09 more clients (mostly made up of casual clients), and earn 54 more shillings from sex work. Panel E also shows the percentage change of the estimated effect on the respective dependent variable in each column. Overall, the effect on the participation margin is weak but precisely measured, as sex sector participation increases by only 3.8% and the number of clients increases by 5.4%. We will show in the next subsection that this is because women choose to supply activities which are better compensated.

5.2.2 Risky Sexual Behavior

As the incidence of STIs, menstruation, and own sickness all can be thought of as exogenous shocks to sex worker health and, hence, labor supply, we will concentrate on household sickness in examining the amount of health risk that women choose to take. These results are presented

[32] Note that identifying an effect of a death is complicated by the fact that attending the funeral may reduce hours but women may need to work more to pay for contributions to the funeral and burial. In addition, it is not uncommon for women to find partners at the funerals.

in Table 13. The specifications and sample in Table 13 are the same as in Panel E, except for different dependent variables and the restriction to the Round 2 sample in Columns 6-9. Columns 1-5 show that women dramatically increase their supply of riskier sex in response to household illness shocks. In particular, women increase their likelihood of having risky sex (defined as unprotected vaginal or anal sex) by 3.3 percentage points on days in which a household member is sick, which is an increase of 23.6% over the baseline level of incidence of unprotected sex on an average day. Women are also 3.7 percentage points more likely to have anal sex (representing a 16.8% increase) and increase the number of unprotected sexual episodes by 0.08 times (a 21.7% increase).

Columns 6-9 examine unprotected vaginal sex and unprotected anal sex specifically, and although the estimates are imprecise, the results potentially suggest that most of the increase in unprotected sex is unprotected vaginal sex. In fact, the estimates on unprotected anal sex in Columns 7 and 9 are slightly negative, although practically zero. While it may seem puzzling as to why women would engage in riskier sexual activities with a low risk premium (as estimated in Table 9), changing the types of activities supplied might be the optimal strategy for these women in an informal commercial sex market, especially if additional clients are difficult to find. Given the large health risks associated with unprotected vaginal sex and even protected anal sex, these changes in behavior in response to shocks are dangerous and can have significant health consequences over time. For example, a simple calculation of the probability of a household member being sick (38%) times the increase in the number of unprotected sexual acts (21.7%) suggests that, on average, changes in behavior during household illness shocks increase the health risks of sex work by 8.2%. Since we are using small, short-term income shocks to estimate changes in behavior, it is likely that larger and more permanent shocks can induce even greater changes in the supply of risky sex. These results, therefore, suggest an opportunity to reduce the health risks *within* sex work by helping women to smooth their risky sexual behavior.

5.3 Robustness

In this subsection, we conduct various robustness checks of our household sickness result. First, we examine the effect of different household sickness durations on labor supply and risky sexual

behavior. A sickness duration is coded as the length of consecutive days in which the respondent reported that a household member was sick. The average sickness duration in our sample is 4.9 days (standard deviation of 7.1 days). A long sickness duration may be thought of as a more permanent sickness, whereas a short sickness duration may be a more temporary shock. Gertler and Gruber (2002) argue that households in developing countries are especially unable to insure themselves against major and more permanent illness, so it is important to examine whether sexual behavior responses differ between long-term and short-term illness shocks.

Appendix 3 examines the effect of household sickness shocks using the same specification as in Panel E of Table 9 with various subsamples of sickness durations. Leading days of no sickness were counted as part of a particular sickness duration within each subsample.[33] The small sample sizes reduce the precision of the estimates, but overall the results suggest that neither short sickness durations nor long sickness durations are completely driving the results. In Panel A, sickness durations of 5 or less days appear to be driving the sex sector participation (Column 1) and number of clients seen (Column 2) results, but the estimates are fairly stable for sex work income among all sickness duration lengths. In Panel B, the evidence is mixed, but it appears as though shorter sickness durations (duration $\leq$ 5 days) drive most of the risky sexual behavior results in Columns 1-5. Unfortunately in Columns 6-9 in Panel B, the estimates are rather imprecise, and there do not appear to be any clear patterns.

As before, Appendix 4 restricts the sample further by excluding women who always use a condom. Interestingly, the labor supply coefficients (Panel A) are slightly smaller and the risky sexual behavior coefficients (Panel B) are slightly larger than in Table 13 and Appendix 3, respectively. Overall though, the results are very similar. Appendix 5 conducts the same regression analysis for the household sickness shock separating previously married women (Panel A) and never married women (Panel B). Initially, we might expect previously married women to change their behavior more drastically because they have more dependents. At the same time, however, never married women tend to be younger, and may be more likely to engage in risky

[33] For example, if a woman marked a period of household sickness as 0011011111000011, the first four days (0011) and the last six days (000011) would be included as observations in the duration $\leq$ 3 days sample. The 011111 period would be included in the 3 $<$ duration $\leq$ 5 days sample. The inclusion of various leading and post days of no sickness were tested with no change in the results.

sexual behaviors. The results show that, in general, both groups of women behave similarly: previously married women increase their participation in the sex sector by 2.6 percentage points and increase the number of clients they see by 0.09 on days in which they report household illness, and never married women increase their participation by 3.1 percentage points and increase the number of clients they see by 0.08. The sexual activities provide more mixed results. In Columns 3 and 7, the coefficient on incidence of unprotected sex and the number of unprotected sexual episodes, respectively, for previously married women is significant and much larger than that for never married women, but in the Round 2 sample in Column 8, the reverse is true. Likewise, the coefficient on the incidence of anal sex is significant and larger for never married women. The results in Appendix 5 are thus mixed, but tend to suggest that previously married and never married women behave similarly in response to household sickness shocks.

Finally, Table 14 shows the effect of knowledge and expectations of HIV status on labor supply and risky sexual behavior responses to household sickness shocks. The results show that women who *are* HIV positive and women who *believe* they are HIV positive (with greater than 50% chance) change their behavior more in response to a household sickness shock. Women who are HIV positive change their behavior the most, as evidenced by the magnitude on the coefficient estimates in Columns 1, 2, 4, 5, and 6. Even though the sample size is smaller than in Panels B and C, the Panel A estimates are surprisingly precise. Interestingly, women who are HIV positive do not exhibit much change in unprotected sexual behavior (Columns 3 and 7), and the point estimates in these columns are similar to those in Panel C for women who believe they have less than a 50% chance of being HIV positive. Within Round 2, however, the HIV positive women exhibit the largest unprotected vaginal sex response to a household sickness shock, although the sample sizes are extremely small. The results regarding unprotected sex are somewhat mixed, but it appears as if women who are HIV positive are better able to smooth their unprotected sexual behavior over shocks. Since they are already HIV positive, one may expect these women to not care about the health risks associated with unprotected sex and be more likely to have unprotected sex in response to an income shock. The evidence here posits that in response to a household sickness shock, HIV positive women do increase their participation in the sex sector, but may be altruistic and not alter their decision-making to

have unprotected sex. In comparing women who are unsure of their HIV status, the smaller coefficients in every column of Panel C when compared to Panel B result suggest that women who believe they are HIV negative (less than 50% chance of being HIV positive) are less likely to respond to household sickness shocks with changes in labor supply and risky sexual behavior. Perhaps women who believe they are HIV negative are less likely to accept additional health risk – based on the theoretical model in Section 2, they may have greater disutility $d(h_t)$ associated with a particular level of health risk or a greater belief in the probability $\partial(h_t)$ that they will be alive in the future, which would lead to a lower acceptable level of health risk in the current period.

6 Expenditures and Other Risk-Coping Strategies

6.1 Expenditures

While labor supply and sexual behavior may change in response to shocks, it is valuable to investigate whether the additional income earned is spent and whether households are then able to smooth consumption. Our data allows us to examine changes in expenditures in response to shocks. In Table 15, Panels A (STIs) and B (menstruation) are the most readily interpretable, as they involve plausibly exogenous shocks to labor income. For both types of shocks, changes in total expenditures are significant at the 10% level. In Panel A, total expenditures increase by 57 shillings in response to an STI, and in Panel B, total expenditures decrease by 30 shillings during menstruation. However, these results obscure the fact that both types of shocks might induce increases in expenditures on items associated with the shock, such as medical and personal hygiene expenses. Therefore Column 2 focuses on food expenditures, Columns 3 and 4 on meals, Column 5 on medical expenditures, and Column 6 on non-medical, non-food expenditures. For both types of shocks, food expenditures decline slightly, although the estimates are imprecise. Meals for both the respondent and household members decline as well in response to an STI. Medical expenditures increase in Panel A, as we would expect, but so do non-medical, non-food expenditures. Similarly, non-medical, non-food expenditures decrease during menstruation. To the extent that these shocks can be considered exogenous, the results are mixed, but somewhat

suggestive that women are not fully able to smooth consumption, which is particularly interesting since menstruation is certainly a predictable "shock."

Panel C presents changes in expenditures for deaths of friends or family members. Death is associated with a large increase in non-medical, non-food expenditures of approximately 342 shillings, an increase of approximately 60% over the average day. These contributions likely go to funeral and burial expenses. In Panel D, medical expenditures increase for own sickness, which accounts for most of the increase in total expenditures.

The effect of household sickness on expenditures is examined in Panel E. Total expenditures increase by roughly 81 shillings when a household member falls ill, a figure much larger than the effect on medical expenditures alone (22 shillings). This could reflect either that women need to spend more on other shared household goods when another household member is unable to contribute his share, or perhaps that our measure of medical expenditures is measured with error. In either case, this increase is equivalent to a 14% increase in total expenditures.

Overall, the increases in medical and total expenditures provide further evidence that women may be working with more clients and engaging in riskier sexual behaviors to earn more income in response to household illness. An interesting (and compelling) result in Table 15 is that the increase in medical expenditures of 22 shillings in response to household illness is approximately the same in magnitude as the risk premium for unprotected sex estimated in Table 9.

6.2 Alternative Risk-Coping Strategies

Thus far it appears that women increase their labor supply and risky sexual behavior in response to income risk, but what other strategies do women employ? Table 16 presents other possible responses to income risk among women in our sample: savings, bank loans, loans from family or friends, gifts from regular clients, and gifts from family or friends. Most of the women do not have formal savings accounts, and for those that do, their accounts are generally group arrangements for loans that do not easily allow for withdrawal. As a result, savings is difficult to measure, but for simplicity, we impute savings as income minus expenditures. For most shocks, the main response is for women tend to draw upon their savings. Interestingly, for household sickness there is little change in savings, but women appear to receive loans and gifts from family and

friends and gifts from regular clients. Gifts from regular clients play a significant and substantial role in response to shocks of death, own sickness, and household sickness, and the specific types of gifts are explored further in Table 17. As we would expect in an environment with few formal savings and credit mechanisms, bank loans do not play a significant role in dealing with shocks.

More detailed information on risk-coping strategies was collected in Round 2, and the analysis of this data is presented in Table 17. The estimates in the first three columns are often insignificant across Panels A-E, but they tend to show that banks play little to no role in responding to income shocks. The types of gifts received from regular clients is broken out in Columns 4-7, producing rather interesting results. During menstruation and when a friend or family member passes away, cash gifts from regular clients increase by about 30 shillings (Column 4) . In Column 5, regular clients contribute about 16-22 shillings more for rent when a woman experiences a death of a friend or family member or is sick herself. Regular clients contribute more for school fees or household items during menstruation and both own and household illness shocks. Finally, much of the transactional sex literature has focused on gifts and material goods exchange in return for sex - in Column 7, we find that the worth of material goods given by regular clients changes significantly in response to shocks. Material goods increase in response to an STI, death, own sickness, and household sickness shock. Interestingly, the magnitude of the increase in material goods in response to household illness is the same as the increase in medical expenditures (about 20 shillings), so perhaps regular clients are providing medicines, food, or other household items to deal directly with illness to a household member.

7 Discussion

Formal and informal sex work is a way of life for many poor women in sub-Saharan Africa, and unfortunately, the nature of sex-for-money transactions remains poorly understood. Using panel data from a sample of both formal and informal sex workers in Busia, Kenya, this paper is one of the first to quantitatively investigate the relationship between sex work and income risk. We first document the existence of a premium of between 23 to 48 shillings for unprotected sex, which is a 5-10% increase in the average total price with a client. While this premium seems low, the labor supply results are quite suggestive that women engage in riskier sexual behaviors

(rather than increasing their participation in the sex sector or seeing more clients) in response to income shocks. In particular, we find that women are 23.6% more likely to have unprotected sex, 16.8% more likely to have anal sex, and increase the number of unprotected sexual episodes by 21.7% on days in which a household member is ill. While these changes in behavior might seem puzzling, changing the types of sexual activities supplied might be the optimal strategy for these women in an informal commercial sex market, especially if additional clients are difficult to find. Given the high HIV prevalence rate in Busia (9.8%) and the large health risks associated with unprotected vaginal sex and even protected anal sex, these increases in risky sexual behavior have enormous health consequences.

These results, therefore, suggest that in addition to helping women exit sex work, there are opportunities to reduce the health risks *within* sex work beyond HIV education and condom distribution. Focusing specifically on household illness, sex workers may be able to better smooth their risky sexual behavior if free drugs, subsidized health care, free bednets, or other public health measures to reduce the disease burden were available to their children and dependents. Thus, public health interventions aimed at children are likely to have additional positive externalities, and perhaps future evaluations of childhood disease interventions can monitor these effects.

Economic theory suggests that these women should be able to smooth their consumption and risky sexual behavior over small, transitory shocks, but the labor supply and expenditure results suggest that these women are not fully insured against income shocks and illness. While there is some evidence that women use alternative risk-coping mechanisms in response to these shocks, the available savings, credit, and informal insurance systems do not appear to adequately insure these women from income risk. As a result, formal savings and credit arrangements have the potential to also reduce risky sexual behavior among sex workers by improving their ability to cope with income risk.

Our results measure sexual behavior at the daily level; consequently, the estimated health impacts are very significant in the long-run. Beyond the obvious health risk for the women themselves, the willingness to engage in unprotected sex in response to health shocks also has a substantial impact on the spread of HIV/AIDS. These women have a large number of sexual

partners, and so their decisions have large spillover effects to their partners and to society as a whole. Understanding how women make decisions to engage in riskier sexual activities is important in stemming the tide of HIV/AIDS in sub-Saharan Africa and in other parts of the world.

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Figure 1. HIV Prevalence among Individuals Aged 15-49 in Kenya

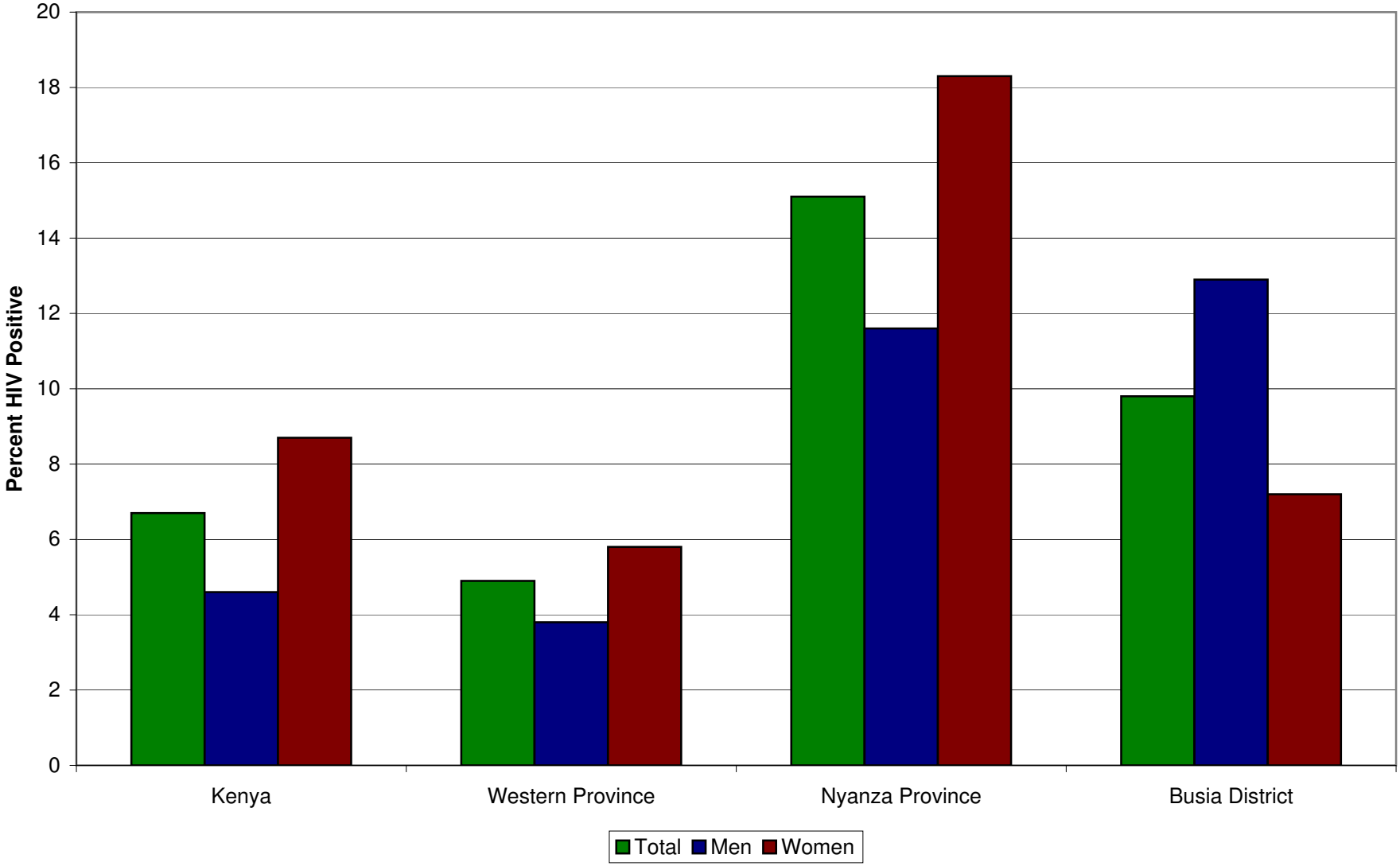

Figure 2. HIV Prevalence by Marital Status among Kenyan Women Aged 15-49

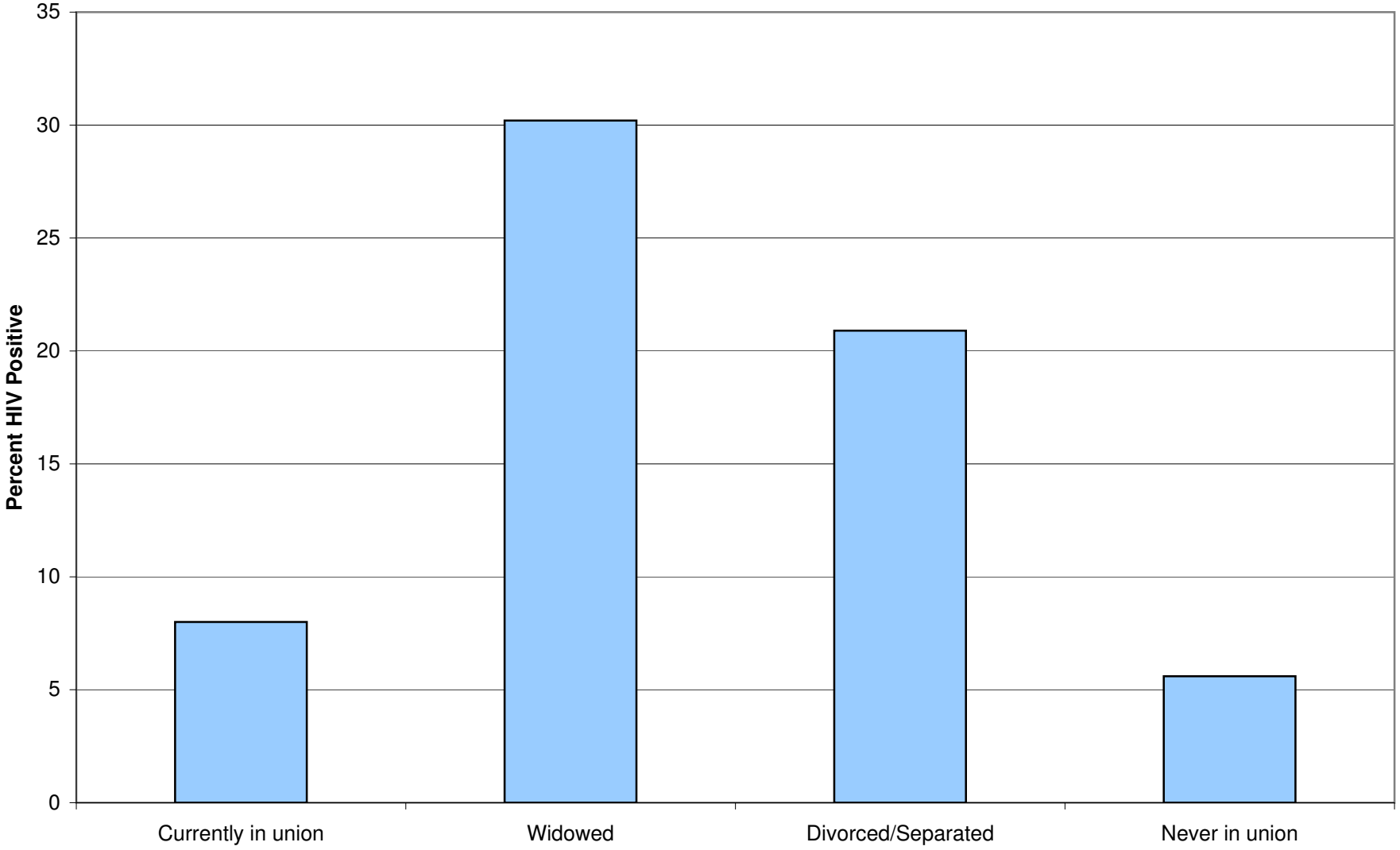

Table 1. Sex Worker Background Statistics

Panel A. Full Sample

Marital Status	*Widowed*	*Divorced*	*Cohabitating*	*Never Married/Not Cohabitating*					
	0.18	0.24	0.12	0.45					
Tribe	*Luhya*	*Luo*	*Teso*	*Kikuyu*	*Other*				
	0.47	0.42	0.04	0.03	0.05				
Religion	*None*	*Muslim*	*Catholic*	*Anglican*	*Other Protestant*	*Other*			
	0.05	0.05	0.40	0.07	0.24	0.19			
Literacy	*Read Kiswahili*	*Write Kiswahili*							
	0.96	0.87							

Panel B. Full Sample

	Full Sample	*Previously Married*	*Never Married*	*P-value*
Age	28.29	33.24	24.53	0.00
	(6.78)	(6.02)	(4.55)	
Educational Attainment	9.37	9.01	9.64	0.02
	(2.73)	(2.69)	(2.74)	
Head of Household?	0.84	0.98	0.74	0.00
Own Children	1.87	3.09	0.96	0.00
	(1.75)	(1.72)	(1.11)	
Total # of Dependents	2.72	4.07	1.70	0.00
	(2.34)	(2.53)	(1.56)	
Times attended Church in Past Month	2.27	2.35	2.20	0.57
	(1.15)	(1.09)	(1.19)	

Panel C. Previously Married Sample

Polygamous Marriage	0.54								
Educational Attainment of Spouse	11.21								
	(2.51)								
Occupation of Spouse	*Businessman*	*Teacher*	*Bicycle Taxi Drive*	*Driver*	*Police*	*Government*	*Customs*	*Fishing*	*Other*
	0.14	0.11	0.01	0.11	0.04	0.08	0.09	0.07	0.35

Observations	*Full Sample*	*Previously Married*	*Never Married*
	222	104	118

Notes: Under Marial Status, the Cohabitating category includes women that have never been married.
Sample means are weighted by peer group membership so that the weighted mean gives the population mean peer group membership. Standard deviations in parentheses.

Table 2. Commercial Sex Work Characteristics

	Full Sample	*Previously Married*	*Never Married*	*P-value*	
Age Began Seeing Clients	19.09	22.08	16.86	0.00	
	(5.38)	(6.78)	(2.20)		
Years Working as Sex Worker	9.15	11.13	7.68	0.00	
	(5.73)	(6.70)	(4.35)		
Respondent in Peer Group?	0.33	0.35	0.30	0.39	
Years in Peer Group	1.68	2.22	1.18	0.02	
	(1.54)	(1.72)	(1.15)		
Respondent is Peer Group Educator?	0.01	0.02	0.00	0.47	
Number of Regular Clients	2.32	2.15	2.44	0.04	
	(1.13)	(1.10)	(1.13)		
Is at least 1 of the Regular Clients Married?	0.85	0.95	0.78	0.00	
Number of Casual Clients Last Week	4.54	4.83	4.31	0.27	
	(2.43)	(2.33)	(2.49)		
Has outside job	0.86	0.96	0.78	0.00	
Would like to stop seeing clients	0.39	0.36	0.41	0.66	
Used a broker in the past month	0.51	0.40	0.60	0.00	
On Birth Control	0.59	0.67	0.53	0.35	
Family Knows of Sex Work	0.31	0.32	0.31	0.54	
Regular Client was Abusive in Past Month	0.32	0.26	0.36	0.41	
Casual Client was Abusive in Past Month	0.26	0.26	0.25	0.20	
Harrassed by Police in Past Month	0.09	0.12	0.06	0.04	
Attractiveness (as rated by Enumerator)					
Very attractive	0.15	0.07	0.21	0.00	
Above average	0.38	0.30	0.43	0.19	
Average	0.45	0.60	0.34	0.00	
Below average	0.02	0.03	0.02	0.50	
When Negotiate Price with Client	*Always before*	*Usually before*	*Equally before/after*	*Usually after*	*Always after*
	0.42	0.43	0.10	0.04	0.00
When Paid by Client	*Always before*	*Usually before*	*Equally before/after*	*Usually after*	*Always after*
	0.26	0.25	0.25	0.25	0.25
Observations	*Full Sample*	*Previously Married*	*Never Married*		
	222	104	118		

Note: Sample means are weighted by peer group membership so that the weighted mean gives the population mean peer group membership.
Standard deviations in parentheses.

Table 3. HIV-Related Characteristics

	Full Sample	*Previously Married*	*Never Married*	*P-value*
Tested for HIV	0.63	0.70	0.57	0.00
HIV Knowledge Test Score	0.93	0.93	0.93	0.75
	(0.06)	(0.07)	(0.06)	
Aware of ARV Drugs	0.95	0.94	0.95	0.94
HIV Positive	0.04	0.05	0.03	0.07
Belief of >50% Chance HIV Positive	0.12	0.09	0.15	0.52
Belief of <50% Chance HIV Positive	0.50	0.56	0.45	0.09
No HIV Status Reported	0.34	0.30	0.37	0.02
Belief of ARV Drug Effectiveness				
Completely effective	0.16	0.51	0.51	0.51
Very effective	0.51	0.32	0.32	0.32
Somewhat effective	0.32	0.01	0.01	0.01
Not effective at all	0.01	0.24	0.24	0.24
Belief of ARV Access				
Easily obtainable	0.24	0.28	0.28	0.28
>50% obtainable	0.28	0.29	0.29	0.29
<50% obtainable	0.29	0.19	0.19	0.19
Not obtainable	0.19	0.47	0.47	0.47
Observations	*Full Sample*	*Previously Married*	*Never Married*	
	222	104	118	

Note: Sample means are weighted by peer group membership so that the weighted mean gives the population mean peer group membership. Standard deviations in parentheses.

Table 4. Attitudes Towards Commercial Sex Work

	Full Sample	*Previously Married*	*Never Married*	*P-value*
Self-Identify As:				
Commercial Sex Worker	0.28	0.23	0.32	0.32
Survivor	0.70	0.75	0.66	0.23
Other	0.02	0.01	0.02	0.40
Marriage Likelihood Before Sex Work				
Very likely	0.47	0.22	0.66	0.00
Somewhat likely	0.24	0.29	0.21	0.30
Somewhat unlikely	0.06	0.08	0.05	0.44
Very unlikely	0.22	0.40	0.08	0.00
Has Sex Work Changed Marriage Likelihood?				
Much more unlikely	0.29	0.42	0.18	0.00
Somewhat more unlikely	0.13	0.11	0.15	0.52
No change	0.03	0.00	0.05	0.04
More likely	0.56	0.47	0.62	0.02
Why Did You Begin Seeing Clients? (categories are non-exclusive)				
Widowed, Divorced, or Separated	0.15	0.36	0.00	0.00
Money	0.27	0.30	0.25	0.51
Forced into sex work	0.03	0.02	0.04	0.31
Lack of Education	0.10	0.06	0.12	0.03
Love	0.71	0.54	0.83	0.02
Protection	0.14	0.11	0.17	0.68
Adolescence or Bodily Desires	0.08	0.06	0.10	0.62
Peer Pressure	0.17	0.05	0.25	0.00
Why Do You Continue to See Clients? (categories are non-exclusive)				
Money	0.99	0.98	1.00	0.32
Love	0.82	0.79	0.84	0.71
Protection	0.20	0.15	0.24	0.12
Enjoy Sex	0.03	0.03	0.03	0.49
Stigma from Sex Work				
Not negative at all	0.37	0.36	0.37	0.27
Somewhat negative	0.53	0.59	0.48	0.04
Very negative	0.10	0.05	0.14	0.11
Observations	222	104	118	

Note: Sample means are weighted by peer group membership so that the weighted mean gives the population mean peer group membership. Standard deviations in parentheses.

Table 5. Wealth, Access to Credit, and Savings

Last time paying medical costs for friend or relative	*< 1 month*	*1 - 3 months*	*3 -6 months*	*Never*
	0.62	0.26	0.08	0.01
Last time paying funeral costs for a friend or relative	*< 1 month*	*1 - 3 months*	*3 -6 months*	*Never*
	0.71	0.16	0.10	0.03
Has Formal Savings Account	0.41			
Savings Contributions in Past Month	978.82			
	(1138.76)			
Savings Withdrawn in Past Month	70.60			
	(393.76)			
Owns Livestock	0.36			
Value of Livestock Owned	1553.95			
	(4769.81)			
Participates in ROSCA	0.55			
Total Value of ROSCA contributions last year	3391.09			
	(5810.70)			
Received Loan from Bank	0.05			
Value of Loans Received from Bank	13479.28			
	(6379.08)			
Observations	222			

Note: Sample means are weighted to be representative of the overall population. Standard deviations in parentheses.
Exchange rate was roughly 70 Kenyan shillings to US $1 during the study period.

Table 6. Summary Statistics from Diaries

	(1) *Daily Average*	(2) *Occurred at Least Once over 3 Month Sample Period*
Panel A. Shocks		
Someone in Household Sick (other than respondent)	0.38	0.94
Respondent Sick	0.34	0.99
Respondent had STI	0.03	0.40
Friend or Relative Died	0.05	0.60
Panel B. Savings, Credit, and Expenditures		
Loans from Bank	20.27	
	(352.51)	
Loans from Family / Friends	38.84	
	(274.36)	
Gifts from Regular Clients	124.09	
	(552.93)	
Gifts from Family / Friends	18.16	
	(109.41)	
Total Expenditures	571.46	
	(660.49)	
Food Expenditures	160.26	
	(153.19)	
Medical Expenditures	36.10	
	(97.76)	
Non-Medical, Non-Food Expenditures	368.60	
	(542.58)	
Savings	150.45	
	(1293.55)	
Observations	21219	255
IDs	237	237

Note: Sickness is an indicator variable equal to 1 if household or respondent reported having a cough, fever, malaria, typhoid, diarrhea, cuts or burns, or any other illness.
Expenditure, income, and savings information reported only for those with non-missing values for all of those variables.
The exact number of observations differs somewhat for some variables due to reporting errors.
Variables in Column 2 are indicators equal to 1 if the given shock ever occurred during the data collection period, so that there is 1 value per woman.
There are more observations than IDs in Column 2 because some women were sampled in both rounds.
Savings are imputed as total income (Table 7) minus total expenditures.
Means are reported, with standard deviations in parentheses.

Table 7. Summary Statistics - Labor Supply and Sexual Behavior

	(1) Daily Average	(2) Transaction Data: All Clients	(3) Transaction Data: Regulars Only	(4) Transaction Data: Casuals Only
Panel A. Full Sample				
Participation in Sex Sector	0.76			
Income from Sex Work	657.62			
	(736.01)			
Total Income (Sex Work and Other Sources)	773.48			
	(790.75)			
Number of Clients Seen	1.58			
	(1.17)			
Probability that Client is a Regular Client	0.37			
Had Vaginal Sex	0.70	0.84	0.83	0.84
Had Anal Sex	0.22	0.23	0.20	0.24
Had Oral Sex	0.17	0.15	0.15	0.16
Had at least 1 Risky Sex Act	0.14			
Used Condom for All Sex Acts		0.87	0.83	0.90
# Times Unprotected Sex	0.35	0.18	0.29	0.16
Panel B. Round 2 Sample				
Had Unprotected Vaginal Sex	0.07	0.08	0.10	0.05
Had Unprotected Anal Sex	0.02	0.02	0.02	0.02
# Times Unprotected Vaginal Sex	0.12	0.06	0.09	0.04
# Times Unprotected Anal Sex	0.03	0.01	0.01	0.01
Observations				
Full Sample:	237	31762	11842	19492
Round 2 Sample:	143	14885	6454	8143

Note: Figures are calculated from self-reported daily diary data.
Figures in Column 1 are daily averages. Figures in Columns 2-4 are averages across all transactions (a maximum of 3 client transactions per woman per day).

Table 8. Client Characteristics

	Regular Clients	*Casual Clients*
Circumcised?	0.74	0.75
Tribe		
Luhya	0.29	0.18
Luo	0.29	0.20
Teso	0.09	0.12
Kikuyu	0.12	0.17
Kalenjin	0.06	0.10
Akamba	0.03	0.05
Kisii	0.04	0.04
Ugandan	0.05	0.06
Somali	0.03	0.05
Other	0.01	0.02
Wealth		
Very wealthy	0.22	0.22
Above average	0.25	0.37
Average	0.43	0.35
Poor	0.11	0.06
Cleanliness		
Clean	0.66	0.47
Average	0.29	0.46
Dirty	0.05	0.06
Physical Attractiveness		
Handsome	0.57	0.43
Average	0.33	0.46
Ugly	0.10	0.10
Occupation		
Truck driver	0.16	0.17
Boda boda	0.08	0.10
Duka Owner	0.09	0.14
Bar worker	0.05	0.05
Hotel worker	0.07	0.09
Government Official	0.28	0.26
Business man	0.20	0.17
Other	0.06	0.03
High Perceived Risk of HIV?	0.47	0.50
Estimated amount of unprotected sex (compared to average client)		
Much more often	0.12	0.10
More often	0.33	0.38
About the same	0.12	0.20
Less often	0.29	0.23
Much less often	0.13	0.09
Estimated number of sexual partners (compared to average client)		
Many more	0.12	0.21
More often	0.14	0.20
About the same	0.14	0.15
Less	0.34	0.26
Many less	0.26	0.19
Observations	608	2738

Note: Client characteristics only available for clients of women sampled in Round 2.
Unweighted means.

Table 9. Hedonic Price Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	---------- Full Sample ----------				---------- Round 2 Sample Only ----------			
	Full Sample	Full Sample	Regular Clients	Casual Clients	All Round 2	All Round 2	Regular Clients	Casual Clients
Had Vaginal Sex	44.036	72.927	50.502	85.956	95.567	82.929	81.216	112.176
	(28.117)	(18.735)***	(22.900)**	(21.960)***	(19.984)***	(44.567)*	(37.905)**	(58.993)*
Had Anal Sex	91.708	96.263	55.727	97.17	146.752	144.529	63.743	168.361
	(23.975)***	(21.247)***	(21.260)***	(25.558)***	(39.319)***	(47.795)***	(34.296)*	(65.132)**
Had Oral Sex	45.119	47.579	59.406	39.745	92.445	75.287	45.881	107.784
	(14.450)***	(14.879)***	(23.471)**	(14.580)***	(25.552)***	(24.989)***	(30.393)	(30.549)***
Massage	70.836	67.222	53.097	70.099	72.667	74.873	21.833	112.345
	(14.212)***	(13.069)***	(15.486)***	(16.823)***	(20.425)***	(25.023)***	(21.019)	(37.081)***
Kissing	59.905	54.977	51.524	48.929	50.701	53.644	17.83	68.225
	(12.026)***	(11.446)***	(16.509)***	(12.810)***	(16.732)***	(18.558)***	(25.223)	(21.654)***
Manual Stimulation	71.469	68.261	79.121	61.407	90.105	102.153	45.847	144.337
	(19.483)***	(19.412)***	(28.801)***	(21.415)***	(34.438)***	(37.833)***	(34.907)	(56.950)**
Company	102.141	92.413	59.603	90.032	123.507	137.622	76.435	151.887
	(13.713)***	(13.665)***	(17.675)***	(16.424)***	(20.720)***	(21.380)***	(20.822)***	(28.788)***
Stripping	52.211	49.472	58.128	35.143	60.662	66.904	74.047	48.967
	(13.639)***	(12.595)***	(15.967)***	(15.543)**	(16.499)***	(20.127)***	(22.875)***	(27.812)*
Sex in Thighs	73.715	68.545	32.39	90.265	115.179	130.7	54.691	182.801
	(25.412)***	(24.570)***	(28.678)	(28.891)***	(47.180)**	(52.460)**	(44.277)	(67.409)***
Regular Client	-35.937	-39.641			-63.036	-69.499		
	(13.871)**	(13.735)***			(18.452)***	(20.340)***		
Used Condom All Sex Acts	-21.555							
	(18.054)							
# Times Unprotected Sex		35.599	48.141	33.616	23.014			
		(10.833)***	(15.137)***	(14.191)**	(35.051)			
Had Unprotected Vaginal Sex						23.057	4.739	49.390
						(28.644)	(28.437)	(38.554)
Had Unprotected Anal Sex						23.254	-57.871	72.94
						(100.001)	(73.290)	(96.570)
Client Controls	No	No	No	No	No	No	No	No
Observations	27529	29541	11023	18518	14622	12606	5469	7137
Number of id	235	235	235	235	143	143	143	142
R-squared	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.06

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.
The dependent variable is Kenyan shillings. The exchange rate was approximately 70 Kenyan shillings to $1 US during the data collection period.
Averages prices paid by type of client: regular - 484 shillings; casual - 464 shillings; overall - 472 shillings.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10. Effect of HIV Status on Hedonic Price Regressions

	(1) HIV+	(2) >50% HIV+	(3) <50% HIV+	(4) HIV+	(5) >50% HIV+	(6) <50% HIV+
Had Vaginal Sex	162.133	97.004	63.922	102.288	129.688	111.445
	(66.590)**	(54.986)*	(48.229)	(53.095)*	(38.391)***	(22.469)***
Had Anal Sex	121.257	136.751	84.792	73.77	127.796	96.773
	(63.794)*	(39.569)***	(42.642)**	(40.614)*	(33.879)***	(35.262)***
Had Oral Sex	103.714	121.809	43.522	81.127	109.11	48.013
	(64.918)	(34.463)***	(24.227)*	(51.518)	(34.789)***	(23.571)**
Massage	106.774	124.732	76.836	101.919	104.022	75.329
	(56.459)*	(24.953)***	(24.520)***	(55.194)*	(23.447)***	(21.522)***
Kissing	1.95	56.911	44.403	18.486	51.17	41.513
	(29.990)	(12.856)***	(21.682)**	(25.199)	(13.627)***	(19.828)**
Manual Stimulation	103.198	95.795	53.73	106.925	84.208	49.535
	(85.829)	(28.270)***	(29.598)*	(79.219)	(26.127)***	(28.118)*
Company	60.379	102.849	110.093	90.446	82.926	95.159
	(33.080)*	(23.287)***	(24.121)***	(30.036)**	(23.371)***	(22.055)***
Stripping	155.046	42.472	34.25	123.121	29.788	37.196
	(46.659)***	(19.501)**	(24.383)	(41.079)**	(21.132)	(20.709)*
Sex in Thighs	40.703	49.568	109.447	8.874	27.197	102.889
	(32.482)	(36.403)	(44.272)**	(55.811)	(41.657)	(43.898)**
Regular Client	-20.479	-39.255	-20.48	3.599	-56.918	-28.694
	(45.941)	(31.166)	(22.051)	(38.305)	(32.794)*	(21.333)
Used Condom All Sex Acts	0.821	9.078	-14.433			
	(48.102)	(43.434)	(30.038)			
Times of Unprotected Sex				7.092	42.421	33.360
				(19.393)	(17.551)**	(24.536)
Client Controls	No	No	No	No	No	No
Observations	1609	4285	11113	1645	4321	12288
Number of id	13	31	106	13	31	106
R-squared	0.18	0.2	0.06	0.26	0.2	0.06

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.
The dependent variable is Kenyan shillings. The exchange rate was approximately 70 Kenyan shillings to $1 US during the data collection perioc
Average prices paid by HIV status: HIV+ 493 shillings; >50% HIV+ 460 shillings; <50% HIV+ 495 shillings
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 11. Nonlinearities in Hedonic Price Regressions

	(1) Full Sample	(2) Full Sample
Had Vaginal Sex	72.927	73.015
	(18.735)***	(18.766)***
Had Anal Sex	96.263	97.758
	(21.247)***	(21.204)***
Had Oral Sex	47.579	48.136
	(14.879)***	(15.064)***
Massage	67.222	67.031
	(13.069)***	(13.068)***
Kissing	54.977	55.472
	(11.446)***	(11.458)***
Manual Stimulation	68.261	68.459
	(19.412)***	(19.395)***
Company	92.413	90.979
	(13.665)***	(13.440)***
Stripping	49.472	49.203
	(12.595)***	(12.644)***
Sex in Thighs	68.545	67.394
	(24.570)***	(24.580)***
Other	64.05	66.066
	(31.761)**	(31.526)**
Regular Client	-39.641	-40.002
	(13.735)***	(13.741)***
Unprotected Sexual Repetitions	35.599	
	(10.833)***	
Unprotected Sex 1 Time		13.426
		(16.778)
Unprotected Sex 2 Times		44.546
		(26.216)*
Unprotected Sex 3 Times		79.035
		(34.844)**
Unprotected Sex 4 Times		273.696
		(100.061)***
Unprotected Sex 5 Times		171.122
		(88.702)*
Unprotected Sex 6 Times		229.141
		(411.632)
Client Controls	No	No
Observations	29541	29541
Number of id	235	235
R-squared	0.05	0.06

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses. The dependent variable is Kenyan shillings. The exchange rate is approximately 70 Kenyan shillings to $1 US.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 12. Labor Supply Response to Shocks

	(1) Saw Any Clients	(2) # of Clients	(3) # of Regular Clients	(4) # of Casual Clients	(5) Sex Work Income	(6) Other Income	(7) Total Income
Panel A. Shock=Sexual Transmitted Infection (STI)							
Sexually Transmitted Infection (STI)	-0.172	-0.381	-0.096	-0.250	-188.702	-12.579	-198.468
	(0.034)***	(0.090)***	(0.049)*	(0.064)***	(44.105)***	(11.185)	(46.275)***
Mean of Dependent Variable	0.756	1.576	0.586	0.991	657.616	102.650	773.483
Percentage Change	-0.227	-0.242	-0.164	-0.252	-0.287	-0.123	-0.257
Observations	20226	20135	20226	20226	19969	20057	19964
Number of id	235	235	235	235	235	235	235
R-squared	0.03	0.04	0.02	0.04	0.04	0.01	0.04
Panel B. Shock=Menstruation							
Menstruating	-0.423	-0.928	-0.317	-0.613	-400.678	3.585	-394.464
	(0.024)***	(0.053)***	(0.026)***	(0.040)***	(29.653)***	(4.683)	(29.849)***
Mean of Dependent Variable	0.756	1.576	0.586	0.991	657.616	102.650	773.483
Percentage Change	-0.559	-0.589	-0.541	-0.619	-0.609	0.035	-0.510
Observations	20217	20126	20217	20217	19963	20048	19959
Number of id	235	235	235	235	235	235	235
R-squared	0.13	0.12	0.04	0.08	0.07	0.01	0.06
Panel C. Shock=Death of Friend / Family Member							
Death	-0.052	-0.113	-0.031	-0.081	-29.851	1.764	-30.316
	(0.026)**	(0.058)*	(0.036)	(0.046)*	(47.331)	(6.566)	(50.605)
Mean of Dependent Variable	0.756	1.576	0.586	0.991	657.616	102.650	773.483
Percentage Change	-0.069	-0.072	-0.053	-0.082	-0.045	0.017	-0.039
Observations	13458	13385	13458	13458	13256	13353	13258
Number of id	233	233	233	233	233	233	233
R-squared	0.02	0.03	0.02	0.03	0.03	0.01	0.03
Panel D. Shock=Own Sickness							
Respondent Sickness (Cough, Fever, Malaria,	-0.076	-0.163	-0.042	-0.115	-94.779	-2.626	-105.186
Typhoid, Burns/Cuts, Other)	(0.015)***	(0.038)***	(0.019)**	(0.026)***	(20.643)***	(4.978)	(22.028)***
Mean of Dependent Variable	0.756	1.576	0.586	0.991	657.616	102.650	773.483
Percentage Change	-0.101	-0.103	-0.072	-0.116	-0.144	-0.026	-0.136
Observations	20198	20108	20198	20198	19943	20029	19938
Number of id	235	235	235	235	235	235	235
R-squared	0.03	0.04	0.02	0.04	0.04	0.01	0.04
Panel E. Shock=Own Sickness / Household Sickness^							
Household Sickness (Cough, Fever, Malaria,	0.029	0.087	0.020	0.066	53.858	6.516	57.098
Typhoid, Burns/Cuts, Other)	(0.012)**	(0.033)***	(0.02)	(0.029)**	(18.816)***	(6.13)	(20.653)***
Respondent Sickness (Cough, Fever, Malaria,	-0.087	-0.193	-0.050	-0.136	-113.275	-6.904	-126.283
Typhoid, Burns/Cuts, Other)	(0.017)***	(0.043)***	(0.022)**	(0.029)***	(22.454)***	(5.210)	(24.513)***
Mean of Dependent Variable	0.762	1.600	0.605	0.995	651.688	112.363	776.563
Percentage Change (Household Sickness)	0.038	0.054	0.033	0.066	0.083	0.058	0.074
Observations	16736	16667	16736	16736	16525	16602	16523
Number of id	197	197	197	197	197	197	197
R-squared	0.03	0.04	0.02	0.04	0.04	0.01	0.04

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.

^Panel A-D are on the full sample of non-missing observations, while Panel E is restricted to respondents with dependents.

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

Table 13. Effect of Health Shocks on the Incidence of Risky Sexual Behavior

	(1) Full Sample Had a Risky Sex Act	(2) Full Sample Had Vaginal Sex	(3) Full Sample Had Anal Sex	(4) Full Sample Had Oral Sex	(5) Full Sample # Unprotected Sex	(6) Round 2 Had Unprotected Vaginal Sex	(7) Round 2 Had Unprotected Anal Sex	(8) Round 2 # Unprotected Vaginal Sex	(9) Round 2 # Unprotected Anal Sex
Household Sickness (Cough, Fever, Malaria,	0.033	0.025	0.037	0.03	0.076	0.017	-0.004	0.029	-0.005
Typhoid, Burns/Cuts, Other)	(0.012)***	(0.013)*	(0.011)***	(0.012)**	(0.043)*	(0.01)	(0.01)	(0.02)	(0.01)
Mean of Dependent Variable	0.140	0.698	0.220	0.166	0.350	0.075	0.015	0.122	0.026
Percentage Change	0.236	0.036	0.168	0.181	0.217	0.227	-0.264	0.238	-0.195
Observations	15909	16736	16736	16736	14987	8588	8588	6210	6373
Number of id	197	197	197	197	197	115	115	115	115
R-squared	0.02	0.03	0.02	0.03	0.04	0.02	0.01	0.02	0.01

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.
Panels include controls for own sickness though the coefficients are not reported. Sample is restricted to respondents with dependents.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 14. HIV Status

	(1) Full Sample Saw Any Clients	(2) Full Sample # of Clients	(3) Full Sample Had a Risky Sex Act	(4) Full Sample Had Vaginal Sex	(5) Full Sample Had Anal Sex	(6) Full Sample Had Oral Sex	(7) Full Sample # Unprotected Sex	(8) Round 2 Had Unprotected Vaginal Sex	(9) Round 2 # Unprotected Vaginal Sex
Panel A. HIV+									
Household Sickness (Cough, Fever, Malaria,	0.075	0.127	0.014	0.055	0.109	0.075	-0.010	0.041	0.046
Typhoid, Burns/Cuts, Other)	(0.036)*	(0.091)	(0.028)	(0.041)	(0.036)**	(0.028)**	(0.072)	(0.030)	(0.030)
Observations	1264	1259	1199	1264	1264	1264	1040	359	284
Number of id	13	13	13	13	13	13	13	5	5
R-squared	0.14	0.15	0.13	0.13	0.20	0.18	0.20	0.25	0.37
Panel B. Estimated > 50% Chance HIV+									
Household Sickness (Cough, Fever, Malaria,	0.020	0.021	0.071	-0.003	0.049	0.040	0.319	0.017	0.004
Typhoid, Burns/Cuts, Other)	(0.027)	(0.094)	(0.047)	(0.025)	(0.024)*	(0.034)	(0.185)*	(0.033)	(0.054)
Observations	2272	2267	2205	2272	2272	2272	1918	500	384
Number of id	25	25	25	25	25	25	25	7	7
R-squared	0.09	0.13	0.08	0.11	0.15	0.06	0.14	0.18	0.21
Panel C. Estimated < 50% Chance HIV+									
Household Sickness (Cough, Fever, Malaria,	0.014	0.078	0.021	0.023	0.016	0.026	-0.020	0.020	0.049
Typhoid, Burns/Cuts, Other)	(0.020)	(0.047)	(0.014)	(0.020)	(0.015)	(0.013)**	(0.041)	(0.014)	(0.031)
Observations	7622	7574	7198	7622	7622	7622	7107	5344	3788
Number of id	95	95	95	95	95	95	95	71	71
R-squared	0.05	0.05	0.03	0.05	0.04	0.04	0.05	0.02	0.04

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.
Panels include controls for own sickness though the coefficients are not reported. Sample panels are restricted to respondents with dependents.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 15. Effect of Shocks on Expenditures

	(1) Total Expenditures	(2) Food Expenditures	(3) # of Meals for Respondent	(4) # of Meals for Household	(5) Medical Expenditures	(6) Non-Medical, Non-Food Expenditures
Panel A. Shock=STI						
STI	57.112	-6.547	-0.038	-0.080	24.486	39.174
	(32.919)*	(6.552)	(0.029)	(0.038)**	(5.366)***	(28.909)
Observations	18437	18437	18437	18437	18437	18437
Number of id	227	227	227	227	227	227
R-squared	0.09	0.16	0.03	0.03	0.04	0.07
Panel B. Shock=Menstruation						
Menstruating	-30.643	-4.218	0.000	-0.005	-0.413	-26.013
	(15.795)*	(3.425)	(0.012)	(0.013)	(2.724)	(13.973)*
Observations	18428	18428	18428	18428	18428	18428
Number of id	227	227	227	227	227	227
R-squared	0.09	0.16	0.03	0.03	0.03	0.07
Panel C. Shock=Death of Friend / Family Member						
Death	353.413	9.684	-0.044	0.002	1.295	342.434
	(49.565)***	(8.040)	(0.026)*	(0.023)	(5.438)	(44.747)***
Observations	12057	12057	12057	12057	12057	12057
Number of id	225	225	225	225	225	225
R-squared	0.11	0.20	0.02	0.01	0.03	0.08
Panel D. Shock=Own Sickness						
Respondent Sickness (Cough, Fever, Malaria,	47.362	-0.949	-0.025	0.000	30.092	18.219
Typhoid, Burns/Cuts, Other)	(15.912)***	-3.560	(0.014)*	-0.012	(2.938)***	-13.702
Observations	18408	18408	18408	18408	18408	18408
Number of id	227	227	227	227	227	227
R-squared	0.09	0.16	0.03	0.03	0.05	0.07
Panel E. Shock=Own Sickness / Household Sickness^						
Household Sickness (Cough, Fever, Malaria,	80.806	5.159	-0.018	-0.033	21.625	54.022
Typhoid, Burns/Cuts, Other)	(14.726)***	(3.191)	(0.013)	(0.014)**	(2.910)***	(12.841)***
Respondent Sickness (Cough, Fever, Malaria,	33.097	-0.614	-0.014	0.009	25.923	7.788
Typhoid, Burns/Cuts, Other)	(17.328)*	(4.106)	(0.015)	(0.014)	(3.353)***	(15.012)
Observations	15539	15539	15539	15539	15539	15539
Number of id	192	192	192	192	192	192
R-squared	0.09	0.17	0.04	0.04	0.06	0.06

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.
^Panel A-D are on the full sample of non-missing observations, while Panel E is restricted to respondents with dependents.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 16. Alternative Risk-Coping Strategies

	(1) Savings	(2) Bank Loans	(3) Loan from Family / Friends	(4) Gifts from Regular Clients	(5) Gifts from Family / Friends
Panel A. Shock=STI					
STI	-243.989	8.530	7.655	16.706	3.446
	(34.412)***	(14.137)	(12.781)	(18.840)	(4.573)
Observations	18208	18324	18325	18409	18287
Number of id	227	227	227	227	227
R-squared	0.05	0.01	0.02	0.04	0.02
Panel B. Shock=Menstruation					
Menstruating	-385.417	-3.827	8.555	17.465	-0.443
	(19.169)***	(8.031)	(7.226)	(10.712)	(2.586)
Observations	18202	18318	18319	18400	18280
Number of id	227	227	227	227	227
R-squared	0.07	0.01	0.02	0.04	0.02
Panel C. Shock=Death of Friend / Family Member					
Death	-368.427	0.652	11.850	78.498	2.420
	(37.725)***	(14.196)	(7.128)*	(23.366)***	(4.890)
Observations	11876	11958	11961	12041	11921
Number of id	225	225	225	225	225
R-squared	0.04	0.01	0.02	0.04	0.02
Panel D. Shock=Own Sickness					
Respondent Sickness (Cough, Fever, Malaria,	-155.401	-0.499	9.387	27.817	6.257
Typhoid, Burns/Cuts, Other)	(14.437)***	-5.998	(5.389)*	(8.005)***	(1.923)***
Observations	18181	18300	18302	18380	18261
Number of id	227	227	227	227	227
R-squared	0.05	0.01	0.02	0.04	0.02
Panel E. Shock=Own Sickness / Household Sickness^					
Household Sickness (Cough, Fever, Malaria,	-10.072	2.007	12.973	19.47	5.544
Typhoid, Burns/Cuts, Other)	(17.030)	(7.416)	(6.756)*	(9.551)**	(2.342)**
Respondent Sickness (Cough, Fever, Malaria,	-165.929	-2.028	9.02	36.373	4.696
Typhoid, Burns/Cuts, Other)	(16.206)***	(7.053)	(6.423)	(9.095)***	(2.227)**
Observations	15337	15442	15445	15518	15413
Number of id	192	192	192	192	192
R-squared	0.05	0.02	0.02	0.04	0.02

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses. Savings are imputed as total income minus total expenditures.

^Panel A-D are on the full sample of non-missing observations, while Panel E is restricted to respondents with dependents.

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

Table 17. Detailed Alternative Risk-Coping Strategies (Round 2 Sample)

	(1) Deposit in Bank	(2) Deposit in ROSCA	(3) Transfer from ROSCA	(4) Cash Gifts from Regular Clients	(5) Rent Paid by Regular Clients	(6) School Fees or HH Items Paid by Regular Clients	(7) Material Goods from Regular Clients
Panel A. Shock=STI							
STI	0.440	3.635	42.209	7.953	10.938	-24.133	49.862
	(11.480)	(6.739)	(15.787)***	(16.602)	(10.785)	(20.427)	(20.131)**
Observations	9616	9617	9552	9581	9586	9598	9463
Number of id	136	136	136	136	136	136	136
R-squared	0.01	0.02	0.02	0.01	0.02	0.02	0.02
Panel B. Shock=Menstruation							
Menstruating	6.908	-6.223	12.764	29.555	-5.737	39.205	-20.675
	(5.750)	(3.375)*	(7.762)	(8.180)***	(5.306)	(10.053)***	(9.846)**
Observations	9618	9619	9556	9586	9590	9603	9467
Number of id	136	136	136	136	136	136	136
R-squared	0.01	0.02	0.02	0.01	0.02	0.03	0.02
Panel C. Shock=Death of Friend / Family Member							
Death	-4.384	13.684	6.980	32.501	22.894	-0.182	40.750
	(8.108)	(4.743)***	(10.971)	(11.620)***	(7.520)***	(14.262)	(13.955)***
Observations	9623	9624	9561	9590	9594	9607	9472
Number of id	136	136	136	136	136	136	136
R-squared	0.01	0.02	0.02	0.01	0.02	0.02	0.02
Panel D. Shock=Own Sickness							
Respondent Sickness (Cough, Fever, Malaria,	5.475	7.436	13.074	10.230	16.336	16.863	12.970
Typhoid, Burns/Cuts, Other)	-4.511	(2.684)***	(6.157)**	-6.507	(4.207)***	(7.985)**	(7.817)*
Observations	9600	9601	9541	9568	9573	9586	9453
Number of id	136	136	136	136	136	136	136
R-squared	0.01	0.02	0.02	0.01	0.02	0.02	0.02
Panel E. Shock=Own Sickness / Household Sickness^							
Household Sickness (Cough, Fever, Malaria,	13.014	6.696	11.015	10.758	8.562	16.87	20.845
Typhoid, Burns/Cuts, Other)	(5.893)**	(3.315)**	(7.566)	(7.717)	(5.400)	(10.029)*	(9.179)**
Respondent Sickness (Cough, Fever, Malaria,	3.94	4.747	9.911	17.248	19.393	18.498	20.011
Typhoid, Burns/Cuts, Other)	(5.762)	(3.242)	(7.394)	(7.535)**	(5.276)***	(9.789)*	(8.947)**
Observations	7694	7695	7651	7670	7672	7683	7561
Number of id	110	110	110	110	110	110	110
R-squared	0.01	0.02	0.02	0.02	0.03	0.04	0.03

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.
The dependent variable is Kenyan shillings. The exchange rate was approximately 70 Kenyan shillings to $1 US during the data collection period.
Savings are imputed as total income minus total expenditures.
^Panel A-D are on the Round 2 sample of non-missing observations, while Panel E is restricted to respondents with dependents in Round 2.
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix 1. Hedonic Price Regressions with Client Characteristics

	(1) Round 2	(2) Round 2	(3) Round 2	(4) Round 2
Had Vaginal Sex	95.567	47.239	82.929	23.485
	(19.984)***	(24.488)*	(44.567)*	(34.553)
Had Anal Sex	146.752	56.474	144.529	53.562
	(39.319)***	(29.563)*	(47.795)***	(32.999)
Had Oral Sex	92.445	54.909	75.287	54.234
	(25.552)***	(27.206)**	(24.989)***	(41.986)
Massage	72.667	10.183	74.873	11.045
	(20.425)***	(20.321)	(25.023)***	(23.164)
Kissing	50.701	53.563	53.644	72.786
	(16.732)***	(17.679)***	(18.558)***	(22.739)***
Manual Stimulation	90.105	29.302	102.153	10.498
	(34.438)***	(29.762)	(37.833)***	(21.542)
Company	123.507	73.185	137.622	77.924
	(20.720)***	(21.549)***	(21.380)***	(28.925)***
Stripping	60.662	44.949	66.904	58.945
	(16.499)***	(23.306)*	(20.127)***	(31.108)*
Sex in Thighs	115.179	27.897	130.7	85.523
	(47.180)**	(34.642)	(52.460)**	(39.554)**
Regular Client	-63.036	-41.227	-69.499	-46.629
	(18.452)***	(30.671)	(20.340)***	(36.231)
Used Condom All Sex Acts				
Times of Unprotected Sex	23.014	64.842		
	(35.051)	(54.706)		
Unprotected Vaginal Sex			23.057	25.801
			(28.644)	(33.043)
Unprotected Anal Sex			23.254	-48.388
			(100.001)	(85.776)
Circumcised				-32.720
				(21.177)
High Estimated Risk of HIV?				82.620
				(47.636)*
Client Controls	No	Yes	No	Yes
Observations	14622	4960	12606	3816
Number of id	143	124	143	116
R-squared	0.05	0.05	0.05	0.07

Note: All regressions are fixed effects regressions with controls for the date.
Clustered standard errors at the individual-level in parentheses.
The dependent variable is Kenyan shillings. The exchange rate was approximately 70 Kenyan shillings to $1 US during the data collection period.
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix 2. Robustness Check Excluding Women Who Always Use a Condom

	(1) Full Sample	(2) Full Sample	(3) Round 2	(4) Round 2
Had Vaginal Sex	36.908	60.402	83.644	71.223
	(28.403)	(21.763)***	(23.644)***	(43.532)
Had Anal Sex	78.178	81.292	129.233	125.17
	(21.664)***	(19.865)***	(38.858)***	(43.603)***
Had Oral Sex	40.123	42.08	104.664	90.915
	(15.264)***	(15.898)***	(28.673)***	(28.052)***
Massage	59.001	55.087	44.55	42.995
	(12.867)***	(11.907)***	(18.307)**	(22.216)*
Kissing	64.01	58.574	65.068	70.707
	(12.726)***	(12.237)***	(18.129)***	(19.377)***
Manual Stimulation	52.26	49.043	45.886	57.366
	(18.392)***	(18.692)***	(30.465)	(34.387)*
Company	101.123	90.577	124.584	143.223
	(14.673)***	(14.513)***	(23.446)***	(25.224)***
Stripping	53.751	51.305	76.781	83.799
	(14.773)***	(13.924)***	(19.358)***	(23.664)***
Sex in Thighs	51.498	49.829	67.485	59.623
	(23.284)**	(22.940)**	(38.892)*	(36.727)
Regular Client	-33.921	-38.564	-62.841	-70.8
	(14.961)**	(15.098)**	(21.264)***	(23.325)***
Used Condom All Sex Acts	-23.256			
	(17.853)			
# Times Unprotected Sex		37.213	27.478	
		(10.571)***	(33.710)	
Unprotected Vaginal Sex				24.780
				(28.172)
Unprotected Anal Sex				25.537
				(100.448)
Client Controls	No	No	No	No
Observations	22112	23538	10113	8680
Number of id	180	180	97	97
R-squared	0.05	0.05	0.05	0.05

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses. The dependent variable is Kenyan shillings.
The exchange rate was approximately 70 Kenyan shillings to $1 US during the data collection period.
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix 3. Robustness Check of Household Sickness Duration Length

Panel A. Labor Supply	(1) Full Sample	(2) Full Sample	(3) Full Sample	(4) Full Sample	(5) Full Sample	(6) Full Sample	(7) Full Sample
Household Sickness Duration Length:	Saw Any Clients	# of Clients	# of Regular Clients	# of Casual Clients	Sex Work Income	Other Income	Total Income
All durations	0.029	0.087	0.020	0.066	53.858	6.516	57.098
	(0.012)**	(0.033)***	(0.018)	(0.029)**	(18.816)***	(6.134)	(20.653)***
	[16736]	[16667]	[16736]	[16736]	[16525]	[16602]	[16523]
duration ≤ 3 days	0.012	0.027	-0.004	0.017	10.929	8.547	19.522
	(0.015)	(0.041)	(0.024)	(0.034)	(25.563)	(6.573)	(27.931)
	[6202]	[6191]	[6202]	[6202]	[6142]	[6159]	[6143]
3 < duration ≤ 5 days	0.040	0.078	0.007	0.058	72.689	6.101	91.866
	(0.027)	(0.067)	(0.040)	(0.051)	(36.870)*	(11.733)	(36.581)**
	[1757]	[1739]	[1757]	[1757]	[1729]	[1738]	[1727]
5 < duration ≤ 10 days	-0.018	-0.025	0.009	-0.009	87.172	10.163	95.492
	(0.032)	(0.081)	(0.041)	(0.077)	(48.004)*	(10.974)	(48.456)*
	[2282]	[2270]	[2282]	[2282]	[2265]	[2262]	[2262]
10 < duration ≤ 18 days	-0.036	-0.110	0.000	-0.093	-51.093	17.799	-44.707
	(0.035)	(0.087)	(0.055)	(0.084)	(48.762)	(12.511)	(54.016)
	[1421]	[1411]	[1421]	[1421]	[1399]	[1413]	[1399]
duration > 18 days	-0.023	0.031	0.026	0.043	99.037	6.910	78.391
	(0.037)	(0.109)	(0.062)	(0.103)	(83.012)	(19.345)	(90.579)
	[2263]	[2242]	[2263]	[2263]	[2196]	[2243]	[2193]

Panel B. Risky Sexual Behavior	(1) Full Sample	(2) Full Sample	(3) Full Sample	(4) Full Sample	(5) Full Sample	(6) Round 2	(7) Round 2	(8) Round 2	(9) Round 2
Household Sickness Duration Length:	Had a Risky Sex Act	Had Vaginal Sex	Had Anal Sex	Had Oral Sex	# Unprotected Sex	Had Unprotected Vaginal Sex	Had Unprotected Anal Sex	# Unprotected Vaginal Sex	# Unprotected Anal Sex
All durations	0.033	0.025	0.037	0.030	0.076	0.017	-0.004	0.029	-0.005
	(0.012)***	(0.013)*	(0.011)***	(0.012)**	(0.043)*	(0.010)	(0.006)	(0.022)	(0.012)
	[15909]	[16736]	[16736]	[16736]	[14987]	[8588]	[8588]	[6210]	[6373]
duration ≤ 3 days	0.021	0.011	0.015	0.006	0.029	0.002	-0.002	-0.016	-0.006
	(0.012)*	(0.016)	(0.012)	(0.013)	(0.036)	(0.012)	(0.007)	(0.019)	(0.015)
	[5882]	[6202]	[6202]	[6202]	[5624]	[3369]	[3369]	[2536]	[2617]
3 < duration ≤ 5 days	0.007	0.032	0.017	0.061	-0.105	0.002	-0.003	0.019	0.010
	(0.021)	(0.029)	(0.019)	(0.017)***	(0.058)*	(0.027)	(0.008)	(0.041)	(0.021)
	[1660]	[1757]	[1757]	[1757]	[1553]	[787]	[787]	[602]	[631]
5 < duration ≤ 10 days	0.015	-0.006	0.033	0.023	-0.013	0.025	-0.006	-0.021	-0.001
	(0.023)	(0.033)	(0.028)	(0.022)	(0.071)	(0.028)	(0.027)	(0.059)	(0.046)
	[2179]	[2282]	[2282]	[2282]	[1994]	[920]	[920]	[685]	[696]
10 < duration ≤ 18 days	-0.006	-0.061	-0.002	-0.022	0.129	0.017	0.020	0.105	-0.027
	(0.045)	(0.037)	(0.031)	(0.033)	(0.129)	(0.038)	(0.032)	(0.066)	(0.069)
	[1363]	[1421]	[1421]	[1421]	[1176]	[319]	[319]	[247]	[258]
duration > 18 days	-0.002	-0.027	0.012	-0.021	0.171	-0.083	-0.006	-0.042	0.015
	(0.042)	(0.041)	(0.048)	(0.030)	(0.215)	(0.091)	(0.011)	(0.111)	(0.035)
	[2144]	[2263]	[2263]	[2263]	[1969]	[710]	[710]	[550]	[554]

Note: All coefficients shown are on household sickness, although the regressions also include the own sickness variable.
All regressions are fixed effects regressions with controls for the date.
Clustered standard errors at the individual-level in parentheses. Observations in brackets.
Sample is restricted to those respondents with dependents.
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix 4. Robustness Check of Labor Supply Regressions Excluding Women Who Always Use a Condom

Panel A. Labor Supply	(1) Full Sample Saw Any Clients	(2) Full Sample # of Clients	(3) Full Sample # of Regular Clients	(4) Full Sample # of Casual Clients	(5) Full Sample Sex Work Income	(6) Full Sample Other Income	(7) Full Sample Total Income
Household Sickness (Cough, Fever, Malaria	0.028	0.081	0.021	0.061	49.661	6.160	49.519
Typhoid, Burns/Cuts, Other)	(0.014)**	(0.040)**	(0.021)	(0.034)*	(21.451)**	(7.252)	(23.569)**
Observations	12920	12862	12920	12920	12737	12810	12739
Number of id	149	149	149	149	149	149	149
R-squared	0.04	0.04	0.02	0.04	0.05	0.02	0.05

Panel B. Risky Sexual Behavior	(1) Full Sample Had a Risky Sex Act	(2) Full Sample Had Vaginal Sex	(3) Full Sample Had Anal Sex	(4) Full Sample Had Oral Sex	(5) Full Sample # Unprotected Sex	(6) Round 2 Had Unprotected Vaginal Sex	(7) Round 2 Had Unprotected Anal Sex	(8) Round 2 # Unprotected Vaginal Sex	(9) Round 2 # Unprotected Anal Sex
Household Sickness (Cough, Fever, Malaria	0.041	0.024	0.045	0.035	0.105	0.026	-0.008	0.049	-0.009
Typhoid, Burns/Cuts, Other)	(0.015)***	(0.015)	(0.013)***	(0.014)**	(0.055)*	(0.016)	(0.009)	(0.032)	(0.018)
Observations	12283	12920	12920	12920	11351	5616	5616	4067	4168
Number of id	149	149	149	149	149	76	76	76	76
R-squared	0.02	0.03	0.03	0.04	0.05	0.02	0.01	0.04	0.02

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.
Panels include controls for own sickness though the coefficients are not reported. Sample is also restricted to respondents with dependents.
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix 5. Previously Married vs Never Married

	(1) Full Sample Saw Any Clients	(2) Full Sample # of Clients	(3) Full Sample Had a Risky Sex Act	(4) Full Sample Had Vaginal Sex	(5) Full Sample Had Anal Sex	(6) Full Sample Had Oral Sex	(7) Full Sample # Unprotected Sex	(8) Round 2 Had Unprotected Vaginal Sex	(9) Round 2 # Unprotected Vaginal Sex
Panel A. Previously Married									
Household Sickness (Cough, Fever, Malaria,	0.026	0.086	0.056	0.030	0.028	0.022	0.119	0.007	0.005
Typhoid, Burns/Cuts, Other)	(0.017)	(0.048)*	(0.019)***	(0.018)	(0.018)	(0.016)	(0.065)*	(0.016)	(0.029)
Observations	8248	8208	7788	8248	8248	8248	7347	4251	3069
Number of id	100	100	100	100	100	100	100	58	58
R-squared	0.04	0.05	0.04	0.04	0.04	0.04	0.07	0.03	0.05
Panel B. Never Married									
Household Sickness (Cough, Fever, Malaria,	0.031	0.080	0.010	0.021	0.040	0.035	0.024	0.026	0.047
Typhoid, Burns/Cuts, Other)	(0.017)*	(0.046)*	(0.013)	(0.018)	(0.013)***	(0.017)**	(0.049)	(0.014)*	(0.031)
Observations	8488	8459	8121	8488	8488	8488	7640	4337	3141
Number of id	97	97	97	97	97	97	97	57	57
R-squared	0.04	0.06	0.02	0.04	0.03	0.04	0.03	0.03	0.03

Note: All regressions are fixed effects regressions with controls for the date. Clustered standard errors at the individual-level in parentheses.
Panels include controls for own sickness though the coefficients are not reported. Sample panels are restricted to respondents with dependents.
* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix 6. Effect of Shocks on Expenditures (IV estimates)

	(1) Residual Total Expenditures	(2) Residual Food Expenditures	(3) Residual Non-Medical, Non-Food Expenditures
Panel A. Instrument=STI (First-stage F = 41.37)			
Residual Total Income		0.019	-0.275
		(0.026)	(0.115)**
Observations		19768	19784
Number of id		235	235
Pseudo R-squared		0.027	0.034
First-stage F Stat			
Panel B. Shock=Menstruation (First-stage F = 625.60)			
Residual Total Income	0.074	0.012	0.042
	(0.034)**	(0.007)	(0.029)
Observations	19800	19758	19779
Number of id	235	235	235
Pseudo R-squared	0.037	0.001	0.025
First-stage F Stat			
Panel C. Shock=Own Sickness (First-stage F = 39.41)			
Residual Total Income	-0.352	0.004	-0.095
	(0.103)***	(0.021)	(0.081)
Observations	19449	19412	19428
Number of id	235	235	235
Pseudo R-squared	0.035	0.012	0.026
First-stage F Stat			

Note: All regressions are instrumental variables regressions of the residuals of the dependent variable on the residual of total household income, instrumented with the shocks.
Regressions include individual fixed effects.
Panel C controls for household sickness.
* significant at 10%; ** significant at 5%; *** significant at 1%