DEMAND FUNCTIONS FOR CONDOMS IN FEMALE SEXUAL WORKERS AND MEN WHO HAVE SEX WITH MEN IN INDIA

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Resumen

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Este estudio explora los determinantes tanto de la decisión de comprar condones como de la demanda en sí misma para dos muestras de trabajadoras sexuales y hombres que tienen sexo con hombres en India. Mediante las bases de datos recogidas por el Proyecto de Prevención en Fronteras se obtuvo información para varias ciudades donde se aplicaron programas de intervención y otras utilizadas como control. Dado que la distribución gratuita de condones no es aleatoria se utilizó un proceso de selección de Heckman para cada grupo poblacional. Esta estrategia sirve para evaluar intervenciones públicas a través de la distribución gratuita de condones y la promoción de la prueba del VIH. En trabajadoras sexuales se encontró que el número de clientes determina la demanda, pero no se encuentra efectos desde el número de condones recibidos gratuitamente. En hombres que tienen sexo con hombres, en cambio, el número de condones recibidos gratuitamente determina una mayor compra.

Palabras claves: *Sesgo de selección, modelo de selección de Heckman, política, VIH / SIDA.*

Abstract

This study explores the determinants of both the decision to purchase condoms and the actual demand for two samples of female sexual workers (FSW) and men who have sex with men (MSM) in India. Through the datasets collected by the Frontiers Prevention Project we obtained information for several cities where intervention programs were administered and for others that were taken as controls. As the free distribution of condoms is not random, we use a Heckman selection process for each sample. This strategy serves to evaluate public interventions based on free supply of condoms and promotion of HIV testing. On sexual workers it is found that the number of paying clients determines demand, but no significant effect is found from the number of condoms received for free. On men who have sex with men, in turn, the number of condoms received for free determines greater purchase.

Keywords: *Selection bias, Heckman selection model, policy, HIV / AIDS.*

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1. Introduction

When surveying the economics of HIV/AIDS, the central issue is the individual and social incentives in avoiding HIV infection, after at least one member of the population has become infected with the virus (Gaffeo, 2000). What matters then is the relation between individual choices (in a situation of asymmetric information since one of the sexual partners may not know the HIV status of the other), the degree of optimality of social outcomes (since externalities arise because of the infection risk generated by population groups such as FSW and MSM) (Stoebenau et al., 2009), and the large differences in bargaining power (since many FSW/MSM may not be in the position to negotiate condom use because of economic dependence on clients) (de la Torre et al., 2010). When combined, these issues imply the emergence of several transmission-enhancing market failures, which constitute the grounds on which the public financing of health-care projects may be justified (Over, 1999). In order to effectively reduce HIV risk in any population it is then important to understand its sources and determinants as a starting point to implement interventions (Blankenship et al., 2008).

Conceptually it is not possible to think of a (close to) perfect substitute good for male condoms when the issue at stake is the prevention of sexually transmitted diseases, particularly HIV/AIDS. Though the female condom could be an alternative option, the current conditions in developing countries is that it has not been fully introduced and is not expected to occur in the upcoming years, thus it is not relevant for the analysis below and do not bring any potential bias for omission of variables. Therefore, henceforth when we mention condoms we refer to male condoms for simplicity.

When considering condoms as the most effective prevention method to control the spread of HIV in sexually active individuals (Bracher et al., 2004; Tremblay et al., 2005), in order to identify the determinants and incentives for individuals to purchase one or more units, one central assumption is that condom purchase and its use are highly and positively correlated. That is, though it is a commodity that may be stocked, its rotation rate is high enough to justify its frequent purchase. Moreover, the analysis below implicitly accepts that having multiple sexual partners carries an associated greater HIV-infection risk, both involving clients, and casual or long-term partnerships (Macaluso et al., 2000; Outwater et al., 2000; Eaton et al., 2010). For FSW/MSM then it is sensible to analyze the consistency of condom use over time, both with casual or new partners and with primary partners, since it determines the joint probability of an infection conditioned on the number of clients served (Allen et al., 2003; Gutierrez et al. 2006; Stephenson et al., 2008; Lippman et al., 2010).

Other studies have shown that issues such as the leve1 of awareness as well as the fear of contracting HIV and other STDs are the major factors influencing condom demand, though factors such as price, income and brand of condom may play a role (Fernandez 2015; Macaluso et al., 2000).

However, FSW/MSM may choose not to use condoms in their work when cheap or free condoms are not available near their work site, despite their awareness of STDs (de la Torre et al., 2010). Also, social and environmental factors such as the availability (and quality) of counselling and testing services, and the bargaining power of a sexual worker to avoid pressure from a client into unprotected sexual intercourse are elements related to HIV prevention and health promotion (Shannon et al., 2009; Lippman et al., 2010). In all these cases, the focus has been directed towards condom use but not on the economic issue of FSW/MSM as agents that face prices and consider condoms as inputs in their work and allocate disposable budget to other expenses. However, we leave open the possibility that eventually a FSW/MSM may not be inclined to purchase any condom where a prior scenario is set, that is, the decision to purchase or not condoms.

Hence, the objective of this paper is to estimate demand functions for condoms in two different population groups, considered as at high risk of HIV infection, namely, FSW and MSM in India. The results of this study serve several purposes, first, policy-makers on sexual health will have information inputs to design future interventions to control the HIV spread (i.e. through giving away condoms for free along with counselling programs) and to analyze the stage of the epidemics development (i.e. either it is concentrated on sexual workers and MSM or its spread to other population groups). Second, condom manufacturers may use it as market research on the population groups who show a relative high demand because of risk profiles. Finally, the theoretical framework developed contribute to the analysis of a good for which it is not possible to find a close substitute, particularly when considering the high level of risk when engaging on sexual intercourse on a repeated basis.

2. Theoretical Framework

The underlying theoretical model relates to condom use/purchase under the uncertainty of getting HIV infected because of the very nature of sexual work or active sexual behavior. The optimization problem for the FSW /MSM is as follows

$$\max f(n,q,\bar{q},x)u(q,\bar{q},l,x|h) + (1-f(n,q,\bar{q},x))u(q,\bar{q},l,x|nh)$$

Subject to $x + pq = w(24-l) + k\bar{q}$

$$l + l^w = 24$$

Where q represents the amount of condoms purchased in a certain period, $\bar{q}$ is the amount of condoms received for free, l is the hours of leisure (or may represent the time devoted to other activities different of sexual work), x is a composite numeraire good, h is whether the FSW/MSM becomes HIV infected and nh if otherwise, w is the average charge for each sexual encounter and $\bar{q}$ is the price the sexual worker may charge for selling the condoms received for free and l^w is the number of hours devoted to sexual work. For simplicity we assume the latter is positively correlated to the number of paying clients.

The intuition behind is that for sexual workers it would make sense to analyze the consistency of condom use over time since it determines the joint probability of an infection, conditioned on the number of clients served, that is, $f(n, q, \bar{q}, x)$.

Setting up the Lagrangian and solving the first-order conditions, the Marshallian demand for condoms would take the generic form:

$$q^d = \left(\frac{f(\cdot)\left(\frac{\partial U(\cdot\,|h)}{\partial l} - \frac{\partial U(\cdot\,|nh)}{\partial l}\right) + \frac{\partial f(\cdot)}{\partial l}\left(U(\cdot\,|nh) - U(\cdot\,|h)\right) + \frac{\partial U(\cdot\,|nh)}{\partial l}}{f(\cdot)\left(\frac{\partial U(\cdot\,|h)}{\partial q} - \frac{\partial U(\cdot\,|nh)}{\partial q}\right) + \frac{\partial f(\cdot)}{\partial q}\left(U(\cdot\,|h) - U(\cdot\,|nh)\right) + \frac{\partial U(\cdot\,|nh)}{\partial q}} \right) l^w$$

$$+ \left(\frac{f(\cdot)\left(\frac{\partial U(\cdot\,|h)}{\partial \bar{q}} - \frac{\partial U(\cdot\,|nh)}{\partial \bar{q}}\right) + \frac{\partial f(\cdot)}{\partial \bar{q}}\left(U(\cdot\,|nh) - U(\cdot\,|h)\right) + \frac{\partial U(\cdot\,|nh)}{\partial \bar{q}}}{f(\cdot)\left(\frac{\partial U(\cdot\,|h)}{\partial q} - \frac{\partial U(\cdot\,|nh)}{\partial q}\right) + \frac{\partial f(\cdot)}{\partial q}\left(U(\cdot\,|h) - U(\cdot\,|nh)\right) + \frac{\partial U(\cdot\,|nh)}{\partial q}} \right) \bar{q}$$

$$+ \left(\frac{f(\cdot)\left(\frac{\partial U(\cdot\,|h)}{\partial x} - \frac{\partial U(\cdot\,|nh)}{\partial x}\right) - \frac{\partial f(\cdot)}{\partial x}\left(U(\cdot\,|nh) - U(\cdot\,|h)\right) + \frac{\partial U(\cdot\,|nh)}{\partial x}}{f(\cdot)\left(\frac{\partial U(\cdot\,|h)}{\partial q} - \frac{\partial U(\cdot\,|nh)}{\partial q}\right) + \frac{\partial f(\cdot)}{\partial q}\left(U(\cdot\,|h) - U(\cdot\,|nh)\right) + \frac{\partial U(\cdot\,|nh)}{\partial q}} \right) x$$

Assume that $\frac{\partial U(\cdot|h)}{\partial l} = \frac{\partial U(\cdot|nh)}{\partial l}$, $\frac{\partial U(\cdot|h)}{\partial q} = \frac{\partial U(\cdot|nh)}{\partial q}$, $\frac{\partial U(\cdot|h)}{\partial \bar{q}} = \frac{\partial U(\cdot|nh)}{\partial \bar{q}}$ and $\frac{\partial U(\cdot|h)}{\partial x} = \frac{\partial U(\cdot|nh)}{\partial x}$, then (1) simplifies to

$$q^d = \left(\frac{\frac{\partial f(\cdot)}{\partial l}\left(U(\cdot\,|nh) - U(\cdot\,|h)\right) + \frac{\partial U(\cdot\,|nh)}{\partial l}}{\frac{\partial f(\cdot)}{\partial q}\left(U(\cdot\,|h) - U(\cdot\,|nh)\right) + \frac{\partial U(\cdot\,|nh)}{\partial q}} \right) l^w$$

$$+ \left(\frac{\frac{\partial f(\cdot)}{\partial \bar{q}}\left(U(\cdot\,|nh) - U(\cdot\,|h)\right) + \frac{\partial U(\cdot\,|nh)}{\partial \bar{q}}}{\frac{\partial f(\cdot)}{\partial q}\left(U(\cdot\,|h) - U(\cdot\,|nh)\right) + \frac{\partial U(\cdot\,|nh)}{\partial q}} \right) \bar{q}$$

$$+ \left(\frac{-\frac{\partial f(\cdot)}{\partial x}\left(U(\cdot\,|nh) - U(\cdot\,|h)\right) + \frac{\partial U(\cdot\,|nh)}{\partial x}}{\frac{\partial f(\cdot)}{\partial q}\left(U(\cdot\,|h) - U(\cdot\,|nh)\right) + \frac{\partial U(\cdot\,|nh)}{\partial q}} \right) x$$

such that:

$$q^d = \Gamma(U(\cdot), l, q) l^w + \Gamma(U(\cdot), \bar{q}, q)\bar{q} + \Gamma(U(\cdot), x, q)x \qquad \textbf{(2)}$$

Assuming that well outcomes are preferred to disease outcomes (Tremblay et al., 2005), the difference $\mathrm{U}(\cdot\,|\mathrm{nh}) - \mathrm{U}(\cdot\,|\mathrm{h})$ is positive, and the signs of the $\Gamma(\cdot)$ terms depend on the influence of $l, q, \bar{q}$ and x on $f(\cdot)$.

If $\frac{\partial U(\cdot|nh)}{\partial l} > 0$ and $\frac{\partial f(\cdot)}{\partial l} < 0$, then for $\Gamma(U(\cdot), l, q) > 0$ it is required that $\frac{\partial U(\cdot|nh)}{\partial l} > \frac{\partial f(\cdot)}{\partial l}\big(U(\cdot|nh) - U(\cdot|h)\big)$, that is, the marginal utility from leisure is larger than the marginal reduction in joint probability (the more hours devoted to leisure rather than sexual work) and whether the sexual worker does not remain indifferent between the infected and non-infected states. Similarly, for $\Gamma(U(\cdot), \bar{q}, q) > 0$, it is required that $\frac{\partial U(\cdot|nh)}{\partial \bar{q}} > \frac{\partial f(\cdot)}{\partial \bar{q}}\big(U(\cdot|nh) - U(\cdot|h)\big)$, that is, the marginal utility from received-for-free condoms is larger than the marginal reduction in joint probability (assuming positive correlation between condoms purchased and received for free, and condom use) and whether the sexual worker does not remain indifferent between the infected and non-infected states. For $\Gamma(U(\cdot), x, q) > 0$, then it is required that $\frac{\partial U(\cdot|nh)}{\partial x} > \frac{\partial f(\cdot)}{\partial x}\big(U(\cdot|nh) - U(\cdot|h)\big)$ where the sign of $\frac{\partial f(\cdot)}{\partial x}$ is ambiguous but may represent all other goods which may expose the FSW/MSM to a larger or lesser risk of infection (i.e., purchase of drugs and alcohol, or getting an HIV test made regularly).

3. Data

The databases correspond to the follow-up surveys administered by the Frontiers Prevention Project (FPP) in India between 2006 and 2007, where the target populations were FSW and MSM. The interview questionnaires were developed by an international team of multidisciplinary researchers with the participation of key actors. In India, a total of 2,374 FSW and 2,014 MSM participated in the study (International HIV/AIDS Alliance, 2006). The districts from the Uttar Pradesh state where the Andhra Pradesh State AIDS Control Society and FPP intervened were Adilabad, Chittoor, Kurnool, Rangareddy, Warangal and Kadapa, and those where only the FPP intervened were Anantapur, Karimnagar, Khammam, Medak, Nizamabad and Nalgonda.

The questionnaires included information on sociodemographic variables (age, education, labor status, assets and others), data on sexual behavior (type of sexual partners or clients, sexual practices, condom use, charge for sexual work and other details about the three most recent clients), information on the regular partner who is defined as the stable non-commercial partner, knowledge about HIV/AIDS and STDs, and attitudes toward people who are HIV-infected (Gutierrez et al., 2006). It also included the quantity of condoms purchased, and the total expenditure incurred, 7 days before the interview.

The categorization of FSWs is as follows (International HIV/AIDS Alliance, 2006):

a) Street-based FSWs: if solicit client on streets (cinema, park, bus-stand, railway station, hotel / lodge, etc) and provide services at hotel / lodge or a place of client's choice.
b) Home-based FSWs: if solicit and provide services to clients at home either directly or through a pimp,

c) Brothel-based FSWs: if solicit clients through a pimp or gatekeeper and provide services at the brothel.

For MSM the behavioural categories are as follows:

a) Active: if self identified to be the insertive partner during sex with males.
b) Passive: if self identified to be ther receptive partner during sex with males.
c) Both

3.1. Variables

Some of the questions that are sought to be answered in this study, and for which the variables of interest and testable hypotheses are defined, are

1. Whether there exist other individual, household and community level variables, apart from condom prices, that determine the decision to purchase condoms and the quantity demanded, such as:
   a) Monthly income which serves to represent socioeconomic status (Stephenson and Ong Tsui, 2002). It includes all revenues from exercising sexual work, remittances and other non-labor income reported.
   b) Marital status
   c) Number of children living in the same household and are supported by the FSW/MSM. In this case two implications are worthwhile mentioning: (i) the budget share to be allocated to condom purchase may decrease for every child in the household because of the requirement to cover the basic needs, or (ii) the budge share for condoms may increase since the opportunity cost of an STD.
   d) Number of paying clients and other sexual partners.
   e) Whether had an HIV test in the past
   f) Whether had experienced condom breakage in past sexual intercourse
   g) The use of lubricants which may be considered as a complement good to the condom

2. Since FSW and MSM are considered as at high-risk of HIV infection, in the case of a geographically concentrated HIV/AIDS epidemics, health interventions are directed towards impeding its spread to other population groups (Jamison et al., 2006), where one of them is giving away condoms for free, along with voluntary counselling sessions and HIV testing. We argue these may affect the market demand and the specification to be chosen in this paper.

3. Along with the above items, we will seek to identify further barriers to condom use related to the social context such as the acceptability of the sexual work and MSM behaviour (Koening et al., 1997; Shannon et al., 2009)

4. Econometric Analysis

Initially the use of least squares regressions, to model the quantity of purchase, is appealing but in all databases it is reported a high level of zeros. In particular, in the MSM sample there appears to be indications that not all of them are sexual workers or, at least, sexual work is not their primary occupation, which requires that the analysis and the approach to be different from the FSW. Thus, let the binary variable y_i represent the i^{th} individual's observed response to the decision on purchasing condoms, where $y_i = 1$ indicates the willingness to purchase at least one, and $y_i = 0$ otherwise, that is, no purchase at all or which is more interesting, relying only on the condoms that are given away for free. Namely,

$$y_i = \begin{cases} 1 \;\; if \;\; \theta Z_i + \epsilon_i \geq 0 \\ 0 \;\; if \;\; \theta Z_i + \epsilon_i < 0 \end{cases}$$

This is the selection equation for the purchase decision and is determined by a vector of exogenous variables Z_i, accordingly to a vector of estimates θ, and unobserved features contained in ϵ_i. The definition for y_i allows a positive probability of not purchasing condoms. Thus, for the positive amounts of condoms purchased, q_i, the econometric specification is as follows:

$$q_i = X\beta + u_i$$

Where X_i stands for explanatory variables, and may contain elements of Z_i, and u_i represents unobserved and uncontrolled effects. In this setting q_i is observed only when $y_i = 1$, such that

$$E(q_i|X, y = 1) = X\beta + E(u_i|X, y = 1) = X\beta + \rho\sigma_u\lambda(Z\gamma)$$

Where ρ is the correlation between the unobserved determinants to purchase condoms ϵ_i, σ_u is the standard deviation of u, and λ is the inverse Mills ratio evaluated at $Z_i\theta$. The testing of the significance of this term in the level equation is equivalent to testing for sample selectivity. The (demand) level equation can then be estimated by replacing θ with Probit estimates from the selection equation, constructing the λ term, and including it as an additional explanatory variable in the linear regression estimation of the level equation. This is the Heckman selection model where the main hypothesis relies on the potential sample selection bias in FSW and MSM for their actual purchase of condoms (Wooldridge, 2010).

5. Results

5.1. Description of the Sample

The distribution of MSM and FSW by districts in the State of Andhra Pradesh, India, is presented in Table 1. For the MSM, 44% of the sample comes from the non-FPP districts of Chittoor and Warangal, whereas 45% from the FPP districts. Data were not collected in the districts of Kadapa and Nalgonda. For FSW, 60% of the sample comes from the non-FPP districts.

Table 1: Distribution of MSM/FSW Interviewed by Districts – Andhra Pradesh State, India

		MSM		FSW	
	District	**n**	**%**	**n**	**%**
Intervened by Andhra Pradesh State AIDS Control Society and FPP	Adilabad	137	6.80	368	15.50
	Chittoor	429	21.30	373	15.71
	Kurnool	61	3.03	130	5.48
	Rangareddy	25	1.24	156	6.57
	Warangal	451	22.39	322	13.56
	Kadapa			65	2.74
Intervened by FPP	Anantapur	289	14.35	154	6.49
	Karimnagar	329	16.34	459	19.33
	Khammam	31	1.54	20	0.84
	Medak	91	4.52	218	9.18
	Nizamabad	171	8.49	103	4.34
	Nalgonda			6	0.25
	Total	2014	100	2,374	100.00

Table 2 contains a comparative description of the FSW sample. FSW in India received, on average, 30 condoms for free and serviced 10 clients on the 7 days before the interview, and charged 4.69 US dollars per client. FSW spent, on average, 30 minutes with each of the last three clients. However, more relevant than considering FSW only as a risk group, research should focus on specific risky practices and their determinants, since these practices, when assumed together with condom use, contribute to maintain a low prevalence of STDs. In this sense, 98.1% of the sample reported to have used condoms with each of the last three clients and for every of the services provided. In terms of services provided, it was expected that there had been a premium charge for every additional service different than vaginal sex (de la Torre et al., 2010), thus, the average charge is 4.69 US dollars and there is a small but significant premium charge of 1.45 dollars for sexual services different than vaginal intercourse. There is a larger variation between districts, where FSW in Adilabad, Kadap, Medak and Nizamabad charged, on average, 3.1 dollars, whereas those in Karimnagar, Khammam, Nalgonda, Rangareddy and Warangal charged 4.65, in Antapur 5.46 and those in Chittoor 6.91.

From Table 3, 50% of the sample reported being married, and almost 80% reported meeting clients in the street or their own homes. Also, 79% of FSW reported belonging either to backward or scheduled caste.

Table 2: Descriptive Statistics for FSW

	Mean	**Standard Deviation**
Expenditure on condoms (last time when purchased)	0.39**	0.65**
Amount of condoms (last time when purchased))	6.26	21.91
Amount of condoms received for free	29.92	52.43
Age	28.66	5.98
Monthly income	53.94**	47.74**
Number of paying clients (last 7 days)	10.27	6.77
Average charge to last three clients	4.69**	3.65**
Average time spent with last three clients (in hours)	0.5	1.511

Note: * in US dollars, ** original figure in Rupees, converted using average exchange rate of 40 rupees = 1 US dollar

Table 3: Socio-Demographic Characteristics for FSW

	N	**%**
Marital Status		
Married	1192	50.21
Single	296	12.47
Separated (not legally divorced)	363	15.29
Divorced	193	8.13
Cohabitation	-	-
Widowed	330	13.90
Total	2374	100
Type of FSW		
Street based	1071	45.11
Brothel based	498	20.98
Home based	801	33.74
Other	-	-
Total	2374	100
Caste		
Forward caste	319	13.44
Backward caste	1180	49.75
Scheduled caste	688	28.98
Scheduled tribe	185	7.79
Total	2372	100

Table 4 shows that on average MSM spent 41 cents on condoms, purchased 4.71 and received 12 for free. With respect to the number of male partners in the 7 days prior the interview, it is 6.69, and only 5.45% of the sample reported to perform some type of sexual work either as a primary or secondary occupation.

From Table 4, 52.23% of the sample reported being single, from those who reported being married (899), 148 reported being currently married to another man, whereas the rest to a woman but still having some relation with another man. In terms of behavior, 46.18% of the sample self-assessed as the active partner in the same-sex encounters, and 75% of the sample reported to belong either to a backward or scheduled caste.

Table 4: Descriptive Statistics for MSM

	Mean	Standard Deviation
Expenditure on condoms (last time when purchased)	0.41**	1.54**
Amount of condoms (last time when purchased)	4.71	6.11
Expenditure on lubricant (last time when purchased)	0.30**	0.52**
Amount of condoms received for free	12.31	27.11
Age	26.94	6.61
Monthly income	23.31**	81.87**
Number of male partners (last 7 days)	6.69	5.99

Note: * in US dollars, ** original figure in Rupees, converted using average exchange rate of 40 rupees = 1 US dollar

Table 5: Socio-Demographic Characteristics for MSM

	n	**%**
Marital Status		
Married	899	44.64
Single	1,052	52.23
Separated (not legally divorced)	16	0.79
Divorced	38	1.89
Cohabitation	-	-
Widowed	9	0.45
Total	2014	100
Type of MSM		
Active	930	46.18
Pasive	701	34.81
Both	383	19.02
Other	-	-
Total	2014	100
Caste		
Forward caste	406	20.16
Backward caste	989	49.11
Scheduled caste	518	25.72
Scheduled tribe	101	5.01
Total	2014	100

5.2. Regression Analysis

For the results in all tables below, the coefficient for the log of price is negative and significant at a 95% level, which shows the basic result expected for a demand function.

5.3. FSW

Tabla 6(a) contains the results of the level equation for FSW. Price coefficient is negative and significant where the calculated elasticity with respect to the quantity purchased is 0.25 in absolute value. Condoms appear to be a normal good since the calculated elasticity of income is 0.046 but it does not appear to be significant. With respect to marital status, those who are single purchase 49% more condoms than a married FSW, but those who are separated (not legally divorced) purchase 13.2% less. Besides, for an additional year the FSW remains in the sex industry, it leads to an additional increase of 1.8% in the purchase of condoms. As expected, the more clients serviced motivates the FSW to purchase more condoms, where for an additional client, the FSW will buy up to one more condom. On the same side, it may be argued that the time the FSW spends with a client implies that the chances of having repeated intercourse which may increases condom use and purchase. However, this effect is not found significant.

Dummy variables are introduced for each of the districts where the FSW are interviewed, where those from the districts of Anantapur, Kurnool, Nizamabad present purchase levels that are between 32 and 63% greater than those interviewed in Adilabad. On the contrary, those from Kadapa and Medak purchase 31% less than those in Adilabad.

There is no difference in condom purchase between street and brothel-based FSW, but those that are home-based purchase slightly less. This may originate because they serviced 7.64 clients in the 7 days before the interview, whereas the other groups serviced on average 11.85. But more interestingly is to observe, from Table 7 (b), that those FSW that are street or home- based show odds for purchasing condoms which are greater in 99 and 97%, respectively, to those who are brothel-based. This effect captures the issue that these two groups received 22 condoms for free, whereas those who are brothel-based received 54.

From the results for the selection equation in Table 6 (b), larger monthly income determines positively the chances to purchase condoms, partly reflecting this item as a normal good where the calculated odds reflect that from a 1% increase in income, the odds of purchasing condoms increase in 15%.

Those who reported being divorced, their calculated odds for purchasing condoms are 35% higher than those who are married. Also, significant effects for caste categories were found though they disappear once we control for education levels. Then, those who had some form of non-formal education and reached the primary level show odds to purchase condoms which are large in 47 and 70%, respectively, compared to those who never attended school. No significant effects are identified for higher levels of education.

For an additional child that has to be supported by the FSW, the calculated odds for purchasing condoms decrease by 7.83%. Similarly, the odds for purchasing condoms for those FSW who participate in a support group are 40% less than those who do not. This would make sense by considering that initially for the former group the average purchase is 5 condoms whereas for the latter is 8.59, this difference is significant at a 95% level. Moreover, for every condom FSW received for free the calculated odds for purchasing condoms, using her own disposable income, decrease in 1.66%. As part of the household variables, family pressure over the FSW decisions is observed since for those whose families are aware of the sexual work, the odds for purchasing condoms increase by 87% compared to those whose families are not.

Because of the insignificance of the inverse Mills ratio, there is no selection process in this sample and it may be argued that the selection and demand processes are independent.

Table 6 (a): FSW Demand Equation

		Coefficient	Standard Error
	Log of price (in rupees)	-0.250***	0.049
	Log of income (in rupees)	0.046	0.031
	Age	-0.006	0.0054
District: Adilabad as reference	Anantapur	0.628***	0.122
	Chittoor	0.053	0.081
	Kadapa	-0.372***	0.132
	Karimnagar	-0.056	0.087
	Kurnool	0.323***	0.123
	Medak	-0.304***	0.105
	Nizamabad	0.617***	0.159
	Rangareddy	0.110	0.133
	Warangal	-0.016	0.125
	Duration in sex industry (years)	0.018**	0.008
	Whether family is aware of sexual work (Yes: 1, No: 0)	0.020	0.066
Marital status: Married as reference	Single	0.491***	0.155
	Separated (not legally divorced)	-0.132*	0.070
	Divorced	-0.033	0.084
	Widower	0.004	0.069
	Number of paying clients (past 7 days)	0.011**	0.005
	Average time spent with last three clients	-0.017	0.013
	Number of free condoms received	-0.0002	0.001
	Whether experienced a condom breakage (Yes: 1, No: 0)	0.072	0.047
	Average charge for last three clients (in rupees)	0.0003	0.0002
Type of sexual worker: brothel based as reference	Street based	0.068	0.087
	Home based	-0.015	0.094
	Intercept	1.374***	0.359

Table 6 (b): Selection Equation - Purchase (No: 0, Yes: 1)

		Coefficient	Standard Error
	Log of income (in rupees)	0.077*	0.042
Caste: Forward caste as reference	Backward caste	-0.147	0.110
	Scheduled caste	-0.176	0.117
	Scheduled tribe	-0.130	0.164
Type of sexual worker: brothel based as reference	Street based	0.411***	0.104
	Home based	0.428***	0.109
Last level of education achieved: Never been to school as reference	Non-formal education	0.285**	0.118
	Primary (class 1 to 5)	0.342***	0.086
	Upper primary (6 and 7)	0.155	0.108
	High (class 8 to 10)	0.059	0.132
Marital status: Married as reference	Single	-0.048	0.181
	Separated (not legally divorced)	-0.062	0.098
	Divorced	0.225*	0.125
	Widower	0.091	0.099
	Whether family is aware of sexual work (Yes: 1, No: 0)	0.414***	0.074
	Number of children supported	-0.063*	0.034
	Number of paying clients (past 7 days)	0.0025	0.006
	Duration in sex industry (years)	-0.004	0.009
	Ever had HIV test (Yes:1, No: 0)	0.178*	0.106
	Number of free condoms received	-0.003***	0.001
	Average charge for last three clients (in rupees)	0.0002	0.0003
	Whether participates in a support group (Yes:1, No: 0)	-0.326***	0.087
	Intercept	-0.786**	0.330
	Mills: lambda	0.189	0.179
	Observations	1,490	
	Censored observations	729	
	Uncensored observations	761	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Khamman and Nalgonda districts are dropped for colinearity.

5.4. MSM

In Tables 7 (a) and 7 (b) we present the estimations for MSM. As before, there are theoretically consistent results because the coefficients for the own-price and income are both negatively and positively significant where the calculated elasticities are -0.42 and 0.06, respectively. Moreover, income also plays a role on motivating the decision to purchasing condoms (see Table 7 (b)).

As expected, sexual behavior has a role on determining the number of condoms purchased. For an additional sexual male partner, condom demand increases in 1.18%, that is, the average purchase increases from 3.25 to 3.83 condoms. Plus, for an additional 1% expenditure on lubricant there is a small but significant increase of 0.3% on the purchase of condoms. In terms of the type of MSM behavior, there is a significant effect only for those who self-assessed as the passive partner, where the mean purchase is 18.6% less than those who self-assessed as active.

The number of condoms received for free induces an increase, though small, in the quantity of condoms purchased, where the calculated elasticity is 0.4. This interpretation is plausible because 1,148 MSM (almost 70% of the sample) reported receiving condoms from some NGO facility or a social worker, where it is customary they receive along some sort of counselling on prevention against STDs and promotion of condom use. In the same sense, those who reported had been tested for HIV present odds to purchase condoms that are 22.1% higher than those who did not.

Observing the district dummies, those MSM interviewed in Anantapur, Chittoor and Medak reported their purchase of condoms is between 37 and 42% less than those in Adilabad. No other significant effects are identified in the rest of districts.

From Table 7 (b) it is identified that those who reported being single, their calculated odds to purchase condoms are 36% larger than the married. Also, for every additional child in the household, the calculated odds for purchasing condoms increase by 16.3%. As part of the community and support variables, the following effects are identified: (i) for those MSM who participate in a support group, their odds to purchase condoms are 38.5% higher than those who do not, (ii) for those who reported having problems with their community for their MSM behavior, their calculated odds to purchase condoms are 82.2% higher than those who do not, and (iii) for those who ever got HIV tested, their calculated odds to purchase condoms are 16.1% higher than those who did not.

In addition, education plays a significant role where the calculated odds for those who achieved senior secondary or college degrees are two and three times larger than those that never attended school.

For this sample the absence of a selection effect is not rejected.

Table 7 (a): MSM: Demand Equation

		Coefficient	Standard error
	Log of price (in Rupees)	-0.417***	0.0520
	Age	0.000112	0.00525
Marital status: Married as reference	Single	-0.0289	0.0729
	Anantapur	-0.371**	0.146
	Chittoor	-0.375**	0.147
	Karimnagar	0.0130	0.125
	Khamman	-0.235	0.232
District: Adilabad as reference	Kurnool	-0.0537	0.394
	Medak	-0.429**	0.173
	Nizamabad	-0.104	0.151
	Rangareddy	-0.239	0.328
	Warangal	-0.212	0.134
	Whether perform some type of sexual work (No: 0, Yes: 1)	0.0484	0.0714
	Number of sexual male partners (last 7 days)	0.0115***	0.00425
Self assessment on type of MSM behavior: Active as reference	Passive	0.187**	0.0728
	Both	0.0450	0.0799
	Log of income	0.0517	0.0477
	Whether experienced a condom breakage (Yes: 1, No: 0)	-0.0407	0.0596
	Number of free condoms received	0.00401***	0.000780
	Expenditure on lubricant	0.00298**	0.00137
	Intercept	1.422***	0.412

Table 7 (b): Selection Equation: Purchase (No: 0, Yes: 1)

		Coefficient	Standard error
	Log of income	0.137**	0.0695
	Age	-0.00512	0.00824
	Whether perform some type of sexual work (No: 0, Yes: 1)	-0.108	0.0969
Marital status: Married as reference	Single	0.215*	0.119
Self assessment on type of MSM behavior: Active as reference	Passive	-0.0232	0.109
	Both	-0.00916	0.127
	Backward caste	0.0305	0.121
Caste	Scheduled caste	-0.0676	0.135
	Scheduled tribe	-0.244	0.217
	Number of children supported	0.104**	0.0484
	Number of sexual male partners (last 7 days)	0.00594	0.00795
	Non-formal education	-0.533	0.343
	Primary (class 1 to 5)	-0.0684	0.159
Last level of education achieved: Never been to school as reference	Upper primary (6 and 7)	-0.0589	0.157
	High (class 8 to 10)	0.208	0.142
	Senior secondary (11 and 12)	0.585***	0.190
	College or more	0.668**	0.275
	Whether experienced a condom breakage (Yes: 1, No: 0)	0.0597	0.0978
	Number of free condoms received	7.84e-05	0.00141
	Ever had HIV test (Yes:1, No: 0)	0.279***	0.0948
	Whether participates in a support group (Yes:1, No: 0)	0.366***	0.0982
	Whether last 3 years had problems with community for MSM behavior (Yes:1, No: 0)	0.520***	0.106
	Intercept	-1.678***	0.558
	Mills	-0.0883	0.0991
	Observations	905	
	Censored observations	511	
	Uncensored observations	394	

Notes: *** p<0.01, ** p<0.05, * p<0.1

6. Discussion

There are several policy implications from the results. First, more inclusive policies directed towards FSW that work in more risky environments and where free condoms are not distributed. Second, interventions should rely more on a perspective inclined to a personal choice framework where those should consider as priority the individual rationality and autonomy to determine condom use, mainly on social groups and communities have lesser control on influencing sexual behavior. Third, FSW and MSM with support from a support network show greater condom purchase which directly implies greater condom use, this accords with Blankenship et al. (2008) in the sense that at least FSW who have participated in collective action have benefits reflected in condom use.

As for the MSM, condom breakage works against deciding to purchase. As mentioned in Bracher et al. (2004) the lower the probability of slippage or breakage, the lower the lifetime risk of infection with HIV. One limitation however is that it is not possible to control for the quality of condoms purchased or the conditions how they are stored (some MSM reported keeping them in the wallet or carrying with them all the time). Then, once a condoms breaks the MSM may decide to purchase some other brand but this does not necessarily imply any behavioural change such that no condoms are required in the future.

According to the social disorganization theory, as communities become more developed and as population size and density increase, residents become less constrained by the inhibiting norms and informal regulation associated with social groups and community institutions, and become more likely to engage in risky behavior, including unprotected sex (FRYE, Victoria et al., 2006). For the FSW sample, the estimations show that purchase is conditionally independent of the decision to purchase. The insignificance of the corresponding Inverse Mills ratio contrasts with the views of Heckman (1990) who argues that identifying the potential outcome is economically more interesting. There might exist a simultaneous relationship between the quantity of condoms purchased and the amount of received-for-free condoms. NGOs and government agencies which give away the condoms do it so because of the low rate of condom use detected in some of the sites where the survey was administered. But FSW or MSM that receive the condoms, at the same time are provided with counselling about protective measures against HIV which, if effective, are expected to motivate the purchase of condoms.

Though in the databases it was available whether the FSW/MSM had received treatment for STDs, it could not be considered in the regression analysis because less than 10% of the samples reported past STDs. Also, risk perception of HIV infection was available, however, most of the samples grouped either in null or low, and proved to be problematic when included in the regression analysis. Another limitation of this study is its cross-sectional nature, which makes that causal relationships cannot be drawn. However, the direction of the association between any of the explanatory variables and the quantity of condoms purchased may be supported by contextual issues.

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