Prevalence and Predictors of Genitourinary Symptoms in China: A Population-Based Study*

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Abstract

This study investigates the prevalence and predictors of genitourinary symptoms in urban China. Using a population-based national probability survey (Chinese Health and Family Life Survey), we find that the prevalence of four major genitourinary symptoms is substantial. Risk factors for genitourinary symptoms among urban men aged 20 to 64 years are low income, unprotected commercial sex, non-steady partners, and living in a relatively poor locale. Among urban women aged 20 to 64 years, risk factors for genitourinary symptoms are low income, unwanted sex, lack of condom use with long-term partners, partners had other concurrent partners, and living in a relatively poor locale. In general, self-reported symptoms are associated with both sociodemographic and behavioral risk factors. This finding also reveals that the predictors for the incidence of genitourinary symptoms are consistent with those of the *de facto* sexually transmitted infections among the population, with transmission remaining concentrated in paths that lead from commercial sex workers or short-term casual partners to husband/steady partner to wife/steady partner. The study suggests potential avenues for intervention.

Introduction

Recent findings from a range of studies suggest that sexually transmitted diseases (STDs) have increased in China (Beyrer, 2003; Zhang, 2002; Luo, Wu, et al., 1999; Cohen, Gao, et al., 2000; Chen, Gong, et al., 2000; Plafker, 2001). Reports from public health clinics and special studies of high-risk populations and commercial sex workers reveal several dimensions of the problem (Beyrer, 2003; Hong, Xin, et al., 2002)**.** Whereas a generation ago, prevailing attitudes toward sex were conservative, today people in China are increasingly open to more liberal ideas about sex and relationships (Pan, Parish, et al., 2004; Wang, Hertog, et al., 2005; Wang, et al., 2002; Pan, 1993;). The proliferation of more liberal attitudes toward sexual behavior among Chinese people has been traced back to the early 1980s, when economic reforms commenced, and is often associated with the

breakdown of traditional norms resulting from urbanization, social mobility, and the influence of Western culture (Zhang, et al.,1999; Tong, Chen & Cheng, 1999; Zhang & Vanghan, 1996). Increasing sexual activity brings economic, social, and, especially, health concerns. More and more Chinese are grappling with issues related to sexually transmitted infections (STIs) and HIV. Surveillance data indicate that between 1990 and 1998, the incidence of syphilis increased from 0.2 to 4.3 cases per 100,000 inhabitants, and the incidence of gonorrhea from 9 to 24 cases per 100,000 (Chen, Gong, et al., 2000). Findings from Chinese Health and Family Life Survey in 2000, a national probability survey, found relatively high prevalence per 100 population of 2.1% among men and 2.6% among women for Chlamydia infection (Parish, Laumann, et al., 2003). Furthermore, China is in the early stages of a major HIV/AIDS epidemic (United Nations, 2002; Kaufman & Jing, 2002).

Genitourinary (GU) symptoms, as the principal clinical manifestations of STIs, can occur at any stage during the course of a sexually transmitted infection (STI) (Mandell, et al., 2000; Rottingen, Cameron, et al., 2001; Dallabetta, Gerbase, et al., 1998; Sherrard, Barlow, 1996). They are characterized by a group of physiological disturbances in urinary and genital systems which may greatly compromise sexual function for both men and women. Studies show that, like STIs, GU symptoms are strongly related to sociodemographic characteristics and sexual behaviors (Lewis, Garnett, et al., 2005; Bhatia & Cleland, 1995; Mandell, et al., 2000; Woelk, Kasprzyk, et al., 2002). They have been a major health concern of sexually active groups and the stimulus for the treatment seeking. While not all GU symptoms are caused by sexual contact, non-sexually transmitted GU symptoms may reflect problems in physical health condition which

relates to sanitation, living standards, and the quality of healthcare provision (Holmes, et al., 1999; Mandell, et al., 2000). Despite the close relationship between GU symptoms and STIs, and the potential impact of these disorders on the population's reproductive health and overall well-being, relevant studies are scant. Based on the few available community studies, it appears that GU symptoms are highly prevalent in developing countries, with women usually having a higher prevalence (Prasad, Abraham, et al., 2005; Bhatia & Cleland, 1995; Newell, Senkoro, et al., 1993). A population-based survey from rural Zimbabwe (Lewis, Garnett, et al., 2005) during 1998-2000 showed that 30% of women aged 15-44 years reported experiencing vaginal discharge and 25% of men reported experiencing urethral discharge. GU symptoms have become an important public health problem which needs urgent attention, including research from population-based data concerning the prevalence and determinants of their occurrence.

The present study addresses these issues by analyzing data on GU symptoms from the Chinese Health and Family Life Survey (CHFLS), the first nationally representative study on adult sexual behaviors and attitudes in the People's Republic of China conducted during 1999 and 2000 (Parish & Laumann, 2003). CHFLS surveyed a probability sample from the Chinese adult population aged 20 to 64 years to determine the prevalence of genitourinary symptoms and to identify social and behavioral factors associated with these symptoms.

Methods

Study population

The sample is a nationally representative of the adult population in China aged 20 to 64 years with the exclusion of Tibet and Hong Kong. This population sample was drawn probabilistically in four steps following standard procedures for complex samples (Levy & Lemeshow, 1999). First, using the 1990 national population census and public health reports of STD infection rates in different provinces and cities, China was divided into 14 strata based on size of urban population and location on the southern and eastern coasts. Coastal regions and large cities were oversampled using known population weights due to higher STDs in some of these regions. Two to six administrative units (urban districts, smaller cities, and counties) were then selected from each stratum, with the probability of the unit being selected being proportional to the population of that unit. These provided 48 primary sampling units. On arriving at a sampling unit, one to two subunits (neighborhoods in cities, villages or towns in counties) were then picked probabilistically, with more highly populated subunits having a greater probability of being selected. This produced a total of 60 sample communities. Finally, using the official community registers of households and temporary migrants, the adult population aged 20 to 64 years was arrayed in order. Starting with a randomly chosen person from this list, individuals were picked at fixed intervals to produce approximately 83 individuals in every community (5000/60 communities=83). Except for Tibet, all of the 31 provincial-level municipalities (Beijing, Shanghai, Tianjin, and Chongqing) and provinces had a chance of being included in the sample. With the exception of Chongqing, the sample included two or more sample sites in each of the eight provinces with the highest prevalence levels for eight reportable STDs. Thirteen provinces were not represented in the sample. Tibet was intentionally omitted because of the sparse population and travel

difficulties, and twelve happened not to be selected by chance. Of the thirteen not included, ten ranked below the median STD prevalence for all provinces. These include Yunnan (southwest) and Xinjiang (far west) provinces, which had many IDU-related HIV cases but only modest levels of STDs. The three unrepresented provinces with above-median STD prevalence were Chongqing Municipality and Jiangxi and Guangxi provinces, with Guangxi having a high rate of IDUs and cases of HIV.

Interview

The pretest interview, based in part on the 1992 US National Health and Life Survey (Laumann, Gagnon, et al., 1994), was conducted in three field trials in China. Also, 50 husband-wife pairs were given shortened versions of the questionnaire. Statistics on their agreements about shared sexual behavior produced κ values that averaged 0.35, modest but in the same range as agreement about other aspects of family life such as partner violence and relative social status of parents (average κ=0.27). Another 50 respondents had repeat interviews after a gap of two months. The 21 items about sexual behavior had average κ agreement values of 0.75 when the same items were compared across the two separate interviews.

Each respondent was surveyed in person by an experienced interviewer, who was of the same sex as the respondent, for a computerized interview averaging 60 minutes. For the sake of privacy, interviews took place away from the respondent's home**.** In large cities, these facilities were typically private rooms in a neighborhood hotel**.** Oral and computer-entered consent were obtained prior to the interview, which began with the interviewer in control of the computerized interview and continued with the computer

controlled entirely by the respondent. Only 13% needed continued interviewer assistance in this last portion of the interview.

The questionnaire of this study tapped into extensive information on key aspects of sexual behaviors, prior STIs, sexual problems and dysfunctions, health and lifestyle variables, and sociocultural predictors (Hershatter, 1997). With respect to GU symptoms, a group of questions were asked in the interview, measuring the presence of critical symptoms and problems. For this study, we focus on four major symptoms which are genitourinary burning, discharge, ulcer, and warts. Other GU symptoms (e.g. lower abdominal pain), though are also common signs of STIs and UTIs, are considered to be non-specific and more open to recall bias than the above four symptoms and hence were excluded from current analysis (Holmes, et al., 1999). Questions concerning above four symptoms are: (1) In the last 12 months, have you ever experienced a burning pain while urinating? (2) In the last 12 months, have you ever experienced a discharge of unusual color or odor from the head of the penis or from the vagina? (3) In the last 12 months, have you ever had any genital lesion, blister, or sore? (4) In the last 12 months, have you had warts in the genital area (genital surface, lower parts)? The possible responses for all four questions are "Yes" and "No". Taken together, these items cover the major genitourinary symptoms for both men and women.

Weighting and Statistical Analysis

When weighted according to sampling fractions, the data set of successful interviews had too few individuals in their 20s and too few in their 50s and 60s, as judged by national census figures and annual population surveys conducted by the government. Accordingly,

analysis weights were further adjusted to make the age distribution approximate what is found in these other data sources. After adjusting weights for both sampling fractions and age distributions, percentage distributions for urban residence, age, and education closely paralleled data available in the national-level statistics, thereby implying that the adjusted sample is representative of the total adult working-age population (China Population Statistics Yearbook, 1999; 1995 National 1% Population Sample Survey Data, 1997).

Using *svy* methods in the STATA 9.0 statistical package (STATA Corp, College Station, Tex), the analysis was adjusted for sample strata, primary sampling units, and population weights (Skinner, Holt, et al., 1989; Kish & Frankel, 1974). Confidence intervals (CIs) for prevalence used a logit transform so that the end points lie between 0 and 1. A stepwise procedure to report the most parsimonious logistic equation models was not adopted due to the danger of overemphasizing chance features in the data. Relatively full models that engage the existing literature and the assumptions within Chinese society on major risk factors were used. Other risk factors found in other societies, but not found to be applicable in China, were also considered in the baseline models. Analyses performed in this study were made by use of standard logistic equation methods. Standard risk factors (high-risk sexual behaviors) were forced into the models.

Results

Of the 5000 individuals initially sampled, 3821 study participants completed the interview, giving a final response rate of 76.4%. Given the few rural respondents in the sample and the differential demographic and behavioral characteristics of urban and rural population, the subsequent analyses focused on the urban population (n=2994). The

urban sites in our sample were defined as communities with a farm labor force of less than 15%. In the weighted sample of study participants, prevalence of burning symptom per 100 population for urban men was 12.5 (95% confidence interval [CI], 9.4-16.6) and discharge prevalence was 2.6 (95% CI, 1.7-4.1). Ulcer and wart prevalence was 1.4 (95% CI, 0.7 -2.4) and 1.2 (95% CI, 0.7-1.9) respectively. Prevalence of burning symptom per 100 population for urban women was 15.6 (95% confidence interval [CI], 12.1-19.9) and discharge prevalence was 20.0 (95% CI, 17.9-22.4). Ulcer and wart prevalence was 3.6 (95% CI, 2.6-4.8) and 2.0 (95% CI, 1.2-3.2) respectively. These values are comparable to the prevalence rates reported from other developing countries, suggesting the severity of GU symptoms in China (Lewis, Garnett, et al., 2005; Prasad, Abraham, et al., 2005; Bhatia & Cleland, 1995; Newell, Senkoro, et al., 1993).

Demographic and behavioral characteristics of urban study participants aged 20 to 64 years are reported in TABLE 1. Thirteen percent of men and four percent of women reported having sex with one or more non-steady partners (non-commercial) in the last year. For the same period, nine percent of men reported paying for sex. In total, 68% of men and 83% of women reported they had a steady sexual partner at the time of interview. In all, 18% of women in comparison to 2% of men thought their steady partners also had other concurrent sexual partners sometime during the life of their relationship. Women were at higher risk of having negative sexual experiences than their male counterparts. Eighteen percent of women versus seven percent for men had unwanted sex before the last 12 months.

TABLE 2 and TABLE 3 depict the prevalence of GU symptoms across selected demographic and behavioral characteristics. Among urban men, GU symptoms were

associated with unprotected commercial sex and non-steady partners during the previous year. Men were less likely to report symptoms if they had a steady partner. Among urban women, symptoms were associated with living in a relatively poor locale. Women who had not used condom with their long-term partners, who previously had unwanted sex, and whose steady partner had other concurrent partners (apart from the respondent) also tended to report more symptoms.

For both men and women, the prevalence of GU symptoms tended to decrease with increasing age except for burning and warts. The exception for burning possibly results from physiological changes associated with the aging process. Increasing age is usually accompanied with higher prevalence rates of lower urinary tract infections, GU malignancy, and stasis secondary to benign prostatic hyperplasia (in men) (Holmes, et al., 1999; Mandell, et al., 2000). Therefore, the higher prevalence of burning for older people (age 50 to 64) may not necessarily result from active sexual activities, but rather be a proxy of pathophysiologic changes among the elderly. With respect to warts, for both men and women, the lowest prevalence was not observed in the oldest age group. This is consistent with epidemiological studies (Rottingen, Cameron et al., 2001; Mandell, et al., 2000) since genital warts are often caused by viral infection in early-life sexual contact (<18 years), and it takes months or even years for warts to appear in later life. In general, women reported a higher prevalence for all four symptoms compared to men. This result fits a similar pattern with epidemiological evidence concerning gender difference in UTIs and GU symptoms since physical makeup of women (e.g. shorter urethra) makes them more susceptible to UTIs. For ulcers and warts, due to the much lower prevalence of these chronic symptoms, few categories were statistically significant when compared to

the reference group. Yet the odds ratios for each risk factor were in general consistent with the pattern we described above.

The results indicate that the incidence of GU symptoms varied with sociodemographic and behavioral risk factors, and it also reflects physiological characteristics of gender difference and life-course progress. In general, the distribution of risk factors has a consistent pattern across all four symptoms.

In TABLE 4, we used multivariate analysis to find risk factors for symptoms. Because ulcer and warts have relatively low prevalence in the population, the results of multivariate logistic regressions exhibit large design effects and wide confidence intervals for some results. Burning and discharge are the most frequent GU symptoms and they are good indicators for STI surveillance and diagnosis, as well (Holmes, et al., 1999). Also, the prevalence results above showed that differences among individual symptoms are not sharply marked and they all exhibit similar patterns, the analyses below therefore concentrate on burning and discharge.

The questionnaire of this study explored extensive information on key aspects of GU symptoms, prior STIs, sexual behaviors, health and lifestyle variables, and sociocultural predictors. Respondents in the study were asked questions about social and demographic characteristics, attitudes and behaviors considered risk factors for STIs and GU symptoms, with an emphasis on commercial sex, sex partner history, and condom use. In the questionnaire, respondents were asked a series of questions about their current paid sex activities and commercial sex experience before (during the life course and for the last 12 months). In our analysis, we categorized men and women's sexual activities for the last 12 months into groups. These groups are mutually exclusive and they

characterize respondents' sexual activities. We denoted these groups with a series of dichotomous variables in multivariate regressions. For urban men, we had seven groups for their sexual behaviors: 1. virgin; 2. no partner; 3. one steady partner, without sex; 4. one steady partner; 5. one or more non-steady partners (non-commercial); 6. commercial sex with condom; 7. commercial sex without condom. This grouping strategy emphasizes our focus on men's protective measures taken with commercial sex workers and casual partners.

For women, only 1 percent of them reported commercial sex and 4 percent reported non-steady casual partner in the last year. Therefore, most women in our study had sexual contact with their long-term partners (mostly husbands). Based on this fact, for women, we would emphasize examining their condom use with long-term partners. Therefore, for urban women, we had seven groups: 1. virgin; 2. no partner; 3. one steady partner, without sex; 4. one steady partner with condom; 5. one steady partner without condom; 6. one or more non-steady partners (non-commercial); 7. commercial sex. Given the fact that multiple sex partners are the major source of STIs for men and the subsequent infections of women related to them, we also included a predictor indicating whether or not the respondent's partner has other concurrent partners for women.

In our preliminary analysis, we found that women's adverse sex experience greatly increase self-reported GU symptoms. Historically, Chinese women were typically not expected to enjoy sex, and unwanted sex is reported to be high (Ruan, 1991; Parish, Yee, & Laumann). Given the salience of this issue, we included an indicator for unwanted sex into our study. Since current reports of adverse sex experience and unwanted behaviors in sex could be subject to feedback effects from current GU

symptoms, one response is to examine earlier experience, which indexes former events that predate current GU symptom report. We adopted a dichtomous variable for the incidence of unwanted sex before the last 12 months as a plausible indicator of prior adverse sex experience. Demographic characteristics including age and income were also included into the final model.

TABLE 4 presents multivariate analyses using binomial logistic regressions for the presence of individual GU symptom for men and women. This approach produced odds ratios (ORs), which indicate the relative odds that members of a given social group reported the symptom relative to a reference group, while controlling for other characteristics. Clearly, risk factors differed by gender. Among urban men risk factors for the symptoms of burning and discharge were commercial sex without condom (OR, 4.00; 95% CI, 1.54-10.34 for burning; OR, 3.11; 95%CI, 1.74-5.57 for discharge) and having one or more non-steady partners (OR, 2.66; 95%CI, 1.41-5.05 for burning). Low income (OR, 1.84; 95% CI, 0.67-5.00 for discharge) and living in a relatively poor locale (OR, 1.74; 95%CI, 0.98-3.07 for burning) are marginally significant at the level of 0.10. Virgins had significantly higher burning and discharge prevalence compared to the group with one steady partner (OR, 3.19; 95%CI, 1.58-6.47 for burning; OR, 4.27; 95%CI, 1.16-15.71 for discharge). In one analysis not shown here, we found that virgins do not have higher prevalence of STDs such as Chlamydia, and 54% of virgins for male are less than 23 years old. Therefore, the elevated symptom reporting among this group might be due to classic “jock itch” which is common with young men who participate sports or who do not keep themselves clean (Mandell, et al., 2000). This fungal infection can cause burning and itching.

Predictors for burning and discharge among urban women were quite similar and included the following: partners had other concurrent partners[1] (OR, 1.64; 95% CI, 1.05-2.58 for burning; OR, 2.56; 95% CI, 1.51-3.37 for discharge), unwanted sex before last year (OR, 1.40; 95% CI, 1.01-1.94 for burning; OR, 1.59; 95% CI, 1.09-2.30 for discharge), and living in a relatively poor locale (OR, 1.92; 95% CI, 1.28-2.89 for burning). The group of having a steady partner without using condom is marginally significant compared to reference group who used condom for burning at the level of 0.10 (OR, 1.88; 95% CI, 0.91-3.90). Low income is also marginally significant for discharge at the level of 0.10 (OR, 1.54; 95% CI, 0.96-2.48). The age effect was especially salient for discharge symptom, with all other age groups showing significantly lower prevalence compared to the youngest age group (age 20 to 34).

Consistent with our discussion before, here our results showed that both older men and older women had a relatively high burning prevalence rate due to the age-dependent pathphysiologic changes. The result is statistically significant for men since old men tend to experience diseases such as prostatic hyperplasia which may directly induce more burning sensation.

In our exploratory analysis, we investigated many other plausible risk conditions and factors including drinking behaviors and manual or less-skilled worker status. These turned out to be statistically insignificant. We also considered same sex contact among men because the existing literature suggests an association between homosexual behaviors and GU symptoms (especially for ulcer and warts) (Holmes, et al., 1999).

[1] In another analysis, we included a variable measuring the "suspicion/jealousy of female to their partners" since the measure for "partners had other concurrent partners" may connote subjective elements of female respondents to their partners. The results showed that, after controlling for the dichotomous variable of "often feel suspicious/jealous of partners", variable "partners had other concurrent partners" is still statistically significant for both burning and discharge at the level of 0.05.

When included in combination with other risk conditions, this factor was not significant in these other models. Due to the high prevalence rate for discharge among urban women in our sample, in a separate analysis, we included a dichotomous variable for diabetes into the logistic regression, since diabetes for women tends to increase vaginal discharge (Mandell, et al., 2000). The result showed no significant association. While in an analysis not reported here, we did find that for wart symptoms, early sexual contact (before age 14) increased women's wart report in later life ($P<0.001$).

Comment

The results from this national survey suggest that genitourinary symptoms are widespread in urban China and the incidence is influenced by both demographic and behavioral risk factors. An earlier study by Parish and Laumann et al. (2003) on the prevalence of *Chlamydia trachomatis* based on the same survey provides the first large population-based evidence of the extent of sexual risk taking and its biological consequences among Chinese adults. The results of this study on GU symptoms fit a similar pattern. The predictors of the presence of GU symptoms are consistent with those of the *de facto* sexually transmitted infections among the population, with transmission remaining concentrated in paths that lead from commercial sex workers or casual sex partners to husband/steady partner to wife/steady partner. Like STI infections, risk of GU symptoms among men was significantly associated with unprotected sex with commercial sex workers or casual partners, while the risk for women was largely associated with behaviors of their spouses or steady partners. The results also suggest that it is possible to identify significant risk groups for GU symptoms. This becomes important as many STIs

are asymptomatic and symptoms often have low specificity for the type of infection (Schaaf, PerezStable, et al., 1990; Holmes, et al., 1999). Another important point is that the very symptomatology that brings most individuals into medical care actually allows STIs to be diagnosed. Finding relevant risk factors for GU symptoms is crucial given that many bacterial STIs can be treated at early stages (Garnett & Bowden, 2000) and untreated infections may have additional morbidity at the individual and societal level including potential infertility and the risk of transmission to others. Finally, our findings are consistent with former studies (Beyrer, 2003; Cohen, Gao, et al., 2000; Chen, Gong, et al., 2000; Plafker, 2001) which demonstrate that too few people are taking steps to protect themselves from these often preventable STIs. Public health education and interventions that improve partner selection and proper use of protective methods could be put into practice targeting commercial sex workers and their clients.

Another aspect of our findings shows that for women, unwanted or forced sex, mostly perpetrated by husbands or steady partners, is associated with increased risk of experiencing GU symptoms. Chinese women reportedly often submitted involuntarily to the sexual desires of their husband or other primary sexual partner (Parish, Yee, & Laumann). Many factors shaped the sexual submission of women. These include their levels of consciousness (indexed by education), bargaining (relative income), partner relationship, and the women's own values about sex (Parish, Yee, & Laumann). Underlying these associated factors, one particular important point is that in China, with a dual-standard about sexual practice for men and women, many women find their family life and sexual behaviors are plagued by patriarchal beliefs. While men have historically had more sexual freedom both inside and outside marriage**,** women tend to be acquiescent

and sex is one of their duties to help husbands to achieve pleasure. In this sense, frequent reported unwanted sex among women is potentially a proxy for this dual-standard and the evidence for women's disempowerment -- with this adverse sexual experience arguably inducing lasting mental and physical health disturbances, negatively influencing partner relationships, and possibly leading to other adverse experience in sex life (lack of kissing, hugging, physical trauma in sexual activities, etc.,). All these could impact the reports of GU symptoms.

Since our study examined GU symptoms which are not exclusively caused by STI-related pathogens, another aspect of our results reveals associated factors which are not directly related to sexual activities. Urinary tract infections (UTIs), often resulting from bacterial invasion of the major structures of the urinary tract, including the kidneys, bladder and urethra, are also associated with increased GU symptoms. In our results, the increased burning symptoms in older age reflect this age-dependent change in urinary system. Another example is the finding that living in a relatively poor locale increased self-reported symptoms. Several mechanisms may explain this effect. Apart from individual inhabitant's characteristics (low income and low education), regional socioeconomic development could also influence local sanitary condition, living standards, and the quality of healthcare provision. Through these intermediate factors, local socioeconomic development might affect GU health, beyond and above individual socioeconomic status.

In a separate analysis (not reported herein), we found that GU symptoms were highly associated with poor physical and mental health conditions. Due to the cross-sectional nature of our research design, we cannot explicate the causal order between

symptoms and general well-being. However, the close relationship does suggest at least two potential mechanisms. First, GU symptoms may influence perception of self-efficacy and therefore induce mental and physical disturbances which could eventually lead to a lower self reported health status. Secondly, GU symptoms may be associated with poor mental health through another psychiatric or somatoform disorder. In this case mental or psychological conflicts may become translated into physical problems or complaints (Fauci, Braunwald, et al., 1998). Literature on somatoform disorder has suggested that GU symptoms are one possible group of physical manifestations for the socially disadvantaged or psychologically distressed. Some studies also reported somatoform among particular social groups in Chinese society (Parker, Gladstone, et al., 2001; Lee, 1998). In this sense, report of GU symptoms actually reflected deteriorating health and well-being. Both these two potential pathways reveal the salience of GU symptoms on quality of life, and the importance of GU symptoms in general well-being. Additional research should be directed toward mapping the relationship between GU symptoms, negative life experience, mental health, and overall well-being as well as developing ways to detect these symptoms in the absence of a diagnosis of a sexually transmitted infection.

However, our study has several limitations, including an incomplete sampling of migrants, underrepresentation of men in their early 20s, and a small number of primary sampling units. Since many young men and women may have left their original place of residence and could not be located by interviewers, this unregistered and unlocatable population could be engaging in more risky behaviors and therefore our results could underestimate the symptom prevalence among young migrants. The choice of focusing

on only four major symptoms (exclusion of other non-specific symptoms) may have led to an underestimation of GU symptoms in this study. Moreover, the few respondents with ulcer and warts symptoms produced wide confidence intervals for some results. This implies that we have probably found fewer significant risk factors than would occur in a larger sample.

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Table 1. Unweighted Observations and Weighted Distribution of Sample of Chinese Urban Men and Women Aged 20 to 64 Years

Characteristic	Urban Men		Urban Women	
	Unweighted Observations, No. (n=1473)	Weighted Distributions, %	Unweighted Observations, No. (n=1521)	Weighted Distributions, %
Age				
20_34	544	39	565	39
35_49	639	34	662	39
50_64	290	27	294	22
Income				
<500	304	25	660	55
>=500	1169	75	861	45
Living in a relatively poor locale[a]				
Yes	705	70	711	70
No	768	30	810	30
Sexual activities last year (for male)				
Virgin	101	8		
No partner	32	2		
One steady partner without sex	58	5		
One steady partner	982	63		
One or more non-steady partners (non-commercial)	174	13		
Commercial sex				
Commercial sex with condom	21	1		
Commercial sex without condom	105	8		
Sexual activities last year (for female)				
Virgin			132	9
No partner			52	3
One steady partner without sex			101	8
One steady partner				
One steady partner with condom			86	5
One steady partner without condom			1068	70
One or more non-steady partners (non-commercial)			76	4
Commercial sex			6	1
Partner had other concurrent partner(s)				
Yes	31	2	281	18
No	1442	98	1240	82
Unwanted sex before last year				
Yes	102	7	262	18
No	1371	93	1259	82

[a]Low PSU (primary sampling unit) economic level is based on the median of male income for each PSU.

Table 2. Prevalence[a] of Genitourinary Symptoms Among Chinese Urban Men Aged 20 to 64 Years[b] by Selective Sociodemographic and Behavioral Characteristics

Characteristic	Sample Size (n=1473)	Burning		Discharge		Ulcer		Wart	
		No. of Cases (n=185)	Prevalence (95% CI)	No. of Cases (n=39)	Prevalence (95% CI)	No. of Cases (n=19)	Prevalence (95% CI)	No. of Cases (n=17)	Prevalence (95% CI)
Age									
20_34 (ref.)	576	67	11.7(8.4-16.0)	20	3.5(2.3-5.3)	12	2.0(0.9-4.3)	9	1.6(0.9-2.9)
35_49	506	59	11.7(7.8-17.1)	11	2.2(0.9-5.2)	4	0.9(0.4-1.8)	4	0.7(0.2-2.9)
50_64	391	59	15.0(10.1-21.6)	8	2.0(0.8-4.7)	3	0.8(0.3-2.4)	4	1.0(0.3-3.5)
Income									
<500	372	39	13.2(9.0-18.9)	15	4.0(2.0-8.0)	8	2.3(0.8-5.9)	7	1.9(0.8-4.6)
>=500	1101	145	10.6(7.4-14.9)	24	2.2(1.2-4.1)	11	1.0(0.6-1.6)	10	0.9(0.5-1.6)
Living in a relatively poor locale[c]									
Yes	1027	142	13.9(9.2-20.4)	33	3.2(1.9-5.3)	11	1.1(0.4-2.8)	12	1.2(0.6-2.3)
No	446	42	9.5(8.3-10.8)	6	1.4(0.7-3.1)	8	1.7(0.7-3.9)	5	1.0(0.3-3.1)
Sexual activities last year (for male)									
Virgin	116	20	16.9(10.7-25.9)	9	7.8(3.3-17.2)†	3	2.2(0.8-6.1)	1	1.3(0.4-4.2)
No partner	23	2	10.5(2.4-36.4)	0	1.3(0.3-4.9)	0	0(0-0)*	1	5.8(1.2-24.2)
One steady partner without sex	79	4	4.6(1.2-15.6)†	2	2.1(0.5-8.6)	1	1.3(0.2-7.5)	0	0(0-0)*
One steady partner (ref.)	921	92	10.0(7.1-14.0)	17	1.8(0.8-4.2)	6	0.6(0.3-1.5)	8	0.9(0.3-2.1)
One or more non-steady partners (non-commercial)	195	36	18.3(10.0-31.1)†	4	2.1(0.9-4.7)†	6	3.3(0.9-11.8)	2	1.2(0.3-4.9)
Commercial sex									
Commercial sex with condom	20	1	4.3(0.6-25.7)	1	5.8(1.1-26.3)	1	2.4(0.3-17.4)	1	5.8(0.7-35.9)
Commercial sex without condom	120	31	25.4(14.3-41.2)†	6	4.9(1.6-14.2)	3	2.6(1.2-5.4)†	3	2.3(1.0-5.2)†
Partner had other concurrent partner(s)									
Yes	27	10	37.4(13.9-68.8)	1	4.4(0.9-19.3)	1	3.3(0.4-21.7)	2	5.2(1.0-23.7)
No	1446	175	12.1(8.6-16.7)	38	2.6(1.6-4.2)	18	1.3(0.7-2.4)	15	1.1(0.7-1.7)
Unwanted sex before last year									
Yes	101	16	15.9(7.5-30.4)	1	1.4(0.2-10.7)	0	0(0-0)	2	1.9(0.4-8.4)
No	1372	169	12.3(9.1-16.3)	38	2.7(1.7-4.4)	19	1.4(0.8-2.6)*	15	1.1(0.7-1.7)

Abbreviation: CI, confidence interval.

*Indicates values are statistically different from the reference category at P<0.05.

†Indicates values are statistically different from the reference category at P<0.10.

[a]In the weighted sample of urban study participants, prevalence of GU symptoms per 100 population for urban men was:

Burning: 12.5 (95% confidence interval [CI], 9.4-16.6).

Discharge: 2.6 (95% confidence interval [CI], 1.7-4.1).

Ulcer: 1.4 (95% confidence interval [CI], 0.7-2.4)

Wart: 1.2 (95% confidence interval [CI], 0.7-1.9).

[b]All results are adjusted by sample weights.

[c]Low PSU (primary sampling unit) economic level is based on the median of male income for each PSU.

Table 3. Prevalence[a] of Genitourinary Symptoms Among Chinese Urban Women Aged 20 to 64 Years[b] by Selective Sociodemographic and Behavioral Characteristics

		Burning		Discharge		Ulcer		Warts	
Characteristic	Sample Size (n=1521)	No. of Cases (n=238)	Prevalence (95% CI)	No. of Cases (n=305)	Prevalence (95% CI)	No. of Cases (n=55)	Prevalence (95% CI)	No. of Cases (n=30)	Prevalence (95% CI)
Age									
20_34 (ref.)	598	90	13.0(12.0-18.7)	151	25.2(19.3-32.3)	26	4.3(2.9-6.6)	10	1.6(0.7-3.6)
35_49	592	84	14.1(10.5-18.9)	110	18.6(15.0-22.9)	22	3.8(2.1-6.8)	11	2.0(0.7-5.5)
50_64	332	65	19.7(10.4-34.1)	44	13.3(9.5-18.3)*	6	1.9(0.5-6.5) †	9	2.6(1.1-6.3)
Income									
<500	843	142	16.9(12.4-22.7)	190	22.6(18.1-28.0)	28	3.3(2.3-4.8)	15	1.8(0.9-3.5)
>=500	678	96	14.2(10.3-19.2)	114	16.9(13.3-21.2)	27	3.9(2.5-6.1)	15	2.2(1.3-3.6)
Living in a relatively poor locale[c]									
Yes	1062	190	17.9(13.6-23.3)	225	21.2(18.1-24.8)	39	3.6(2.35-5.3)	20	1.9(0.9-3.8)
No	459	48	10.5(8.0-13.7)*	80	17.4(14.7-20.5)†	16	3.5(2.2-5.6)	10	2.1(1.1-4.3)
Sexual activities last year (for female)									
Virgin	144	16	10.8(4.3-24.5)	22	15.6(8.4-27.2)	3	1.8(0.6-5.1)	1	0.9(0.2-4.3)
No partner	50	6	12.5(4.3-31.3)	6	11.8(5.1-25.0)	1	1.9(0.3-10.3)	2	3.3(0.7-14.1)
One steady partner without sex	120	20	16.7(9.1-28.7)	15	12.6(6.3-23.5)	1	0.8(0.1-5.9)	0	0(0-0)
One steady partner									
One steady partner with condom(ref.)	69	6	9.4(4.4-18.7)	12	17.2(6.0-40.2)	4	6.3(1.5-22.4)	1	1.1(0.2-4.8)
One steady partner without condom	1065	181	17.0(12.8-22.2)†	231	21.7(17.9-26.0)	42	3.9(2.8-5.5)	24	2.2(1.3-3.9)
One or more non-steady partners (non-commercial)	64	8	12.9(6.0-25.7)	17	26.1(18.4-35.5)	4	6.4(1.5-23.3)	3	4.0(0.6-22.5)
Commercial sex	8	1	13.1(1.4-61.0)	2	27.4(3.4-80.2)	0	0(0-0)	0	0(0-0)
Partner had other concurrent partner(s)									
Yes	273	59	21.6(13.0-33.6)	87	31.8(27.0-37.1)	19	6.9(3.6-12.5)	8	3.0(1.2-7.3)
No	1248	179	14.4(11.9-17.4)	218	17.5(15.0-20.3)*	36	2.9(1.8-4.5)	22	1.7(1.0-3.1)
Unwanted sex before last year									
Yes	272	57	21.1(14.6-29.3)	73	26.9(21.6-32.9)	11	4.0(2.0-7.6)	10	3.5(1.3-9.2)
No	1249	181	14.5(11.4-18.4)*	232	18.6(15.9-21.6)*	44	3.5(2.6-4.8)	20	1.6(0.9-3.0)

Abbreviation: CI, confidence interval.

*Indicates values are statistically different from the reference category at $p<0.05$.

†Indicates values are statistically different from the reference category at $p<0.10$.

[a]In the weighted sample of urban study participants, prevalence of GU symptoms per 100 population for urban women was:

Burning: 15.6 (95% confidence interval [CI], 12.1-19.9).

Discharge: 20.0 (95% confidence interval [CI], 17.9-22.4).

Ulcer: 3.6 (95% confidence interval [CI], 2.6-4.8)

Wart: 2.0 (95% confidence interval [CI], 1.2-3.2).

[b]All results are adjusted by sample weights.

[c]Low PSU (primary sampling unit) economic level is based on the median of male income for each PSU.

Table 4. Logistic Analyses of Individual GU Symptoms

Characteristic	Odds Ratio (95% Confidence Interval)			
	Urban Men		Urban Women[a]	
	Burning	Discharge	Burning	Discharge
Age				
20_34 (ref.)	1.00	1.00	1.00	1.00
35_49	1.46(0.91-2.32)	0.92(0.42-1.97)	0.74(0.55-0.98)*	0.48(0.28-0.83)***
50_64	2.59(1.54-4.36)***	0.88(0.29-2.61)	1.29(0.49-3.43)	0.39(0.23-0.66)***
Income				
<500	0.77(0.39-1.52)	1.84(0.67-5.00) †	1.08(0.73-1.59)	1.54(0.96-2.48) †
>=500	1.00	1.00	1.00	1.00
Living in relatively poor locale[b]				
Yes	1.74(0.98-3.07) †	2.15(0.63-7.38)	1.92(1.28-2.89)***	1.12(0.86-1.46)
No	1.00	1.00	1.00	1.00
Sexual activities last year (for male)				
Virgin	3.19(1.58-6.47)***	4.27(1.16-15.71)*		
No partner	1.42(0.27-7.33)	0.65(0.11-3.75)		
One steady partner without sex	0.32(0.07-1.44)	0.99(0.14-6.88)		
One steady partner (ref.)	1.00	1.00		
One or more non-steady partners (non-commercial)	2.66(1.41-5.05)***	1.34(0.42-4.29)		
Commercial sex				
Commercial sex with condom	0.39(0.04-3.88)	3.64(0.52-25.79)		
Commercial sex without condom	4.00(1.54-10.34)***	3.11(1.74-5.57)***		
Sexual activities last year (for female)				
Virgin			1.18(0.30-4.57)	0.77(0.18-3.32)
No partner			1.15(0.23-5.82)	0.91(0.24-3.45)
One steady partner without sex			1.44(0.47-4.35)	0.97(0.28-3.39)
One steady partner				
One steady partner with condom(ref.)			1.00	1.00
One steady partner without condom			1.88(0.91-3.90) †	1.43(0.44-4.65)
One or more non-steady partners (non-commercial)			1.27(0.41-3.96)	1.38(0.44-4.33)
Partner had other concurrent partner(s)				
Yes			1.64(1.05-2.58)*	2.56(1.51-3.37)***
No			1.00	1.00
Unwanted sex before last year				
Yes			1.40(1.01-1.94)*	1.59(1.09-2.30)**
No			1.00	1.00

†Indicates values are statistically different from the reference category at p<0.10.
*Indicates values are statistically different from the reference category at p<0.05.
**Indicates values are statistically different from the reference category at p<0.02.
***Indicates values are statistically different from the reference category at p<0.01.
[a]women who had commercial sex last year (n=8) were excluded from analysis.
[b]Low PSU (primary sampling unit) economic level is based on the median of male income for each PSU.