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ORIGINAL ARTICLE

Male Health

Survey of knowledge, attitude, and practice regarding reproductive health among urban men in China: a descriptive study

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There has been little focus on men's reproductive health (RH) in China. This descriptive study conducted in Yiling District, Yichang, China, surveyed male knowledge of sexual physiology and RH to assess levels of knowledge, attitudes and practices (KAPs) regarding prevention of sexually transmitted diseases (STDs). A total of 3933 men, aged 18–59 years (mean, 40.3 years), were recruited by cluster random sampling. They completed a questionnaire in the presence of an interviewer, with items related to subject characteristics, RH knowledge, and subjective symptoms of the reproductive system. Physical examination and reproductive system disease diagnosis were performed. Participants' occupations were predominantly skilled labor (80.5%). Nearly four-fifths (78.5%) respondents had at least one reproductive disease. Over half of respondents were aware of and declared a positive attitude about sexual physiology and safe sex, and 70% of them selected to visit a doctor when they had a reproductive disorder. However, only 41.9% believed human immunodeficiency virus/acquired immunodeficiency syndrome could be transmitted through breastfeeding, and 64.6% incorrectly thought they could avoid contracting STDs by cleaning their genitals after intercourse. In addition, 45% discriminated against and were unwilling to be friends with infected persons. Nearly 45% of those with a reproductive system disorder refused to discuss it with friends or family members. These results indicate that this cohort of Chinese men had a certain degree of KAP about RH, whereas some aspects require further public health education in the general population. It is necessary to disseminate accurate knowledge of STD risk in China based on sociodemographic characteristics.

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INTRODUCTION

The 1994 International Conference on Population and Development (ICPD) held in Cairo, first proposed that communication between men and women on issues of sexuality and reproductive health (RH) should be improved to encourage and enable men to take responsibility for their sexual and reproductive behavior. Therefore, special efforts should be made to promote the active involvement of men in the prevention of sexually transmitted diseases (STDs), including human immunodeficiency virus (HIV) infection.¹

Male RH is a relatively new concept in China. Traditionally, RH and family planning was included in maternal and child health services, which focused on females and young adolescents, and not on adult males. Thus, the availability of quality information on sexual and RH services for men was inadequate.^{2,3} However, as men are active in sexual activities, they are the predominant population at risk of STDs, such as HIV infection/acquired immunodeficiency syndrome (AIDS) in many countries. It was reported that 9% of Jamaican male adolescents and young adults had symptoms of STDs following high-risk sexual behavior.⁴ In recent years, data showed higher morbidity rates of STDs among males (67.0–444.4 per 100,000 population) than that among

females (50.0–425.3 per 100 000 population), and the mean ratio of men to women ranged from 1.59:1 to 2.64:1 in several cities in China.^{5–8}

The ICPD recommended that steps should be taken to bring men into a wide range of RH services in such a way they are supported as equal partners and responsible parents, as well as clients in their own right. As a result, better outcomes of RH indicators, such as contraception acceptance and continuation, safer sexual behaviors, use of RH services, and reduction in reproductive morbidity and mortality, could be expected.⁹ Male involvement is necessary for healthcare programs designed to improve their partners' sexual and RH, and is likely to be more effective than a program that only targets women.¹⁰ This study aimed to determine male knowledge of RH and their RH status to assess the knowledge, attitudes and practices (KAPs) of RH of urban males in China.

METHODS

Research setting

This descriptive, cross-sectional study was conducted in Yiling District, Yichang, Hubei Province, China, the area locates on the Northwest bank of Xiling Gorge in the Three Gorges Dam Region. This district of

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Yichang is mainly comprised of an immigrant population, and most of the residents are drivers or blue-collar workers. Yiling District consists of one administrative district, one economic development zone, eight towns, and three townships.

Subjects

The study recruited 4000 men aged 18–59 years by cluster random sampling. Briefly, we selected male residents in the first stage cluster sample living in the regions of Yiling District except for three townships. Then simple random sampling was used to select 400 subjects aged 18–59 years from each cluster.^{11–13} These residents were invited by letter to attend for interview about RH, assessment of height, weight and RH physical and laboratory examination.

Ethical approval

The study was approved by the Medical Ethics Committee of Wuhan University of Science and Technology (WUST), and written informed consent was obtained from recruited subjects in the survey, who were assured of confidentiality by the use of anonymous questionnaires. Verbal consent was also sought from community leaders prior to the focus group discussions.

Data collection/questionnaire

Researchers from School of Public Health of WUST interviewed the participants one-to-one using a self-designed Health Assessment Questionnaire (HAQ), which had been proved in a preliminary study to have suitable reliability and validity. The interviewers had professional backgrounds in medicine and teaching. To minimize interviewer bias, they received intensive training on how to conduct a survey, including a deep understanding of contents of the HAQ, standard survey procedures and techniques.

Each interviewee was given information on the background and aim of the survey, and it was emphasized that participation was voluntary and anonymous prior to participation. The questionnaire was distributed to the participants to fill out by themselves, during this period a researcher was present to explain the questionnaire and clarify any misunderstandings as necessary. The procedure lasted approximately 20 min in a private room, as described in a previous study.¹⁴

The HAQ included items on sociodemographic characteristics, such as age, education, current address, occupation, and symptoms or signs of reproductive system disorders. In addition, the core contents of the HAQ consisted of RH-related KAP, with ten questions on knowledge, six questions on attitude, and six questions on behavior related to RH.

Reproductive health-related knowledge

Ten RH-related questions, K1 to K10, consisted of five items with “yes” or “no” answers and five items with multi-optional answers to assess knowledge about RH and STD/AIDS. Six questions from K1 to K6 were used to assess participant knowledge on sexual physiology and safe sex. One question (i.e. “Which statement is not a clinical characteristic of prostatitis?”) was used to assess knowledge of general reproductive diseases. Three questions from K8 to K10 assessed STD/AIDS knowledge.

Reproductive health-related attitude

Six questions, A1 to A6, examined RH-related attitude. Three items, A1, A3, and A6, were used to assess attitude to RH and safe sex. Items A2 and A5 measured use of safe sex practices. A4 determined the attitude to multiple sexual partners.

Reproductive health-related behavior

Reproductive health-related behaviors were assessed by eight questions, P1 to P8.

Physical and laboratory examination

A standard physical examination was carried out by a urologist in Yiling Hospital. Prostatic fluid samples were taken at baseline, and a prostate ultrasound was performed. Reproductive diseases were diagnosed with reference to a published book “Surgery.”¹⁵ The prevalence of diseases was investigated in different age groups, with participants stratified into five subgroups as follows: 18–19, 20–29, 30–39, 40–49, and 50–59 years.

Data analysis

Personal and health status information from individual interviews were collated manually using the Epi database and checked for errors. Descriptive statistics, including means, standard deviations, frequencies, and percentages are used to describe the characteristics of participants. The Statistical Package for Sciences (SPSS) software version 17.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis.

RESULTS

Characteristic of participants

Four thousand residents were recruited to participate in this survey, 3959 respondents completed the questionnaire in which some people were unable to attend an interview, leaving 3933 subjects with valid information, which resulted in a 99.3% response rate. The age of the respondents ranged from 18 to 59 years; 67.7% were between 30 and 49 years old; 3437 (87.4%) were married and 119 (3.0%) were divorced or widowed; 80.5% of respondents were employed as skilled laborers. Nearly, 97% of respondents received at least junior high school education (Table 1).

Symptoms of diseases of the reproductive system

Table 2 presented the clinical signs and symptoms of the reproductive system of the participants. Nearly, one-third of the respondents

Table 1: Sociodemographic characteristics of respondents (n=3933) at baseline

Characteristic	Value
Age, year, n (%)	
Mean±s.d.	40.3±9.0 (18.0-59.0)
18-19	13 (0.3)
20-29	576 (14.6)
30-39	1225 (31.2)
40-49	1544 (39.3)
50-59	575 (14.6)
Height (cm), mean±s.d.	166.7±5.9
Weight (kg), mean±s.d.	68.0±10.8
Marital status, n (%)	
Unmarried	377 (9.6)
Married	3437 (87.4)
Divorced	98 (2.5)
Widowed	21 (0.5)
Degree of education, n (%)	
No formal education	23 (0.6)
Primary school	90 (2.3)
Junior high school	1191 (30.3)
Senior high or technical secondary school	1840 (46.8)
Junior college or above	789 (20.1)
Occupation, n (%)	
Unskilled; e.g., trader, farming	190 (4.8)
Skilled labor; e.g., driver, blue-collar worker	3165 (80.5)
Professional; e.g., teacher, health care worker, office worker	129 (3.3)
Others	449 (11.4)

s.d.: standard deviation

manifested at least one related symptom (1275/3933, 32.4%) within the previous year.

Categorization of diseases of the reproductive system

At least one reproductive system disease was diagnosed in 3088 respondents, with a prevalence of 78.5%. Phimosis (36.0%) was the major disease (Table 3). When we stratified the participants into five age groups, the majority of respondents with phimosis were 20–49 years old. Furthermore, all other diseases predominantly occurred at 40–49 years of age.

Knowledge, attitudes and practice information analysis

Table 4 presented data on the awareness of sexual physiology and safe sex (K1, K3, K4 and K6). More than 65% had knowledge about unintended pregnancies, emergency contraception, consequences of abortion (Table 4a), and adverse effects of consanguineous marriage. However, only 54.8% were aware of the concept and details of erectile dysfunction. Over 83% of respondents believed that HIV/AIDS could be transmitted by unprotected sexual intercourse and sharing sharp objects. However, <50% respondents believed that HIV/AIDS could be transmitted through breastfeeding a child (Table 4b). About 1533 (39.0%) and 866 (22.0%) respondents had the impression that HIV could be transmitted through mosquito bites and kissing, respectively. In addition, about 66.4% and 90.4% of respondents thought that fewer sex partners and using condoms, respectively, were effective methods to prevent STDs, whereas 43.9% incorrectly believed that cleaning the genitals could prevent STDs (K10), which was backed up by responses to K5, in which 2542 (64.63%) respondents misunderstood that cleaning the vagina/penis after sexual intercourse was effective in avoiding the risk of STDs. Regarding the types of STD, although more than 70% of respondents knew that STDs included gonorrhoea, syphilis, and HIV/AIDS, nearly half of respondents were of the opinion that genital warts were not included.

The majority of respondents showed a positive attitude to a steady sexual partner, readily obtainable condoms for unmarried youth and a physical examination before marriage. On the other hand, only about 45% of respondents were likely to make friends with those who had STDs (Table 5a), even if they had good knowledge of the transmission routes of STDs. In addition, 63.4% showed a tolerant attitude to masturbation behavior (Table 5b). Nearly 45% were unwilling to discuss sex and RH with friends or family because of psychological taboos (Table 5a).

About RH practices (Table 6), approximately 90% answered that they cleaned their penis once a day, and insisted on using condoms every time when they had sexual intercourse with a stranger. If respondents had a sexual problem or symptoms of STD, the majority would select to visit a doctor for professional treatment instead of talking with family members. Usually, when they had sexual impulses, half of respondents selected to divert attention by working, listening to music, or taking part in other activities. Table 6 also showed that respondents could get information about sexual and RH from multiple channels, including radio and television, newspapers and magazines, the web, and medical staff. At the same time, they would like to obtain more specialist knowledge about human reproductive anatomy and physiology, prevention and treatment of STDs, and characteristics of fertility.

DISCUSSION

Previous studies postulated a positive relationship between KAP levels and family planning, or HIV/AIDS prevention.^{16–18} However, there is little evidence about KAP information on RH among general

Table 2: Symptoms and signs of the reproductive system (*n*=3933) during the previous year

Symptoms	<i>N</i>	Proportion (%)
Frequent micturition, urgency, dysuria	660	16.8
Swollen or tender scrotum	215	5.5
Testicular swelling and pain	162	4.1
Swelling and pain in urethra	146	3.7
Abnormal excrescence in perineum	92	2.3

Table 3: Diagnosis of diseases of the reproductive system according to age (*n*=3933)

Categorization of diseases	Numbers in subgroups of age					<i>n</i> (%)
	18-19	20-29	30-39	40-49	50-59	
Redundant prepuce and phimosis	6	251	428	539	193	1417 (36.0)
Benign prostatic hyperplasia	1	12	100	373	233	719 (18.3)
Prostatitis	0	48	162	252	112	574 (14.6)
Varicocele	3	33	95	163	84	378 (9.6)
<i>n</i> (%)	10 (0.2)	344 (8.7)	785 (20.0)	1327 (33.7)	622 (15.8)	3088 (78.5)

Table 4a: Five dichotomous items to assess knowledge of respondents (*n*=3933) about reproductive system health

Number	Knowledge of RH	<i>n</i> (%)	
		Yes	No
K1	Do you think one unprotected sex could lead women to conceive	3274 (83.2)	659 (16.8)
K2	Do you know the concept and characteristics of ED	2155 (54.8)	1778 (45.2)
K3	Do you think emergency contraceptives is a remedy after condom breakage during sexual activity	3281 (83.4)	652 (16.6)
K4	Do you think abortion may lead to infertility in women	2999 (76.2)	934 (23.8)
K5	Do you think cleaning the vagina/penis after sexual intercourse can avoid the risk of STDs	2542 (64.6)	1391 (35.4)

ED: erectile dysfunction; RH: reproductive health; STDs: sexually transmitted diseases

urban male residents. This study presents the outcomes of a survey on reproductive system knowledge, attitude, and behavior, and the RH status of urban men in China.

Almost one-third of respondents reported that they had reproductive system symptoms in the previous year, but according professional diagnosis from urologists, the proportion with at least one reproductive system disease (78.5%) was slightly higher than in a survey run in 2003,¹⁹ in which 64.2% of respondents were diagnosed with diseases of the reproductive system in a medical examination. These data from both surveys called our attention to public health on male reproductive health. In this study, the prevalence rates of phimosis, benign prostatic hyperplasia, and prostatitis were 36.0%, 18.3%, 14.6%, respectively, which were markedly higher than that in another report,²⁰ in which the rate of prepuce and phimosis was only 16.0%, whereas the rates of prostatitis and varicocele were similar to our study (14.5% vs 14.6%, 9.9% vs 9.6%, respectively). The difference between the two studies may relate to different subject characteristics in that there were more unmarried people and much younger cases in the previous study.

We found that 43.0% of reproductive system diseases occurred among middle-aged (40–49 years) participants. A similar



Table 4b: Five items with multi-optional answers to assess knowledge of respondents (n=3933) about reproductive system health

Number	Items	Options	n (%)
K6	The main reason for banning consanguineous marriage	Unethical	439 (11.2)
		Genetic diseases inflicted on offspring	822 (20.9)
		The risk of genetic diseases will be increased in offspring	2580 (65.6)
		Harm for couple's health	92 (2.3)
K7	Which one is not clinical characteristics of prostatitis	Men <50 years old are susceptible	1403 (35.7)
		Usually accompanied by urethral irritation and chronic pelvic pain	1202 (30.6)
		The best treatment is operation	808 (20.5)
		The cause is complicated	520 (13.2)
K8	Which of the following behaviors can transmit HIV/AIDS? (Multiple choice)	Having dinner together	290 (7.4)
		Using public toilet	477 (12.1)
		Unprotected sexual intercourse	3286 (83.6)
		Sharing sharp objects	3353 (85.2)
		Mosquito bite	1533 (39.0)
		Breastfeeding	1649 (41.9)
K9	Which of the following are STDs? (Multiple choice)	Kissing	866 (22.0)
		Gonorrhea	2795 (71.1)
		Prostatitis	257 (6.5)
		Urinary tract infection	715 (18.2)
		Syphilis	3298 (83.8)
		Genital warts	1980 (50.3)
		HIV/AIDS	3293 (83.7)
K10	Which of the following are methods to prevent STDs? (Multiple choice)	Vaginitis	660 (16.8)
		Reducing the numbers of sex partners	2613 (66.4)
		Injecting penicillin	228 (5.8)
		Cleaning genitals	1728 (43.9)
		Consistent condom use	3556 (90.4)

STDs: sexually transmitted diseases; HIV: human immunodeficiency virus; AIDS: acquired immunodeficiency syndrome

Table 5a: Three dichotomous items to assess attitude of respondents (n=3933) about reproductive system health

Number	Attitude of RH	Yes n (%)	No n (%)
A1	Can you speak freely with friends or family about sex and RH?	2153 (54.7)	1780 (45.3)
A2	Do you think it is suitable to provide condoms to unmarried youth?	2858 (72.7)	1075 (27.3)
A3	Would you like to make friends with those who has STDs?	1756 (44.6)	2177 (55.4)

STDs: sexually transmitted diseases; RH: reproductive health

Table 5b: Three items with multi-optional answers to assess knowledge of respondents (n=3933) about reproductive system health

Number	Items	Options	n (%)
A4	The main adverse effect with multiple sexual partners	No effect on health	321 (8.2)
		Contribute to health	207 (5.3)
		Increase the risk of STDs	3405 (86.6)
A5	What do you think of masturbation (console oneself)?	Normal behavior	2492 (63.4)
		Very shameful behavior	1441 (36.6)
A6	What do you think of marriage examination?	Very necessary	3615 (91.9)
		No needs	107 (2.7)
		Doesn't matter	211 (5.4)

STDs: sexually transmitted diseases

relationship between age and lower urinary tract symptoms was also reported in Japanese subjects.²¹ In China, husbands, usually, play the leading role in a family, and at middle stage of life they have multiple pressures from work and life, which lead them to ignore concerns about their own RH. Therefore, it is important that men

are included and supported in interventions to improve sexual and RH for themselves and their wives.^{22,23} Consequently, we suggest that middle-aged men ought to be a focus for improving RH awareness and intervention.

This study suggested that males were aware of the benefits of condom use during sexual intercourse, and therefore, did behaviour in accordance with this knowledge. Thus, 87.7% of respondents believed it was correct to use condom during sexual relationships with unfamiliar partners, which was markedly higher than that of previous studies in Jamaica and New Guinea,^{4,24} possibly because the respondents in this study were living in urban areas, where they were more likely to receive correct information about STDs, and to have access to condoms from multiple sources. Generally, when respondents in this study had a certain knowledge about RH, their attitude and behavior towards promoting RH was favorable. In particular, the knowledge about the prevention of HIV/AIDS infection by use of condoms was relatively widespread among the majority of respondents in this study, which was in agreement with previous research.²⁵

Some other aspects of STD/AIDS knowledge levels were low in this study, with only 41.9% believing that breastfeeding could transmit HIV/AIDS, only 50.3% being aware that genital warts was one type of STDs, and a number of subjects thinking that mosquito bites and kissing could transmit HIV/AIDS. Thus, it is important and necessary to disseminate accurate and detailed information among this population. In contrast, 85.2% knew that sharing sharp objects was a risk factor for HIV/AIDS transmission, which was much higher than in a previous study in one community in Beijing (14.1%) but similar to that in another report (95%).^{25,26} This outcome can be attributed to

Table 6: RH behavior of respondents (n=3933)

Number	Items	Options	n (%)
P1	How often do you clean your penis?	Once a day	3482 (88.5)
		Once in 2 days	373 (9.5)
		Occasionally	64 (1.6)
		Never	14 (0.4)
P2	Do you use condoms when you have sex with random people?	Every time	3451 (87.7)
		Occasionally	339 (8.6)
		Never	143 (3.6)
P3	If you have a sexual problem, what would you do?	Discuss with friends or family	297 (7.6)
		Buy medicine by yourself	310 (7.9)
		See a professional doctor	3014 (76.6)
		See the doctor of traditional Chinese medicine	161 (4.1)
		See private doctors by street advertising	8 (0.2)
P4	What is the main way to solve your sexual impulses?	Others	143 (3.6)
		Cold bath	303 (7.7)
		Masturbation	366 (9.3)
		Looking for sex partner	845 (21.5)
		Suppressing oneself	353 (9.0)
		Looking for commercial sexual services	63 (1.6)
		Sport to divert attention	2003 (50.9)
P5	If you get STDs, what would you do?	Discuss with friends or family	366 (9.3)
		Buy medicine by yourself	498 (12.7)
		See a professional doctor	2894 (73.6)
		See the doctor of traditional Chinese medicine	87 (2.2)
		See private doctors by street advertising	20 (0.5)
P6	The ways that you get the sexual and RH knowledge (multiple choice)	Others	68 (1.7)
		Radio and television	2043 (52.0)
		Newspapers and magazines	1993 (50.7)
		Internet	1504 (38.2)
		Communication with friends	807 (20.5)
		Medical staff promotion	1955 (49.7)
P7	Which ways do you want to receive knowledge about sexual and RH? (multiple choice)	School education	156 (4.0)
		Radio and television	2115 (53.8)
		Newspapers and magazines	1820 (46.3)
		Internet	1504 (38.2)
		Communication with friends	810 (20.6)
		Medical staff education	2571 (65.4)
P8	Which part of RH knowledge do you want to know?	School education	1078 (27.4)
		Human reproductive anatomy and physiology	1543 (39.2)
		Knowledge of STDs prevention and treatment	2436 (61.9)
		Knowledge of fertility	2040 (51.9)
		Knowledge of contraception	1702 (43.3)
		Knowledge of infertility and aphoria	818 (20.8)

STDs: sexually transmitted diseases; RH: reproductive health

the Chinese government's dissemination of information to the public on how to prevent HIV/AIDS, with a particular focus on modes of transmission recent years.

The study also showed that a significant proportion of respondents (55.4%) considered that they were reluctant to make friends with those who had STDs. This kind of discrimination

was in line with some surveys in China, in which nearly half of the respondents had negative opinions of STD patients.^{27,28} Hence, health education and awareness campaigns for the population are necessary to clarify misconceptions. In addition, Jin *et al.*²⁸ reported the sources of knowledge of AIDS were video, TV, newspapers, and magazines, whereas data from another study showed that the top three sources were internet web (31.8%), freely obtained public science and video material (24.9%), and professional lectures (22.3%). This was well-displayed in this study where about 50% of the respondents reported that they obtained relevant information from radio and TV, newspapers, and magazines and the web. In addition, another important source of information was given by medical doctors, and almost three-quarters expected to obtain treatment from medical professionals after developing STDs, which was consistent with a study in Brazil.²⁹ However, our study also found that men sometimes deliberately avoided discussing reproductive system problems with their wives or friends. Discussion between partners was reported to contribute to improved education of RH, especially among young people.³⁰ However, in this study, the mean age of respondents was 40.3 years, and sex is a highly private topic in the traditional culture of China, such that these adults are unlikely to discuss problems with others apart from medical doctors.

Numerous studies have shown that male migrant workers in China came from rural areas and were ignorant about reproductive tract infections. They had never obtained sexual and RH education or contraceptive consulting services in their transient living areas.^{31,32} This appeared to be related to inaccessibility to services for men as these were mainly available in women and children's health care services in China, and thus men did not know how and where to obtain RH services. In fact, the risk of contracting HIV/STDs among women in a nonhigh-risk group has been reported to be largely determined by their male partner's behavior,³³ and in China, it was assumed that most transmission was from husbands to wives. A report confirmed that 48.5% of male HIV-positive participants' spouses were HIV-positive,^{34,35} thus engaging men more extensively in HIV/STD prevention was likely to reduce women's risk of HIV infection.

However, our study also pointed out the lack of knowledge and misconception about several items, such as characteristics of STDs, the reason for banning consanguineous marriage, and the means of transmission of HIV/AIDS. Further research is also needed to explore other factors that could account for reproductive system diseases. For example, lifestyle factors such as nutrition, smoking habit, and lack of physical exercise may also contribute to reproductive disease occurrence, as reported in recent studies that a range of lifestyle factors were associated with male reproductive disorders and infertility.³⁶⁻³⁸

Reproductive system diseases are a major health burden for men in China, yet few men had adequate KAP about RH. Therefore, we suggest that a male RH service should be a requisite in China's integrated health system. It is necessary not only to provide these services in communities, but also to ensure that available resources are effective, accessible, feasible, and acceptable to men, and it is equally crucial for the population to be mobilized and educated on reproductive system diseases.

Our study had several limitations. First, it used self-reported data from the participants, who might misreport their behaviors or attitudes because sex remains a sensitive topic in China, as discussed in previous research.^{14,39} Another limitation was the questionnaire design. The questionnaire was designed with reference to the European Male Ageing Study Sexual Function Questionnaire,^{40,41} and although the questionnaire had been verified and quality controlled in a presurvey,

the results were based on cross-sectional data from questionnaires and physical examination provided by urologists. The diagnosis of reproductive system diseases was selected according to the published documents without the use of international scores for individual diseases. Therefore, a further comprehensive general assessment is required to seek the potential relationship between RH's KAP and benign prostatic hyperplasia.

To the best of our knowledge, only a few studies in the literature have evaluated the relationship between reproductive system diseases and the RH's KAP of men. On the basis of data from this general population, our study indicated that the KAP levels of RH among urban men in China need to be improved to protect men from contracting reproductive system diseases.

AUTHOR CONTRIBUTIONS

LZ, RLG, LQW and SDX designed the questionnaire, and performed the survey and data analysis. QRH and QAJ carried out the physical examinations. LZ, YQS and CCZ wrote the manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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