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RESEARCH ARTICLE

Incidence and risk factors of female sexual dysfunction in urban and rural China: a 4-year prospective cohort study

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Abstract **This study aimed to investigate the incidence and risk factors for female sexual dysfunction (FSD) in urban and rural China. A prospective cohort study was conducted from February 2014 to January 2016, with follow-up from June to December 2018. Women aged ≥20 years were recruited from urban and rural areas in six provinces of China using a multistage, stratified, cluster sampling method. Sexual function was assessed using the Female Sexual Function Index questionnaire. A total of 16 827 women without sexual dysfunction at baseline participated in this study, 9489 of them (urban, 5321; rural, 4168) who had complete information from baseline to follow-up were included in the final analysis. The rate of follow-up was 68.81%, and the median follow-up time was 4.13 years. The 4-year incidence of FSD was 43.07%, with an incidence density of 12.02 per 100 person-years. In particular, the 4-year incidence and incidence density of FSD were 41.03% and 11.88 per 100 person-years in the urban group and 45.68% and 12.17 per 100 person-years in the rural group. Among women with sexual dysfunction, difficulties in sexual desire, satisfaction, and arousal were the main symptoms. In urban women, the risk factors for FSD included age ≥45 years (adjusted relative risk 1.69, 95% confidence interval 1.57–1.81), hypertension (1.31, 1.14–1.49), previous delivery (1.26, 1.13–1.41), post-menopausal status (1.20, 1.10–1.32), pelvic inflammatory disease (1.13, 1.05–1.21), and multiparity (1.11, 1.03–1.19). In the rural group, the risk factors significantly associated with FSD were age ≥45 years (1.50, 1.40–1.61), previous delivery (1.39, 1.17–1.65), hypertension (1.18, 1.06–1.30), multiparity (1.16, 1.07–1.27), and post-menopausal status (1.15, 1.07–1.23). FSD is a hidden epidemic condition in China, and the development of prevention strategies should consider the distinct risk factors present in rural and urban areas.**

Keywords female sexual dysfunction; incidence; risk factor; urban; rural; China

Introduction

Sexuality is the cornerstone of not only human survival, but also reproduction, and it has deep spiritual and cultural connotations [1]. The American College of Obstetricians and Gynecologists defines female sexual dysfunction (FSD) as the condition experienced by women who encounter persistent and recurrent issues in sexual arousal, desire, orgasm, or pain, which cause distress to the patient and strain the relationship with their

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partner [2]. FSD seriously affects women's mental health, quality of life, and family stability.

The prevalence of FSD is alarmingly high worldwide. Population-based surveys have revealed that the prevalence of any female sexual problem was 51.2% in the UK [3] and 43.1% in the United States [4]. However, sexual dysfunction often remains concealed, and it is rarely addressed in public health strategies. FSD is influenced by a complex array of biological, physical, psychological, and genetic factors. Factors such as age, race, religion, education, menopause, employment, parity, and stress have been reported to be associated with FSD [5,6]. The high prevalence of FSD and the diverse range of risk factors emphasize the necessity for the inclusion of FSD in public health initiatives.

In China, only a few cross-sectional studies have examined the sexual well-being in women, and the prevalence of FSD varies from 29.7% to 63.3% depending on the diagnostic criteria used [7–10]. Despite improvements in sexual education [11], Chinese women, particularly those in rural or underdeveloped areas, often adhere to traditional and passive sexual roles and avoid mentioning issues related to sexual function [12]. With the availability of pharmacological interventions and the implementation of the "three-child policy" in China, estimating the prevalence of FSD in the general population is urgently necessary. However, evidence regarding the incidence and risk factors associated with FSD in China is lacking [5,13,14].

Therefore, this study aimed to investigate the incidence of FSD in urban and rural areas of China and to assess the underlying risk factors.

Materials and methods

Study design and participants

This study was a nationally representative, prospective cohort study. A baseline survey was conducted from February 2014 to January 2016 using a multistage stratified cluster sampling method. Details of the sampling technique, baseline recruitment, and data collection have been described previously [8,15]. In brief, six provinces of China (Gansu in the north-west, Shanxi in the central China, Guizhou in the south-west, Liaoning in the north-east, Jiangsu in the east, and Guangdong in the south-east), which represent six major geographic and socioeconomic regions, were randomly selected as study regions. Sampling was stratified in accordance with the geographical region, urbanization degree (large cities and rural townships), and economic status (based on the gross domestic product of each province). Three counties and three cities were randomly drawn from each province. After considering population data from the 2010 Chinese census, samples were stratified in accordance with age during the final step of sampling.

The survey was conducted at various health service centers hosting survey sites during the National Mass Screening of Breast and Cervical Cancers (NMSBCC), a free nationwide preventive public health service promoted by the Chinese government. After completing the NMSBCC project, the participants continued to be recruited into our survey.

The target population was all eligible adult female residents in accordance with the updated census lists from the community registry offices. The inclusion criteria for this study were women aged 20 years or older who had resided in the target regions for at least 5 years and had been sexually active during the previous 4 weeks. Women who are pregnant, have cognitive dysfunction, and have difficulties understanding or participating in the study were excluded. A total of 55 477 women initially met the inclusion criteria and participated in the baseline survey. Among them, 16 827 did not have FSD (9484 from urban and 7343 from rural areas). Follow-up was conducted by contacting women without FSD, and 14 942 women who had complete baseline information were contacted by telephone from June to December 2018. Of these women, 10 282 (68.81%) completed the follow-up survey. After excluding 793 participants with missing outcome data, 9489 women (63.5%) who had no FSD detected at baseline and had complete data from baseline to follow-up were included in the final analysis (Fig. 1). The baseline demographic characteristics of participants who completed the follow-up and those who loss to follow-up were compared (Table S1).

Ethical approval for this study was obtained from the Research Ethical Committee of the Peking Union Medical College Hospital (IRB No. S-689). Approval in the form of a written informed consent was obtained from all participants.

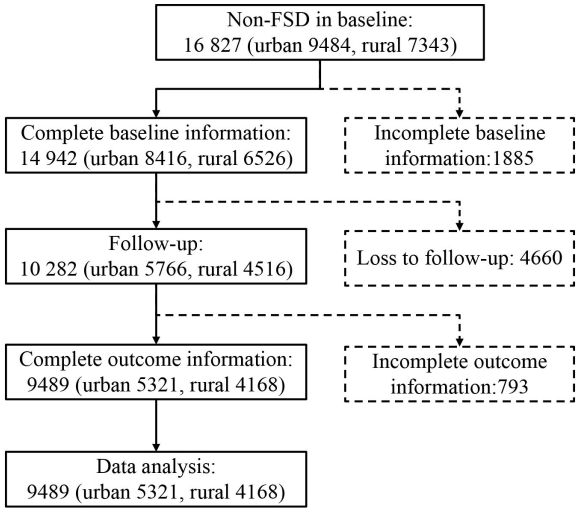

Fig. 1 Study flowchart.

Measurements

Data on various characteristics and potential risk factors for FSD were collected. The collected information encompassed the following aspects. (1) General characteristics: this aspect included information such as birth year, race, height, weight, occupation, education level, marital status, monthly income, menstrual status, and any history of pelvic surgery. (2) Reproductive history: information regarding childbearing history, mode of delivery, and parity was recorded. (3) Disease status: the presence of chronic diseases, such as hypertension and diabetes, as well as gynecological diseases such as myoma, pelvic inflammatory disease, chronic pelvic pain, endometriosis, and pelvic organ prolapse, were assessed. In addition, the participants' body mass index (BMI) was calculated using their height and weight measurements. Then, the BMI was categorized into four classes based on tertiles: < 18.5 kg/m^2 (underweight), 18.5–23.9 kg/m^2 (normal), 24.0–27.9 kg/m^2 (overweight), and ≥ 28.0 kg/m^2 (obese).

The validated Chinese version of the Female Sexual Function Index (FSFI) questionnaire was used to evaluate the sexual dysfunction of women at baseline and during the follow-up period [16,17]. The FSFI, consisting of 19 items, is widely regarded as the gold standard for the self-reported evaluation of FSD. The FSFI questionnaire comprises six domains, each with a different number of items and scoring ranges: desire (two items, scored 1.2–6.0), arousal (four items, scored 0–6.0), lubrication (four items, scored 0–6.0), orgasm (three items, scored 0–6.0), satisfaction (three items, scored 0.8–6.0), and pain (three items, scored 0–6.0). The total score on the FSFI ranged from 2.0 to 36.0, with higher scores indicating better sexual function. A score of 26.55 or lower was considered the diagnostic cutoff criteria for identifying FSD [18]. Furthermore, scores below specific thresholds were indicative of particular sexual difficulties: a score of less than 3.6 in desire or arousal suggested dysaphrodisia or arousal difficulties, a score below 3.9 in lubrication suggested vaginal lubrication problems, a score below 4.0 in orgasm denoted orgasm dysfunction, and a score below 4.4 in satisfaction or pain indicated sexual satisfaction disorders or dyspareunia. This study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines [19], ensuring transparency and completeness in reporting the research findings.

Statistical analysis

Using PASS version 15.0, the sample size was calculated to be 599 in each urban and rural area, considering an expected FSD incidence of 40.0% over a 4-year follow-up period [13], a 95% confidence interval (CI), and an 8% allowable error (0.2 times the expected incidence). Considering a potential non-response rate of 15% and a loss of follow-up at a rate of 20%, a total of 10 572 women without FSD at baseline were required for the prospective survey.

Descriptive data are presented as the mean and standard deviation or frequency (percentage), depending on the distribution of variables. Student's *t*-test was used to compare mean, and the chi-square test was used to analyze proportions. The modified Poisson regression model was used to examine the associations between risk factors and FSD, and the adjusted relative risk (aRR) and 95% CI were estimated [20]. All statistical analyses were performed using STATA version 17.0, and a two-sided *P*-value of less than 0.05 was considered statistically significant.

Results

Characteristics of participants at baseline

Table 1 shows the descriptive statistics for the entire study sample (n = 9489) and a comparison of the characteristics of participants in the urban area (n = 5321) and rural area (n = 4168). The age of participants ranged from 20 to 61 years. The participants in the urban area were found to be younger, more likely to be engaged in intellectual work, better educated, had higher incomes, and had a higher rate of ethnic minority than those in the rural area (all $P < 0.001$). In addition, no significant differences in current marital status ($P = 0.104$) and pelvic inflammatory disease ($P = 0.264$) were found between the urban and rural area.

FSFI scores and the incidence of FSD in the urban and rural areas

Among the 9489 participants included in the analysis, the median (25th percentile, 75th percentile) follow-up time was 4.13 years (3.68, 4.28). The rural area had significantly lower scores than the urban area in the overall FSFI score (25.54 ± 6.92 vs. 26.64 ± 5.90, $P < 0.001$), as well as in all six dimensions at the follow-up assessment (Table 2).

Table S2 reveals that the 4-year cumulative incidence of FSD was 43.07%. The rural area (45.68%) had a significantly higher risk of FSD than the urban area (41.03%), using the cutoff point of 26.55 on the FSFI. With regard to the incidence of FSD within the six dimensions, the urban area had significantly lower rates than the rural area, except for the dimensions of satisfaction and pain. In addition, the incidence density of FSD is 12.02/100 person-years, with 11.88/100 person-years for urban women and 12.17/100 person-years for rural women. In urban and rural areas, the incidence density and cumulative incidence rate of FSD show

Table 1 Sociodemographic characteristics and physiological and health behaviors of participants at baseline

Variables	Total (n = 9489)	Urban (n = 5321)	Rural (n = 4168)	P value
Mean age, year (SD)	35.04 (8.18)	34.39 (7.80)	35.88 (8.56)	< 0.001
Age (year), *n* (%)				< 0.001
20–45	8167 (86.07)	4724 (88.78)	3443 (82.61)	
⩾ 45	1322 (13.93)	597 (11.22)	725 (17.39)	
Race, *n* (%)				0.001
Han	9206 (97.02)	5134 (96.49)	4072 (97.70)	
Minority	283 (2.98)	187 (3.51)	96 (2.30)	
Mean BMI, kg/m^2 (SD)	22.29 (2.65)	22.05 (2.58)	22.61 (2.71)	< 0.001
BMI, *n* (%)				< 0.001
Underweight (< 18.5 kg/m^2)	544 (5.73)	347 (6.52)	197 (4.73)	
Normal (18.5–23.9 kg/m^2)	6779 (71.44)	3935 (73.95)	2844 (68.23)	
Overweight (24.0–27.9 kg/m^2)	1854 (19.54)	896 (16.84)	958 (22.98)	
Obese (⩾28.0 kg/m^2)	312 (3.29)	143 (2.69)	169 (4.05)	
Occupation, *n* (%)				< 0.001
Manual labor	4647 (48.97)	2270 (42.66)	2377 (57.03)	
Intellectual labor	4842 (51.03)	3051 (57.34)	1791 (42.97)	
Education, *n* (%)				< 0.001
Primary school or lower level	1289 (13.58)	383 (7.20)	906 (21.74)	
Middle or high school	5295 (55.80)	3039 (57.11)	2256 (54.13)	
College or higher level	2905 (30.61)	1899 (35.69)	1006 (24.14)	
Currently married, *n* (%)				0.104
No	424 (4.47)	254 (4.77)	170 (4.08)	
Yes	9065 (95.53)	5067 (95.23)	3998 (95.92)	
Monthly income (yuan per person), *n* (%)				< 0.001
⩽ RMB 2000	2711 (28.57)	874 (16.43)	1837 (44.07)	
RMB 2001–4000	3731 (39.32)	2284 (42.92)	1447 (34.72)	
RMB 4001–6000	2481 (26.15)	1736 (32.63)	745 (17.87)	
> RMB 6000	566 (5.96)	427 (8.02)	139 (3.33)	
Menopause, *n* (%)				< 0.001
No	9053 (95.41)	5150 (96.79)	3903 (93.64)	
Yes	436 (4.59)	171 (3.21)	265 (6.36)	
Previous pelvic surgery, *n* (%)				< 0.001
No	6345 (66.87)	3716 (69.84)	2629 (63.08)	
Yes	3144 (33.13)	1605 (30.16)	1539 (36.92)	
Reproductive History				
Have given birth, *n* (%)				< 0.001
No	1687 (17.78)	1101 (20.69)	586 (14.06)	
Yes	7802 (82.22)	4220 (79.31)	3582 (85.94)	
Mode of delivery, *n* (%)				< 0.001
Vaginal delivery	5648 (72.39)	2948 (69.86)	2700 (75.38)	
Cesarian delivery	2154 (27.61)	1272 (30.14)	882 (24.62)	
Parity, *n* (%)				< 0.001
1	4815 (61.71)	2968 (70.33)	1847 (51.56)	
⩾ 2	2987 (38.29)	1252 (29.67)	1735 (48.44)	

(*Continued*)

Variables	Total (*n* = 9489)	Urban (*n* = 5321)	Rural (*n* = 4168)	*P* value
Current illnesses				
Hypertension, *n* (%)				< 0.001
No	9212 (97.08)	5203 (97.78)	4009 (96.19)	
Yes	277 (2.92)	118 (2.22)	159 (3.81)	
Diabetes				0.023
No	9334 (98.37)	5248 (98.63)	4086 (98.03)	
Yes	155 (1.63)	73 (1.37)	82 (1.97)	
Pelvic inflammatory disease, *n* (%)				0.264
No	7086 (74.68)	3950 (74.23)	3136 (75.24)	
Yes	2403 (25.32)	1371 (25.77)	1032 (24.76)	
CPP, *n* (%)				< 0.001
No	8002 (84.33)	4611 (86.66)	3391 (81.36)	
Yes	1487 (15.67)	710 (13.34)	777 (18.64)	
POP, *n* (%)				< 0.001
No	8260 (87.05)	4778 (89.80)	3482 (83.54)	
Yes	1229 (12.95)	543 (10.20)	686 (16.46)	

BMI, body mass index; CPP, chronic pelvic pain; POP, pelvic organ prolapse.

Table 2 Mean scores of the FSFI items and domains at follow-up (mean ± SD)

	Total (*n* = 9489)	Urban (*n* = 5321)	Rural (*n* = 4168)	*P*
FSFI	26.16 ± 6.39	26.64 ± 5.90	25.54 ± 6.92	< 0.001
Desire	3.73 ± 0.97	3.82 ± 0.92	3.61 ± 1.02	< 0.001
Arousal	4.09 ± 1.22	4.20 ± 1.12	3.94 ± 1.32	< 0.001
Lubrication	4.76 ± 1.32	4.86 ± 1.22	4.63 ± 1.43	< 0.001
Orgasm	4.33 ± 1.22	4.43 ± 1.12	4.20 ± 1.32	< 0.001
Satisfaction	4.32 ± 1.00	4.35 ± 0.95	4.28 ± 1.06	0.001
Pain	4.94 ± 1.40	4.99 ± 1.30	4.88 ± 1.52	< 0.001

FSFI, Female Sexual Function Index.

similar trends within the six dimensions (Fig. 2). Although the risk of FSD differed between the urban and rural groups, such a risk increased with age (Fig. 3).

Univariate analysis of FSD and risk factors

The modified Poisson regression analysis showed that age, baseline BMI, occupation, education level, marital status, monthly income, menopause, reproductive history, previous pelvic surgery, hypertension, diabetes, and pelvic inflammatory disease had a significant impact on the incidence of FSD at follow-up in the urban and rural areas (all $P < 0.05$, Table S3).

Multivariate analysis of FSD and its risk factors

Our analysis revealed that several factors were associated with an increased risk of FSD in the urban area. These factors included age ⩾45 years (aRR, 1.69; 95% CI, 1.57–1.81), hypertension (aRR, 1.31; 95% CI, 1.14–1.49), previous delivery (aRR, 1.26; 95% CI, 1.13–1.41), post-menopausal status (aRR, 1.20; 95% CI, 1.10–1.32), pelvic inflammatory disease (aRR, 1.13; 95% CI, 1.05–1.21), and multiparity (aRR, 1.11; 95% CI, 1.03–1.19). On the contrary, having a middle school education or higher (aRR, 0.87; 95% CI, 0.80–0.95; aRR, 0.67; 95% CI, 0.60–0.76), having a monthly family income of > 6000 RMB/person (aRR, 0.75; 95% CI, 0.63–0.90), and working in intellectual occupation (aRR, 0.89; 95% CI, 0.83–0.96) were identified as protective factors for FSD (Table 3).

In the rural area, age ⩾45 years (aRR, 1.50; 95% CI, 1.40–1.61), previous delivery (aRR, 1.39; 95% CI, 1.17–1.65), hypertension (aRR, 1.18; 95% CI, 1.06–1.30), multiparity (aRR, 1.16; 95% CI, 1.07–1.27), and post-menopausal status (aRR, 1.15; 95% CI, 1.07–1.23) were identified as risk factors for FSD. Conversely, having middle school education or higher

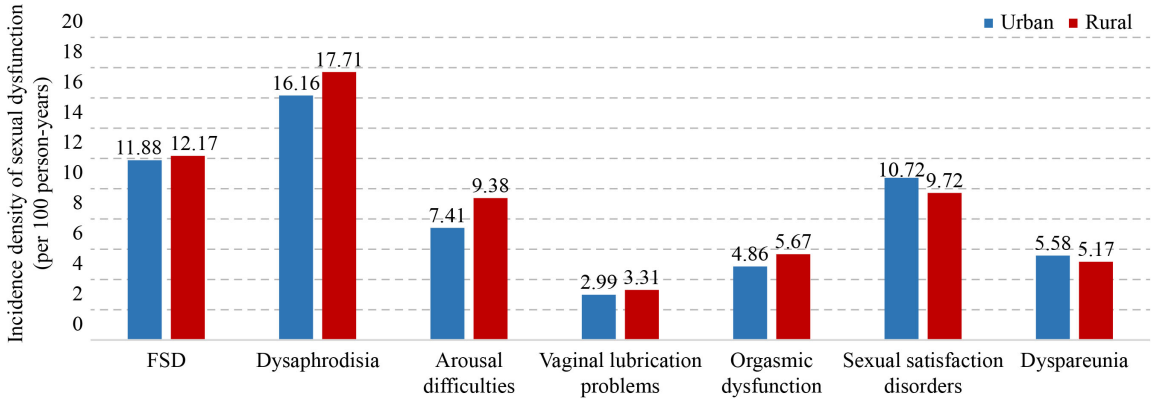

Fig. 2 Incidence density of FSD in urban and rural groups (per 100 person-years).

(aRR, 0.78; 95% CI, 0.72–0.84; aRR, 0.65; 95% CI, 0.56–0.75), working in an intellectual occupation (aRR, 0.83; 95% CI, 0.76–0.91), and having a previous cesarean delivery (aRR, 0.83; 95% CI, 0.74–0.92) were found to be protective factors for FSD.

Discussion

To the best of our knowledge, this is the largest nationwide general population-based prospective study focusing on evaluating the incidence and risk factors of FSD. We found that FSD is a hidden epidemic condition in China, with a higher incidence observed in rural women than in urban women. Thus, special attention should be paid to dysaphrodisia. The risk factors of developing FSD include age ⩾45 years, hypertension, previous delivery, post-menopausal status, multiparity, and urban women with pelvic inflammatory disease. The findings of this study will guide women from diverse regions and backgrounds in the prevention of FSD. In addition, these findings provide insights into the disease burden of FSD in countries with a similar social background and sexual cultures to China.

Studies on the incidence of FSD, as well as data available on this topic, are lacking. Haavio-Mannila studied sexual dysfunction in Finnish women aged 18–74 years and found a 5-year incidence of 45%, with an incidence of approximately 20% in women younger than 25 years and an incidence of 70% to 80% in women aged 55–74 years [21]. Results from an Australian study indicated that 36% of women aged 20–64 years reported at least one new sexual difficulty during the previous 12 months [22]. Notably, estimates of FSD incidence are affected by FSD definitions, different populations, and sampling strategies, and they should be compared and explained with caution. However, the previously reported study results and our study show that the incidence of FSD is relatively high in adult women, especially in elderly women.

Our study further highlights that rural women bear a greater burden of FSD compared with urban women. The incidence of FSD can be influenced by cultural factors, including sexual norms and attitudes toward sexuality. In China, sexual topics usually remain taboo and surrounded by feelings of embarrassment, whereas male-centered sexual culture persists. In rural areas where the custom of male superiority in marriage is prevalent, women rarely talk about and even avoid sexual topics with their partners [12]. Given the abovementioned conditions, FSD may become a hidden epidemic, but it fails to attract public health attention. Although sexuality remains a socially sensitive issue in China, urban women, who benefit from more dynamic and less unequal social interactions, tend to be more self-conscious about their appearance and sexual attractiveness than women living in underdeveloped rural areas with conservative gender norms [23,24].

Consistent with the previous study [5], our study also confirmed that dysaphrodisia was the leading concern among women with sexual dysfunction. Prolonged avoidance of sexual behavior can gradually weaken the activation of the sexual excitation system [25]. Moreover, most patients with low sexual desire are complicated by sexual satisfaction disorders and arousal difficulties [26]. In our study, the 4-year incidence of these complications ranked second, following dysaphrodisia, in urban and rural areas.

Previous studies have indicated that patients with pelvic inflammatory disease experience poor quality of sexual life, lack sexual confidence, and suffer from anxiety compared with healthy women [27,28]. When pelvic inflammatory disease occurs, patients may experience sexual desire disorders and fear of sex as a result of the symptoms, such as lumbosacral pain [29]. In our study, pelvic inflammatory disease was an independent risk factor for FSD in urban rather than rural China. A possible explanation for this phenomenon is that urban women, who have higher income and easier access to

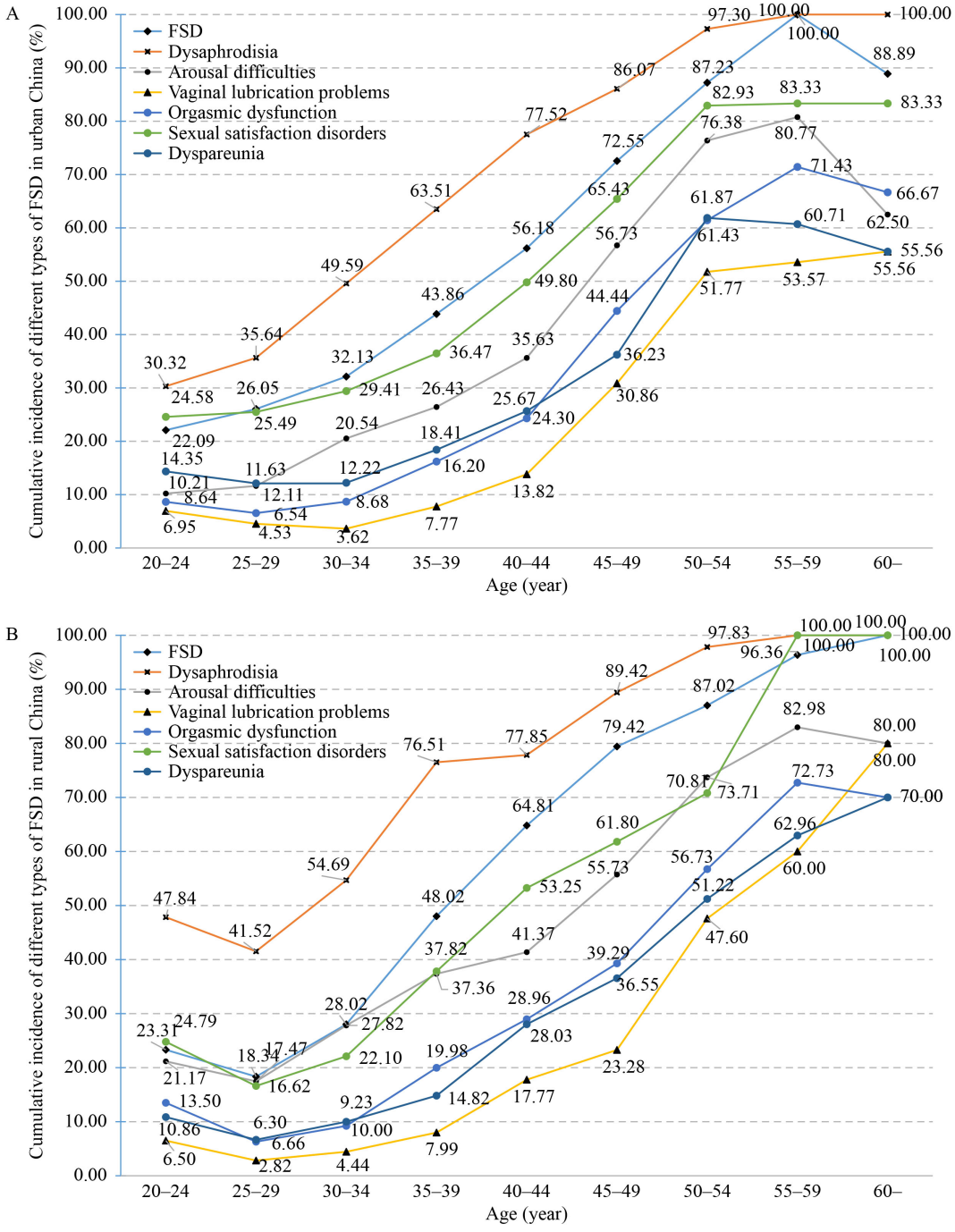

Fig. 3 Trend of the 4-year incidence of different subtypes of FSD with age.

medical care, may experience negative treatment experiences. In addition, the belief that sexual intercourse is unclean and harmful to the health of women after the diagnosis of pelvic inflammatory disease is a barrier to enjoying sexual activity [30].

Rural women who underwent cesarean delivery were found to be less likely to have sexual dysfunction. Lou *et al.* [7] demonstrated that women who had a vaginal delivery were more prone to pelvic floor muscle damage, soft birth canal injury, and postpartum hemorrhage compared with those who had a cesarean delivery. These issues have adverse effects on the structure and function of the pelvic floor, resulting in sexual dysfunction. In China, the accessibility of postpartum pelvic floor rehabilitation in rural areas is inferior to that in urban areas.

Consistent with previous studies [6,31–36], our study showed that age, post-menopausal status, and

Table 3 Multivariate analysis of FSD with potential risk factors

Risk factors	Urban (n = 5321)		Rural (n = 4168)	
	aRR (95% CI)	*P*	aRR (95% CI)	*P*
Age (year)				
20–45	Reference		Reference	
⩾ 45	1.69 (1.57–1.81)	< 0.001	1.50 (1.40–1.61)	< 0.001
BMI (kg/m^2)				
< 24.0	Reference		Reference	
⩾ 24.0	0.96 (0.90–1.04)	0.320	0.99 (0.93–1.05)	0.683
Occupation				
Manual labor	Reference		Reference	
Intellectual labor	0.89 (0.83–0.96)	0.001	0.83 (0.76–0.91)	< 0.001
Education				
Primary school or lower level	Reference		Reference	
Middle or high school	0.87 (0.80–0.95)	0.003	0.78 (0.72–0.84)	< 0.001
College or higher level	0.67 (0.60–0.76)	< 0.001	0.65 (0.56–0.75)	< 0.001
Currently married				
No	Reference		Reference	
Yes	1.01 (0.83–1.25)	0.889	0.90 (0.68–1.18)	0.438
Monthly income (yuan per person)				
< RMB 2000	Reference		Reference	
RMB 2001–4000	0.93 (0.86–1.01)	0.099	1.05 (0.97–1.14)	0.220
RMB 4001–6000	0.99 (0.90–1.09)	0.878	0.95 (0.84–1.08)	0.437
> RMB 6000	0.75 (0.63–0.90)	0.001	1.07 (0.84–1.37)	0.578
Menopause				
No	Reference		Reference	
Yes	1.20 (1.10–1.32)	< 0.001	1.15 (1.07–1.23)	< 0.001
Have given birth				
No				
Yes	1.26 (1.13–1.41)	< 0.001	1.39 (1.17–1.65)	< 0.001
Mode of delivery				
Vaginal delivery	Reference		Reference	
Cesarian delivery	0.92 (0.84–1.01)	0.089	0.83 (0.74–0.92)	0.001
Parity				
1	Reference		Reference	
⩾ 2	1.11 (1.03–1.19)	0.008	1.16 (1.07–1.27)	< 0.001
Pelvic surgery				
No	Reference		Reference	
Yes	1.01 (0.94–1.09)	0.725	1.01 (0.95–1.08)	0.724
Hypertension				
No	Reference		Reference	
Yes	1.31 (1.14–1.49)	< 0.001	1.18 (1.06–1.30)	0.002
Diabetes				
No	Reference		Reference	
Yes	0.88 (0.72–1.09)	0.248	0.94 (0.82–1.08)	

(*Continued*)

Risk factors	Urban (n = 5321)		Rural (n = 4168)	
	aRR (95% CI)	P	aRR (95% CI)	P
Pelvic inflammatory disease				
No	Reference		Reference	
Yes	1.13 (1.05–1.21)	0.001	1.07 (0.99–1.14)	0.064

aRR, adjusted relative risk; FSD, female sexual dysfunction; BMI, body mass index.

hypertension have a negative effect on the sexual function of women. These factors contribute to a natural and pathological decline in physiological function, resulting in vaginal dryness, atrophy, decreased sexual desire, vaginal lubrication disorders, painful intercourse, and other sexual problems in women. Moreover, previous studies showed that a higher level of education was a protective factor for FSD [7,37]. Furthermore, our study showed that women with intellectual occupations were less likely to report sexual problems compared with those in manual labor. This finding indicates that women who engaged in physically demanding jobs may experience physical and mental exhaustion, making it more challenging to maintain satisfying relationships. Therefore, paying considerable attention to women with lower level of education and who engaged in physically demanding work is important to identify and treat any potential sexual dysfunction as early as possible.

Our study has several limitations. First, selection bias may occur as only 63.5% of the initially motivated participants completed the follow-up survey and were included in the final analysis. However, the absolute proportion of the important risk factors of FSD between participants who completed the follow-up and those who loss to follow-up was similar (Table S1), although the difference is statistically significant in this large sample survey. Therefore, it is considered to be approximately random loss of follow-up. Second, the follow-up survey was conducted after a median of 4.13 years, which made it impossible to determine the specific onset time of FSD. Third, the FSFI and personal characteristics related to FSD were obtained through retrospective self-reporting, which might be susceptible to recall and information bias. Finally, data on the depression or anxiety status, domestic violence, and the marital relationship status of the participants were not collected in this study. Thus, feuture research must be conducted to explore the impact of these factors on FSD.

This study shows that FSD is a hidden epidemic condition in China, with a higher incidence observed in rural women than in urban women. Special attention should also be paid to dysaphrodisia. Apart from the well-established risk factors for FSD, such as older age, hypertension, previous delivery, post-menopausal status, and multiparity, urban women with pelvic inflammatory disease are also at risk of developing sexual dysfunction.

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Compliance with ethics guidelines

Conflicts of Interest Haiyu Pang, Mingyu Si, Tao Xu, Zhaoai Li, Jian Gong, Qing Liu, Yuling Wang, Juntao Wang, Zhijun Xia, and Lan Zhu declare that they have no competing interests.

The study was approved by the institutional review board of Peking Union Medical College Hospital (Number: S-689, Date: 05/15/2014), and the study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Informed consent was obtained from all participant for being included in the study.

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