Evaluation of temporal changes in the sexual function among Japanese women using the female sexual function index: An Internet survey

Keiko Okumura1, Hirokazu Takeda1 and Toshikazu Otani2

Abstract
Objectives: Female sexual dysfunction is an underestimated problem that negatively affects women’s quality of life. Although the overall prevalence of sexual dysfunction in women is high, only a few studies have focused on this problem. In Japan, an index of female sexual function has not been clearly defined. Hence, this study aimed to investigate the sexual function of normal Japanese women and the temporal changes they experienced using the Female Sexual Function Index administered online in 2012 and 2019.
Methods: The subjects were Japanese women aged 20–79 years registered in an Internet research company. We collected data of 1034 and 2031 women in 2012 and 2019, respectively, based on Japan’s population distribution according to age. Subsequently, we analyzed the collected data using a Japanese version of the Female Sexual Function Index. We investigated the temporal changes in the Female Sexual Function Index total score, the ratio of women who did not engage in sexual activities and women having “no sexual activity” with their partners, and the total Female Sexual Function Index scores according to age.
Results: The average Female Sexual Function Index total score decreased from 14.6 in 2012 to 12.5 in 2019 (p < 0.001). No significant difference was observed in the average Female Sexual Function Index score of the group with sexual activity between 2012 (22.2) and 2019 (22.4). The ratio of women not engaging in sexual activities increased from 42.2% in 2012 to 54.0% in 2019. The ratio of women having “no sexual activity” with their partners increased by 10%.
Conclusion: Comparison of data between 2012 and 2019 indicated that Japanese women have become less sexually active. The average Female Sexual Function Index total score of 22 may be useful as a reference value for diagnosing female sexual dysfunction in Japan.

Keywords
Female Sexual Function Index, female sexual function, Internet, Japanese, relationship

Date received: 15 March 2021; revised: 15 March 2021; accepted: 18 March 2021

Introduction
Globally, the prevalence of female sexual dysfunction is approximately 40%–50%.1

Multiple studies have reported that anxiety and dissatisfaction concerning women’s sexual relationship with their partners affect them mentally and physically. Therefore, sexual wellbeing is important for women’s mental and physical health.2–5

In recent years, pharmacotherapy, physical therapy, and surgical treatment have been used to treat female sexual dysfunction.6–8 Due to an increase in the number of treatment options, our society has entered a new phase of female sexual dysfunction, and the necessity of evaluating...
the female sexual function has increased. In 1998, the
American Urological Association published the definition
of female sexual dysfunction based on the Diagnostic and
Statistical Manual of Mental Disorder, Fourth Edition and
the International Statistical Classification of Diseases and
Related Health Problems, Tenth Edition and classified
female sexual dysfunction into four categories: desire, arousal, orgasm, and sexual pain.9
In 2000, Rosen et al.10 proposed the Female Sexual
Function Index (FSFI) as a multidimensional and objec-
tive evaluation tool for female sexual function. The FSFI
has been used internationally to diagnose various medical
conditions and evaluate treatment results due to its excel-
lent psychometric characteristics.
In Japan, only a few studies and surveys focus on
female sexual function. The temporal changes in female
sexual function at an interval of more than 5 years have
occasionally been investigated in Japan and some foreign
countries. Araki et al.11 used a mailing method, comparing
data between 2000 and 2012, and indicated that Japanese
have become less sexually active.
We hypothesized that the sexual function of normal
Japanese women might worsen with time. This study
investigated the temporal changes in the sexual function of
normal Japanese women by conducting an online survey
using the FSFI in 2012 and 2019.
The survey was administered for 2 days in both 2012
and 2019 and was scheduled to be conducted every
10 years, specifically in 2012 and 2022. However, because
the “World Meeting on Sexual medicine” was to be held in
Japan in 2020, the survey was conducted in 2019, instead
of 2022, to present the results in the conference.
Because the FSFI enables us to make objective evalua-
tions, this study used the FSFI to understand the current
situation of the sexual function of normal Japanese women.
Presently, there are no clear standards on the evaluation of
female sexual dysfunction in clinical practice in Japan.
Therefore, proposing indices for the FSFI is considered
useful for the treatment of female sexual dysfunction in
Japan in the future.

Methods
The inclusion criteria for this study were women aged
between 20 and 79 years, who were registered in an
Internet research firm, and had agreed to participate in the
survey related to the female sexual function and completed
all sections of the questionnaire.
The number of women who consented to participate in
the survey and began answering the survey questions was
1160 in 2012 and 1183 in 2019. Out of these, 126 in 2012
and 152 in 2019 did not complete the questions and were
consequently excluded from the study. Therefore, the total
number of women who were analyzed in this study was
1034 in 2012 and 1031 in 2019.

FSFI
The FSFI proposed by Rosen et al. (2000) consists of 19
questions concerning the female sexual function, asking
women about their sexual function in the last 4 weeks and
constituting six domains. These are desire (Questions 1
and 2), arousal (Questions 3, 4, 5, and 6), lubrication
(Questions 7, 8, 9, and 10), orgasm (Questions 11, 12, and
13), satisfaction (Questions 14, 15, and 16), and pain
(Questions 17, 18, and 19). The total score is calculated
using the following formula

\[
\text{Total score} = (\text{desire} \times 0.6) + (\text{arousal} \times 0.3) \\
+ (\text{lubrication} \times 0.3) + (\text{orgasm} \times 0.4) \\
+ (\text{satisfaction} \times 0.4) + (\text{pain} \times 0.4)
\]

A higher score indicates better sexual function, with the
perfect score being 36.10 The FSFI has been used world-
wide as a scale that measures female sexual function.12
This study was conducted using a Japanese version of
FSFI, hereby referred to as FSFI-J, developed by Takahashi
et al. in 2011.13 We have included the survey files used in the
study as Supplementary File 1 and Supplementary File 2.
The FSFI-J asks women about their sexual activity over the
past 3 months and defines sexual activity not only as vaginal
intercourse but also extending it to include caressing, fore-
play, and masturbation. At the beginning of the question-
naire, the following instruction was added: “The following
questions are in a form that can be answered without a part-
tner or engaging in sexual activities.” For Questions 15 and
16, which ask women about sexual satisfaction, another
instruction was added: “Includes cases without sexual activ-
ity.” For Questions 14 and 15, an option of “no partner” was
added. Therefore, unlike the FSFI developed by Rosen
et al., the FSFI-J cannot be used for cross-national studies
regarding female sexual function. In this survey, an original
question, “How about your relationship with your partner in
your daily life?” was equally asked.

Statistical analysis
Pearson’s chi-square tests for independence (categorical
variables) or t-tests for independent samples (continuous
variable) were used to examine differences in demo-
graphic characteristics between the 2012 group and the
2019 group. The significance level was set at \( p < 0.05 \),
and data were analyzed using EZR (Easy R) statistical
software.

Ethical considerations
We explained to the subjects that this survey was to inves-
tigate sexual function. All the subjects voluntarily partici-
pated in this survey, and the data obtained were analyzed
such that the identity of the participants was not revealed, and informed consent was obtained from everyone. The 2012 study was approved by the Narita Memorial Hospital Ethics Committee (approval no. 25-01-02), and the 2019 study was approved by the Ethics Committee of Tosei General Hospital (ethics no. 771-1). We followed all items, as applicable, of the consensus checklist for retrospective cohort studies contained in version 4 of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.14

Results

Collected data based on Japan’s population distribution

Based on Japan’s population distribution, we collected data from 141 women (13.6%) in their 20s, 188 (18.2%) in their 30s, 176 (17.0%) in their 40s, 175 (16.9%) in their 50s, 201 in their 60s (19.4%), and 153 in their 70s (14.8%), for a total of 1034 women in 2012. In 2019, we collected data from a total of 1031 women: 132 (12.8%) in their 20s, 167 (16.2%) in their 30s, 198 (19.2%) in their 40s, 168 (16.3%) in their 50s, 201 (19.5%) in their 60s, and 165 (16.0%) in their 70s. Table 1 shows the data collected based on Japan’s population distribution by age.

This study excluded women who had chosen “no partner” or “no sexual activity” in Question 14. Consequently, the survey classified 567 and 434 survey participants in 2012 and 2019, respectively, as women who engaged in sexual activity, and these women were subsequently categorized.

Table 1. Collected data based on Japan’s population distribution.

| Age | 2012, n (%) | 2019, n (%) |
|-----|-------------|-------------|
| 20s | 141 (13.6)  | 132 (12.8)  |
| 30s | 188 (18.2)  | 167 (16.2)  |
| 40s | 176 (17.0)  | 198 (19.2)  |
| 50s | 175 (16.9)  | 168 (16.3)  |
| 60s | 201 (19.4)  | 201 (19.5)  |
| 70s | 153 (14.8)  | 165 (16.0)  |

This table presents the number of people (%).

Table 2. Background of participants.

| Age (years) (mean ± SD) | 2012 (n = 1034) | 2019 (n = 1031) | p-value |
|-------------------------|----------------|----------------|---------|
| Unmarried, n (%)        | 310 (30.0%)    | 327 (31.7%)    | 0.393   |
| Have children, n (%)    | 730 (70.6%)    | 713 (69.3%)    | 0.475   |
| Housewife, n (%)        | 468 (45.3%)    | 386 (37.4%)    | <0.001  |
| Part-time job, n (%)    | 192 (18.6%)    | 239 (23.2%)    | 0.010   |
| Housewife and part-time job, n (%) | 660 (63.8%) | 625 (60.6%) | 0.133   |

SD: standard deviation.

The number of respondents who were housewives significantly decreased from 468 (45.3%) in 2012 to 386 (37.4%) in 2019 (p < 0.001), and the number of women engaged in part-time jobs significantly increased from 192 (18.6%) in 2012 to 239 in 2019 (23.2%) (p = 0.010).

There were many married women and the ratio of housewives to the total number of subjects was high.15–17

FSFI

Total FSFI score. In 2012, the average FSFI-J score of all the subjects (n = 1034) was 14.6, and that of women in their 20s (n = 141) was 21.0, in their 30s (n = 188) was 17.4, in their 40s (n = 176) was 16.4, in their 50s (n = 175) was 13.1, in their 60s (n = 201) was 10.9, and in their 70s (n = 153) was 9.8. In 2019, the average FSFI score of all the subjects (n = 1031) was 12.6, and that of women in their 20s (n = 132) was 19.4, in their 30s (n = 167) was 16.3, in their 40s (n = 198) was 13.4, in their 50s (n = 168) was 12.3, in their 60s (n = 201) was 8.6, and in their 70s (n = 165) was 7.5. Thus, the average FSFI scores of the subjects in their 40s, 60s, and 70s were significantly lower in 2019 than in 2012 (Figure 1).

The ratio of women without sexual activity to the total number of subjects. Twelve questions, 3–14, contained a question item of “No sexual activity.” In 2012, the percentages of women who selected “No sexual activity” to the above-mentioned item compared to the total number of subjects were 40.3% in Question 3, 40.0% in Question 4, 40.8% in Question 5, 42.9% in Question 6, 43.3% in Question 7, 43.5% in Question 8, 43.9% in Question 9, 43.8% in Question 10, 40.6% in Question 11, 40.9% in Question 12, 41.2% in Question 13, and 45.4% in Question 14 (included no partner). The average ratio was 42.2%.
In 2019, the ratios of women who answered “No sexual activity” to the above-mentioned item compared to the total number of subjects were 52.8% in Question 3, 51.7% in Question 4, 52.5% in Question 5, 54.5% in Question 6, 54.0% in Question 7, 54.4% in Question 8, 55.3% in Question 9, 55.2% in Question 10, 52.7% in Question 11, 53.2% in Question 12, 53.5% in Question 13, and 57.9% in Question 14. The average ratio was 54.0%; thus, the ratio of women without sexual activity increased by more than 10% 7 years from the first survey.

According to age, the percentages of those who answered “No sexual activity” to the above-mentioned item in relation to the total number of subjects in Question 3 were 13.5% in their 20s, 27.7% in their 30s, 30.1% in their 40s, 47.4% in their 50s, 54.2% in their 60s, and 66.0% in their 70s in 2012. In 2019, the ratio of women who answered “No sexual activity” to the above-mentioned item compared to the total number of subjects in Question 3 was 24.2% in their 20s, 34.1% in their 30s, 48.0% in their 40s, 52.4% in their 50s, 71.6% in their 60s, and 77.6% in their 70s. Thus, the ratio signifies an increase of approximately 10% in 7 years regardless of age (Table 3).

Table 3. The number and ratio of people who answered “no sexual activity” over the past 3 months in Question 3.

| Age | 2012 % (the number of “no sexual activity”/total number) | 2019 % (the number of “no sexual activity”/total number) |
|-----|---------------------------------------------------------|----------------------------------------------------------|
|     | 2012 | 2019 | 2012 | 2019 |
| Total | 40.3% (417/1034) | 52.8% (544/1031) |
| 20s   | 13.5% (19/141) | 24.2% (32/132) |
| 30s   | 27.7% (52/188) | 34.1% (57/167) |
| 40s   | 30.1% (53/176) | 48.0% (95/198) |
| 50s   | 47.4% (83/175) | 52.4% (88/168) |
| 60s   | 54.2% (109/201) | 71.6% (144/201) |
| 70s   | 66.0% (101/153) | 77.6% (128/165) |

The ratio signifies an increase of approximately 10% in 7 years regardless of age.

In 2012, regarding Question 14, which contained two question options, “no partner” and “no sexual activity,” the ratios of women who selected “no partner” and “no sexual activity” compared to the total number of subjects were 16.3% and 28.8%, respectively. In 2019, the ratios of
women who selected “no partner” and “no sexual activity” in relation to the total number of subjects were 17.2% and 40.7%, respectively. Thus, the ratio of women who had partners but no sexual activity significantly increased by approximately 10% in 7 years ($p < 0.001$) (Figure 2).

**Sexual function domains.** Regarding the domains of desire, arousal, lubrication, orgasm, and pain, the average FSFI-J score of all the subjects was statistically significantly higher in 2012 than in 2019 ($p < 0.05$). However, for desire, the average FSFI-J score of women with sexual activity was statistically significantly increased by approximately 10% in 7 years ($p < 0.001$) (Figure 2).

**Relationship between women and their partners and their total FSFI-J scores.** The relationship between the question “How about your relationship with your partner in your daily life?” and the FSFI-J scores were investigated. Results showed that the average FSFI score of women with partners ($n = 855$) was $14.04 \pm 10.03$. Regarding each question item, the average FSFI-J score of women who answered “very good” (overall ($n = 313$), women with sexual activity ($n = 188$), and women without sexual activity ($n = 125$)) was 16.81. The score of women who answered “good” (overall ($n = 242$), women with sexual activity ($n = 141$), and women without sexual activity ($n = 101$)) was 14.89, and those who answered “normal” (overall ($n = 248$), women with sexual activity ($n = 97$), and women without sexual activity ($n = 151$)) obtained a score of 11.15. Finally, the score of women who answered “bad” (overall ($n = 30$), women with sexual activity ($n = 7$), and women without sexual activity ($n = 23$)) was 7.63, and those who answered “very bad” (overall ($n = 22$), women with sexual activity ($n = 1$), and women without sexual activity ($n = 21$)) obtained a score of 6.63 (Figure 3).

**Relationship between the total FSFI-J score and age.** As shown in Figure 1, the average FSFI-J total score decreased with age in both 2012 and 2019.

In 2012, the average FSFI-J score of all the subjects with sexual activity was 22.2; the average FSFI-J scores were 24.4 in their 20s, 23.0 in their 30s, 22.4 in their 40s, 20.8 in their 50s, 19.7 in their 60s, and 22.3 in their 70s. Thus, the average FSFI-J score of women in their 70s was the highest among the subjects. In 2019, the
Pain 11.5
Satisfaction 10.1
Orgasm 8.7
Lubrication 13.7
Arousal 10.0
Desire 4.9

Arousal 6.0
Desire 4.1
Lubrication 8.0
Pain 6.9

Domain 2012 (Group with sexual activity with no sexual activity despite having partners. Araki et al. 2012 to 2019 may be due to the 10% increase in women were considered to be reflected in the study results. Therefore, the changes in social conditions wives in the recent census, this ratio was lower in 2019 (Table 4). Similar to the decrease in the ratio of housewives in the recent census, this ratio was lower in 2019 than in 2012. Therefore, the changes in social conditions were considered to be reflected in the study results.

The decrease in the average FSFI-J total score from 2012 to 2019 may be due to the 10% increase in women with no sexual activity despite having partners. Araki et al.

development of FSFI-J, they examined factorial, judgmental, and reference-related validities and confirmed that the FSFI-J was appropriately validated. For this reason, we used FSFI-J in this study.

The FSFI-J total scores, including the results of all the sexual function domains, were higher in 2012 than in 2019 (Table 4). Similar to the decrease in the ratio of housewives in the recent census, this ratio was lower in 2019 than in 2012. Therefore, the changes in social conditions were considered to be reflected in the study results.

The decrease in the average FSFI-J total score from 2012 to 2019 may be due to the 10% increase in women with no sexual activity despite having partners. Araki et al.

compared data between 2000 and 2012 and indicated that Japanese have become less sexually active. Moreover, this tendency was presumed to be further accelerated in 2019. According to the data obtained by Araki et al. (2012), the sexual function of people in their 70s was excellent, and people in their 70s are supposedly in the “golden age.” People in their 70s progressed to the 80s age group in 2019, who were not included in this study. Moreover, people in their 60s aged to the 70s group in 2019. Therefore, people in their 70s who engaged in sexual activities in 2012 were no longer active in 2019.

Although the average FSFI-J total score of all the subjects decreased from 2012 to 2019, no significant difference was observed in the average FSFI-J score of women comparing the domain of sexual satisfaction between 2012 and 2019. As this domain included no sexual activity, Japanese women were considered to have maintained a good relationship with their partners even without sexual activity.

In 2019, a significant difference was observed in the domain of “desire” among sexually active women. However, significant changes were observed in the other five domains between the years 2012 and 2019.

Since women’s average FSFI-J score tended to increase as their relationship with their partner improved, it could be said that women with good partners had a good sexual function. However, among the 555 women who considered their relationship with their partners being “good” or “very good,” 226 (40.7%) did not have any sexual activity with their partners. Therefore, factors other than having sexual activity affected a good relationship with their partner.

In the group with sexual activity, the average FSFI-J score was between 22 and 23 in both 2012 and 2019, respectively. In 2000, the total scores of FSFI developed by Rosen et al. were 30.5 ± 5.29 and 19.2 ± 6.63 in the control group and sexual dysfunction group, respectively. The cutoff value proposed by Wiegel et al. was 26.55. In the results of the 2005 Global Sex Survey that examined sexual attitudes and behavior of 317,000 people from 41 countries, the frequency of sexual intercourse for Japanese people was the lowest globally. This is probably due to the principle of five desires in Buddhism, the predominant religion in Japan, and the

**Table 4. Sexual function domains in the FSFI.**

| Domain    | 2012 (n=1034) mean ± SD | 2019 (n=1031) mean ± SD | p-value |
|-----------|-------------------------|-------------------------|---------|
| Desire    | 4.1 ± 1.8               | 3.9 ± 2.0               | 0.041   |
| Arousal   | 6.0 ± 5.8               | 4.9 ± 5.8               | <0.001  |
| Lubrication | 8.0 ± 7.9            | 6.4 ± 7.7               | <0.001  |
| Orgasm    | 5.3 ± 5.3               | 4.2 ± 5.1               | <0.001  |
| Satisfaction | 7.7 ± 4.1           | 7.4 ± 4.0               | 0.179   |
| Pain      | 6.9 ± 6.5               | 5.5 ± 6.4               | <0.001  |

**Group with sexual activity**

| Domain    | 2012 (n=567) mean ± SD | 2019 (n=434) mean ± SD | p-value |
|-----------|-------------------------|-------------------------|---------|
| Desire    | 4.9 ± 1.6               | 5.2 ± 1.8               | 0.019   |
| Arousal   | 10.0 ± 4.4              | 10.2 ± 4.4              | 0.563   |
| Lubrication | 13.7 ± 5.5           | 13.8 ± 5.5              | 0.899   |
| Orgasm    | 8.7 ± 4.0               | 8.3 ± 4.0               | 0.661   |
| Satisfaction | 10.1 ± 3.3         | 10.5 ± 3.1              | 0.059   |
| Pain      | 11.5 ± 4.3              | 11.2 ± 4.6              | 0.271   |

**Figure 3. Relationship between women and their partners and their total FSFI-J scores.**

The FSFI total score of a person who had a good relationship with their partner was high, whereas that of a person who had a bad relationship with their partner was low.
shame culture in Japan. In Buddhism, there is an idea of five desires (desires for food, fortune, love affair, fame, and sleep) and a desire for love affair, that is, libido, all of which are deemed unfavorable.24

Similarly, Japan has a prominent shame culture, wherein people dislike disgracing themselves.25 Because Japanese women do not want to embarrass themselves in public, they have considered a modest attitude a virtue for a long time. Therefore, very few women sexually approach men in Japan.

There is a certain relationship between sexual activity and childbirth; therefore, a definite relationship is considered to exist between sexual inactivity and declining birthrate. Presently, Japan has become an aging society with a low birth rate; the ratio of older people to the total population has increased, and the population of young people has decreased.

In Japan, although the number of people aged ≥65 years will not change significantly, the number of people aged 20–64 years will decrease drastically from 2020 to 2065. Simply, the ratio of older people to the total population will increase by approximately 10% in this period. Consequently, the number of people aged ≥65 years will account for 38% of the total population in 2065.26

Because sexlessness is progressing in Japan, investigating the reasons for sexlessness and its countermeasures is supposedly necessary to maintain a stable society in the future. Because sexual activity is lower in Japan than in other countries, the FSFI developed by Rosen et al.10 and the cutoff value proposed by Wiegel et al.22 were difficult to apply to Japanese people.

Among the studies on Asians, Ma et al.27 reported that the cutoff value of urban Chinese women was 23.45 and that urban Chinese women were more open and had more liberal attitudes toward sexual issues than women in other countries. Thus, the rates of sexually transmitted diseases were lower in urban Chinese women than in women in other countries.

Using the FSFI data of healthy people in Japan obtained through existing literature, Takahashi’s total score was 22.03 ± 8.22,13 Imamura and Kayashima’s28 total score was 21.77 ± 5.83, and Iwata et al.’s total score was 23.1 ± 8.2, wherein the subjects were 21.0 ± 2.6 years old.29 Therefore, it was thought that the average FSFI-J total score of 22 in 2012 and 2019 obtained in this study could be used as the reference value of FSFI-J for Japanese women with sexual activity (Table 5).

**Limitations**

As this survey was conducted through the Internet, there were limitations, including subject bias, as many subjects were housewives, and this factor may have influenced the reliability of the results obtained. Besides, because elderly people are not familiar with operating a computer, their participation in the survey may have been curtailed, further contributing to the bias. Okumura conducted an Internet survey and reported that 62.5% of the participants did not resist responding to the questions in the FSFI.30 Therefore, the advantage of an Internet survey was that the participants found it relatively easy to respond to the questions because of anonymity.

**Conclusion**

In 2012 and 2019, we surveyed more than 2000 women through the Internet and investigated the temporal changes
in the sexual function of Japanese women. Results showed that Japanese women engaged in less sex compared to previous years. For Japanese women with sexual activity, a total FSFI-J score of 22 could be used as a reference value. This reference value may be useful for diagnosing sexual dysfunction in Japanese women.

Author contributions
K.O. designed the study, contributed to data collection and interpretation, and wrote the initial draft of the manuscript. H.T. assisted in the preparation of the manuscript. Under the supervision of T.O., this manuscript is completed. All authors approved the final version of the manuscript, and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Declaration of conflicting interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Unblinded ethical statement
The 2012 study was approved by the Narita Memorial Hospital Ethics Committee (approval no. 25-01-02), and the 2019 study was approved by the Ethics Committee of Tosei General Hospital (ethics no. 771-1).

ORCID iDs
Keiko Okumura https://orcid.org/0000-0002-7576-9557
Toshikazu Otani https://orcid.org/0000-0001-7865-0247

Supplemental material
Supplemental material for this article is available online.

References
1. Marita P. McCabe, Ira D. Sharlip, Elham Atalla, et al. Definitions of sexual dysfunctions in women and men: consensus statement from the Fourth International Consultation on sexual medicine. J Sex Med 2016; 13: 135–143.
2. Laumann EO, Paik A and Rosen RC. Sexual dysfunction in the United States: prevalence and predictors. JAMA 1999; 281: 537–544.
3. Lindau ST, Schumm LP, Laumann EO, et al. A study of sexuality and health among older adults in the United States. N Engl J Med 2007; 357: 762–774.
4. Lapate RC, van Reekum CM, Schaefer SM, et al. Prolonged marital stress is associated with short-lived responses to positive stimuli. Psychophysiology 2014; 51(6): 499–509.
5. Nappi ER, Martella S, Rossi M, et al. Female sexual dysfunction (FSD): prevalence and impact on quality of life (QoL). Maturitas 2016; 94: 87–91.
6. Farmer M, Yoon H and Goldstein I. Future targets for female sexual dysfunction. J Sex Med 2016; 13(8): 1147–1165.
7. Goldstein I, Meston CM, Davis SR, et al. Women’s sexual function and dysfunction. London; New York: Taylor & Francis, 2006.
8. Berghmans B. Physiotherapy for pelvic pain and female sexual dysfunction: an untapped resource. Int Urogynecol J 2018; 29: 631–638.
9. Basson R, Berman J, Burnett A, et al. Report of the international consensus development conference on female sexual dysfunction: definitions and classifications. J Urol 2000; 163: 888–893.
10. Rosen R, Brown C, Heiman J, et al. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. J Sex Marital Ther 2000; 26(2): 191–208.
11. Araki C, Ishida M, Ohkawa R, et al. Sekkusuresujidai no chukounen seihakusyo (Study on the sexuality of middle-aged people in the sexless era). (Translation by Okumura) Harunosa, Japan, 2016, https://www.healthline.com/health/healthy-sex/sexless-marriage#TOC_TITTLE_HDR_1 (in Japanese).
12. Neijenhuijs KI, Hooghiemstra N, Holtmaat K, et al. The Female Sexual Function Index (FSFI)—a systematic review of measurement properties. J Sex Med 2019; 16(5): 640–660.
13. Takahashi M, Inokuchi T, Watanabe C, et al. The Female Sexual Function Index (FSFI): development of a Japanese version. J Sex Med 2011; 8(8): 2246–2254.
14. von Elm E, Altman DG, Egger M, et al. The strengthening the reporting of observational studies in epidemiology (STROBE) Statement: guidelines for reporting observational studies. Int J Surg 2014; 12: 1495–1499.
15. Statistics Bureau of Japan. Population census, 2015, https://www.stat.go.jp/data/kokusei/2015/kekka/kihon1/pdf/gaiyou1.pdf (2015, accessed 30 November 2020).
16. Ministry of Health Labor Welfare. Annual Health, Labor and Welfare Report, 2010, https://www.mhlw.go.jp/content/000351685.pdf (2010, accessed 30 November 2020).
17. Cabinet Office. The white paper on gender equality, 2016, http://www.gender.go.jp/about_danjo/whitepaper/h28/zentai/pdf/h28_genyou1.pdf (2016, accessed 10 February 2020).
18. Giraldi A, Rellini A, Pfäus JG, et al. Fugl-Meyer. Questionnaires for assessment of female sexual dysfunction: a review and proposal for a standardized screener. J Sex Med 2011; 8: 2681–2706.
19. Hatzichristou D, Kirana PS, Banner L, et al. Diagnosing sexual dysfunction in men and women: sexual history taking and the role of symptom scales and questionnaires. J Sex Med 2016; 13(8): 1166–1182.
20. Rosen RC, Riley A, Wagner G, et al. The international index of erectile function (IIEF): a multidimensional scale for assessment of erectile dysfunction. Urology 1997; 49: 822–830.
21. Quirk FH, Heiman JR, Rosen RC, et al. Development of a sexual function questionnaire for clinical trials of female sexual dysfunction. J Womens Health Gend Based Med 2002; 11(3): 277–289.
22. Wiegel M, Meston C and Rosen R. The female sexual function index (FSFI): cross-validation and development of clinical cutoff scores. J Sex Marital Ther 2005; 31(1): 1–20.
23. The 2005 Global Sex Survey by Durex. Available at: http://www.durex.com/en-JP/SexualWellbeingSurvey/Documents/gss2005result.pdf (2005, accessed November 30, 2020).

24. Jodo Shinshu Honganji-ha Research Institute. Jodo Shinshu Scripture (Commentary Edition). 2nd ed. Kyoto, Japan: Honganji Shuppansha, 1988.

25. Benedict R. The Chrysanthemum and the Sword. Vermont: Tuttle Publishing, 1946.

26. Ministry of Finance Japan. Thinking about Japan’s finances (Reference material):https://www.mof.go.jp/zaisei/reference/index.html (accessed 30 November 2020).

27. Ma J, Pan L, Lei Y, et al. Prevalence of female sexual dysfunction in urban Chinese women based on cutoff scores of the Chinese version of the female sexual function index: a preliminary study. J Sex Med 2014; 11(4): 909–919.

28. Imamura K and Kayashima K. Female sexual function and influence factors in women 4 to 5 months postpartum. Jpn J Sex 2013; 31: 15–26 (in Japanese).

29. Iwata A, Hayashi A, Saotome T, et al. Survey of sexual function using the Female Sexual Functioning Index in young adult women. Jpn J Sex 2018; 36: 37–44 (in Japanese).

30. Okumura K, Takeda H, Isobe Y, et al. Internet survey on the sexual function of Japanese women using the Female Sexual Function Index (Japanese version) in 2012. Jpn J Sex 2020; 38: 43–54 (in Japanese).