

## Validation of the Vietnamese Translation Version of the Female Sexual Function Index in Infertile Patients

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### ABSTRACT

**Introduction:** The Female Sexual Function Index (FSFI) is regarded as a self-administered screening questionnaire for assessing the presence of any type of sexual dysfunction.

**Aim:** The aim of this study was to investigate the psychometric properties of the Vietnamese translation version of the Female Sexual Function Index (VN-FSFI) in a sample of infertile Vietnamese women.

**Methods:** An existing Vietnamese translated-FSFI version was used as a first-step approach to back-translate into English. Based on the comparison of the original English version and the back-translation script, a modified version of the FSFI was revised. This version was evaluated for “content validity” by a panel of 3 experts and for “face validity” by a pilot study that was based on its results to refine to reach the last Vietnamese FSFI version (VN-FSFI version). A cross-sectional survey to investigate psychometric reliability and validity of the last VN-FSFI version was conducted with 271 infertile Vietnamese women from January 2017 through February 2018, at a hospital located in a central region of Vietnam. Construct validity was evaluated by principal component analysis using varimax rotation and factor analysis. Reliability studies on internal consistency (Cronbach’s alpha coefficient, domain inter-correlations, and domain-total correlations) and on test-retest (Intraclass correlation coefficient).

**Main Outcome Measure:** Construct validity and the reliability of the VN-FSFI version.

**Results:** Based on principal component analysis, a 5-factor model was established, consisting of arousal/orgasm, satisfaction, pain, lubrication, and desire that explained 72.32% of the total variance. The factorial structure supported to 6 retrieved domains that corresponded to the original version. The Cronbach’s alpha coefficients were 0.92 for the total scale and 0.72–0.89 for the domains. Domain inter-correlations ranged from 0.36–0.73 and domain-total correlation coefficients ranged from 0.67–0.84. Test-retest correlation coefficients over 2–4 weeks were 0.97 ( $P < .001$ ) for the total scale and 0.84–0.96 for the domains.

**Conclusion:** With good psychometric properties, which are almost similar to the original English version, this Vietnamese translation version of the Female Sexual Function Index (VN-FSFI version) was proved to be a valid and reliable instrument to measure multidimensional aspects of sexual function in infertile Vietnamese women.

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**Key Words:** Infertility; Vietnamese Version; Female Sexual Function Index

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## INTRODUCTION

Sexuality is considered an integral part of life. It not only plays a significant role in reproduction but also expresses deep feelings, excites the imagination, adds excitement, offers pleasure, and enhances the marital relationship.<sup>1</sup> Female sexuality has been recognized as a basic human right and an important component of women's health, as declared by the World Health Organization.<sup>2</sup>

Female sexual dysfunction has been a widespread problem in many countries, ranging from 25–63%.<sup>3</sup> This proportion was approximately 30% in some Asian countries.<sup>4</sup> Moreover, infertile women have a higher proportion of sexual dysfunction than fertile women.<sup>5</sup> Infertility rates ranged from 15–20%. Infertile women are more likely to develop negative emotions, such as feeling being stigmatized, lacking of femininity, decreased self-esteem, depression and anxiety, and their sexual intimacy may be seriously compromised because of altered sexual behavior for the primary purpose of getting pregnant or interference in sexual privacy with the evaluation and treatment of infertility.<sup>1</sup>

In infertile women, sexual dysfunction not only reduces the quality of life and destabilizes the marital relationship but also has a negative impact on fertility function, lower success rate, and increases probability of quitting infertility treatment. According to Palha and Lourenço,<sup>6</sup> sexual health evaluation is an indispensable part of the infertility treatment protocols.

In practice, standardized validated multidimensional self-reported questionnaires are designed to objectively capture women's subjective perceptions of sexual responses. These can be a valuable solution, with many advantages, such as a relatively sensitive approach, ease of use in a naturalistic setting, somewhat limited overlap, avoidance of simplification, and help reflecting a true picture of women's sexuality. Currently, this is the most commonly used method for evaluating female sexual dysfunction in research and clinical practice.<sup>7</sup>

The Female Sexual Function Index (FSFI), which is compared to many developed instruments, is a widely used screening tool for the presence of any type of female sexual dysfunction.<sup>8</sup> The FSFI is a brief, multidimensional, self-reported scale, which is developed by Rosen et al. It is known for its excellent psychometric properties and high cultural adaptability and is capable of evaluating the stages of female sexual response cycle according to the updated standard from the "International Consensus Development Conference on Female Sexual Dysfunctions: Definitions and Classifications."<sup>9–12</sup> The FSFI has been used to evaluate sexual function in various stages of the lifetime, as well as in a variety of medical conditions, including infertility.<sup>13</sup> Until now, FSFI has been available in >30 countries, with some translated versions being evaluated only for language validity, whereas others are considered for psychometric reliability and/or validity.<sup>8</sup>

The validated FSFI versions of psychological characteristics are all suitable for use in the new cultural context.<sup>14–27</sup> However, there is no consistency in the factor solution through construct

validity analysis.<sup>14,15,17–19,23,25,27</sup> Only a few FSFI versions show that there are 6 domains as in the original version,<sup>15,18,19,25</sup> 2 Iranian FSFI versions on 2 different study populations show different results,<sup>15,17</sup> and the Malaysian FSFI version in the infertile women as 3 domains.<sup>23</sup>

In Vietnam, currently, variations of current clinical barriers still exist for studying female sexual function and dysfunction. Most Vietnamese women have cultural difficulty with arousal due to patriarchal preferences in society, such as taboo issues about the concept and sex life, in the context specific of Eastern culture or gender sensitivity. There is an existing Vietnamese FSFI version, which was translated and used by Ngo TY in a Vietnamese PhD thesis. However, this version has not been validated yet. Therefore, this study aimed to investigate the psychometric properties of the Vietnamese translation version of the FSFI (VN-FSFI version) in a sample of infertile Vietnamese women.

## MATERIALS AND METHODS

### Phase 1: Translation and Face and Content Validity Assessment

The original English version of the FSFI was translated into Vietnamese by Ngo TY. We used this version as a first-step approach to back-translate into English by a person who is bilingual in both Vietnamese and English. After that, a member of the research team who was an expert in Reproductive Medicine compared the back-translated version with the original to adjust the Vietnamese translation, and then added the instructions of the concept of "sexual desire" to better fit with the updated knowledge. This FSFI version was then evaluated for "content validity" by a panel of 3 experts of Hue University of Medicine and Pharmacy, with bilingual translation ability, 1 psychiatrist, and 1 expert from the Center for Reproductive Endocrinology & Infertility), and 1 gynecologist. A follow-up pilot study using this FSFI version was conducted with 30 women who were examined at the Center for Reproductive Endocrinology & Infertility, Hue University Hospital, to evaluate "face validity." Based on this study, we developed the final revisions of the Vietnamese FSFI version (VN-FSFI version).

### Phase 2: Empirical Research

#### Procedures

A cross-sectional survey to investigate psychometric reliability and validity of the last Vietnamese-FSFI version (VN-FSFI version) was conducted with 271 Vietnamese infertile women who were examined from January 2017 through February 2018, at the Center for Reproductive Endocrinology and Infertility of Hue University Hospital. The size of this sample is considered large enough to investigate multidimensional scales.<sup>28</sup>

Exclusion criteria included ethnic minorities, illiteracy, psychiatric disorders, known drug or alcohol dependence, treatment

with medications such as hormones, and those reporting no sexual activity over the previous 4 weeks.

A letter explaining the study's purpose was given to infertile couples who came to our clinic, together with a consent form offered to female partners. The female partner was interviewed to gather information, which included basic sociodemographic variables and history of infertility. Finally, the women were asked to answer the VN-FSFI version in private (ie, without the attendance of their male partners). Individual respondents were assigned an identification code, but no personal information was recorded.

Among 271 respondents who completed the VN-FSFI version the first time, 107 completed this version the second time after 2–4 weeks when they returned to accomplish investigations for infertility.

## Instruments

- (1) The general questionnaire: This was used to collect basic sociodemographic variables and history of infertility.
- (2) VN-FSFI version: "VN-FSFI version" was the last translation in Vietnamese of the FSFI after undergoing multistep procedures of translation, back translation, expert reviewing, and pilot testing according to general guidelines for cross-cultural adaptation of measures, as described above.

The original FSFI,<sup>11,12</sup> which was developed in English by Rosen et al, is a multidimensional self-reported instrument including 19 items about 6 domains of female sexual function measurement: desire (items 1–2), arousal (items 3–6), lubrication (items 7–10), orgasm (items 11–13), satisfaction (items 14–16), and pain (items 17–19). The score ranges of individual items are 1–5 for 4 items (1, 2, 15, and 16) and 0–5 for the other items on the scale, with zero indicating no sexual intercourse over the past 4 weeks. The full-scale score range is from 2–36, with a higher score indicating a higher level of sexual functioning. The total FSFI score  $\leq 26.55$  is considered female sexual dysfunction. The original FSFI has been proven to fulfill excellent psychometric properties.

## Statistical Analysis

The data was analyzed with the SPSS software version 20.0. Construct validity was evaluated by principal component analysis using varimax rotation and factor analysis. Reliability studies on internal consistency (Cronbach's alpha coefficient, domain inter-correlations, and domain-total correlations) and on test-retest (intraclass correlation coefficient [ICC]). All statistical tests performed were considered statistically significant with  $P$  value  $< .05$ .

Principal component analysis was performed on all 19 questionnaire items. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was used to assess the aptitude of the questionnaire items to be included into the factor analysis. KMO

measures  $>0.80$  were considered optimal and measures  $<0.5$  were considered insufficient. Moreover, the Bartlett test of sphericity was calculated to make sure that the variables correlate sufficiently well with each other, hence, to be suitable for the factor model.<sup>29</sup> Eigenvalues were used to determine the number of components, with a minimum eigenvalue of 1.0 as the criterion for factors.<sup>20</sup> A matrix that is factorable should include several considerable correlations. If none of the correlations surpasses 0.30, the use of factor analysis is debatable.<sup>29</sup> Questionnaire items are generally grouped into the domain according to the predictive model, and have a factor loading for the domain it measures relatively high.<sup>11</sup>

A Cronbach's alpha coefficient being  $<0.6$  was considered poor or weak,  $0.6–0.8$  moderate but satisfactory, and  $>0.8$  reflected a high internal consistency. A coefficient that was  $>0.7$  was usually considered acceptable. Domain inter-correlations and domain-total correlation coefficients were calculated by using Pearson's correlation. To assess test-retest reliability, we used the ICC. The ICCs below 0.40 represented poor to fair agreement,  $0.41–0.60$  represented moderate agreement,  $0.61–0.80$  represented good agreement, and  $>0.80$  represented excellent agreement between 2 assessments. A coefficient that was  $>0.7$  was usually considered acceptable.<sup>30</sup>

## Ethical Considerations

This study was approved by the Ethics Committee of Hue University of Medicine and Pharmacy. All information and data were encrypted and confidential.

## RESULTS

A total of 271 respondents have completed this questionnaire in no more than 15 minutes without any difficulty with understanding and accepting the VN-FSFI version. This indicates that VN-FSFI version has good face validity.

As reported in Table 1, most of the subjects in this study were relatively young, employed, declared no religious identity, and had medium incomes. The mean infertility duration was  $3.74 \pm 3.01$  (1–17.7) years, and the mean duration of treatment was  $13.25 \pm 12.45$  (1–62) months. In the sample, the mean FSFI score was 26.45.

## Construct Validity

For principal component analysis, the data in our study have been indicated to be suitable for analyzing and exploring the domains of the VN-FSFI version, with a KMO score of 0.903 and a statistically significant Bartlett's test of sphericity (chi-squared = 3095.535;  $P < .000$ ).

As in the original FSFI by Rosen, in the 4-factor model with eigenvalues over 1.00, percentage of the total variance over 50% was identified. However, the 5-factor solution yielded the most consistent pattern of factor loadings, with the fifth factor having an eigenvalue high enough to justify inclusion.<sup>11</sup> Therefore, we

**Table 1.** Sociodemographic, infertile, and FSFI characteristics of the sample (n = 271)

Factors	N	%
Age, years Mean (SD) (range)	31.25 ± 5.06	(20–46)
Education		
Primary school	6	2.2
Secondary school	46	17.0
Secondary high school	61	22.5
University	158	58.3
Employment		
Present	240	88.6
Absent	31	11.4
Religion		
Present	68	25.1
Absent	203	74.9
Economy (self-reported)		
Low income	16	5.9
Medium income	244	90.0
High income	11	4.1
Duration of marriage, years Mean (SD) (range)	4.97 ± 4.01	(1–18)
Duration of infertility, years Mean (SD) (range)	3.74 ± 3.01	(1–17.7)
Infertility type		
Primary	191	70.5
Secondary	80	29.5
Infertility cause		
Female	88	32.5
Male	82	30.3
Combined	63	23.2
Unexplained	38	14.0
Duration of infertility treatment, months Mean (SD) (range)	13.25 ± 12.45	(1–62)
<i>In vitro</i> fertilization	19	7.0
The mean FSFI score Mean (SD) (range)	26.45 ± 3.70	(13.20–34.80)

FSFI = Female Sexual Function Index.

selected the 5-factor model solution shown in Table 2 with 4 factors having eigenvalues over 1.0 and the fifth factor having an eigenvalue of 0.88. This model accounted for 72.32% of the variance in VN-FSFI item scores.

The items that related to desire, lubrication, satisfaction, and pain were, respectively, more correlated with factor number 5, 4, 2, and 3, which were shown by each item to be loaded mainly on the single factor associated with its relevant domain, with the highest factor loadings (range 0.66–0.86). Thus, they were extracted corresponding to these factors.

36 of the 4 items related to arousal were more correlated with factor 1. The fourth one (item 4) was more correlated with factor 5 ( $r = 0.64$ ) while it also correlated with factor 1 ( $r = 0.41$ ). Considering the content of this item, it was decided to accept it as 1 of the items for factor 1.

Similar to the items about orgasm, they were also appropriately assigned for the factor 1, although the item 13 had a stronger correlation with the factor 2.

The items 3, 5, 8, 10, 11, 14, and 16 cross-loaded on factors that were not associated with their relevant domains. Being compared with the primary factor loadings, the cross factor loadings were lower and the difference exceeded 0.1. According to Meir and Gati,<sup>29</sup> this could be accepted.

Based on this analysis, the 5-factor model has been established. The first factor consisted of a mixture of arousal/orgasm; the next factors were, in turn, for satisfaction, pain, lubrication, and desire. Factor 1 had a high eigenvalue of 8.1, which accounted for 42.64% of the total explained variance. This statistical result, when considered together with clinical data, supported the separation of arousal and orgasm into 2 distinct domains, as the way Rosen has done with the original FSFI.<sup>11</sup>

Thus, by the exploratory factor analysis and clinical consideration, the VN-FSFI version has identified 6 domains: desire, arousal, lubrication, orgasm, satisfaction, and pain.

## Reliability

As indicated in Table 3, the Cronbach's alpha coefficients and the test-retest coefficients (ICC) of the VN-FSFI version were good to excellent ( $>0.80$ ), except for the Cronbach's alpha for the desire domain being generally accepted ( $>0.70$ ). The Cronbach's alpha coefficient was 0.92 for the total scale and 0.72–0.89 for the domains. The ICC was 0.97 for the total scale and ranged from 0.84–0.96 for the domains of the scale. This result was quite similar to that of the original FSFI.

Table 4 shows that all the domains were positively correlated between each other and with the total scale; the domain inter-correlations were significantly high, ranging from 0.36–0.73 ( $P < .05$ ); the domain-total correlation coefficients ranged between 0.67 and 0.84 ( $P < .05$ ). The strongest correlation was shown between the domains of arousal and orgasm ( $r = 0.73$ ), which was consistent with the factor analysis results described in the previous section.

## DISCUSSION

In this study, in infertile Vietnamese women, the VN-FSFI version has been proven to be a self-reported instrument having high cultural adaptation and good psychometric properties. It includes 6 domains of desire, arousal, lubrication, orgasm, satisfaction, and pain, corresponding to the original FSFI to evaluate female sexual function.<sup>10–12</sup> According to our knowledge, this is the first study about the psychological characteristics of the Vietnamese-FSFI version used for this population.

Cross-cultural adaptability is considered to be the strength of the original FSFI because it is clear and does not contain items on sexual matters that are too intimate or embarrassing.<sup>24</sup>

**Table 2.** Factor analysis of the Vietnamese translation version of the FSFI (n = 271)

Item	F 1	F 2	F 3	F 4	F 5
1. Desire: frequency	-	-	-	-	<b>0.75</b>
2. Desire: level	-	-	-	-	<b>0.82</b>
3. Arousal: frequency	<b>0.59</b>	-	-	-	0.44
4. Arousal: level	<i>0.41</i>	-	-	-	<i>0.64</i>
5. Arousal: confidence	<b>0.53</b>	-	-	-	0.41
6. Arousal: satisfaction	<b>0.71</b>	-	-	-	-
7. Lubrication: frequency	-	-	-	<b>0.81</b>	-
8. Lubrication: difficulty	-	-	0.49	<b>0.66</b>	-
9. Lubrication: frequency of maintaining	-	-	-	<b>0.76</b>	-
10. Lubrication: difficulty in maintaining	-	-	0.32	<b>0.77</b>	-
11. Orgasm: frequency	<b>0.73</b>	0.34	-	-	-
12. Orgasm: difficulty	<b>0.74</b>	-	-	-	-
13. Orgasm: satisfaction	<i>0.52</i>	<i>0.63</i>	-	-	-
14. Satisfaction: with amount of closeness with partner	0.40	<b>0.77</b>	-	-	-
15. Satisfaction with sexual relationship	-	<b>0.85</b>	-	-	-
16. Satisfaction: with overall sex life	0.34	<b>0.76</b>	-	-	-
17. Pain: frequency during vaginal penetration	-	-	<b>0.82</b>	-	-
18. Pain: frequency following vaginal penetration	-	-	<b>0.83</b>	-	-
19. Pain: level during or following vaginal penetration	-	-	<b>0.86</b>	-	-
Eigenvalue	8.10	2.24	1.32	1.20	0.88
% of explained variance	42.64	11.76	6.94	6.34	4.65

FSFI = Female Sexual Function Index.

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Only factor loadings greater than 0.30 are represented. Primary loadings are indicated in **bold**. Items with cross-loadings are indicated in *italic*.

Regarding construct validity, although the VN-FSFI version was supported to extract 6 domains being similar to the original FSFI, there was a slight difference in factor analysis. Statistical results have shown that factor 1 reflected both the content of arousal/orgasm, while it displayed arousal/desire in the study conducted by Rosen.

The current literature generally reveals the inconsistent factor solution in the validated FSFI versions. The factor quantity of various versions is from 3 to 6.<sup>17,23,25,27</sup> However, there have been some similarities, such as items of arousal or cross-loading

on the desire,<sup>15,19,25</sup> or orgasm domain,<sup>17</sup> or cross-loading on both.<sup>14,18,23</sup> In the Persian P-FSFI version, the items about the content of “arousal” and “orgasm” are loaded together in 1 factor,<sup>17</sup> quite similar to the VN-FSFI version. Based on female sexual physiology, the arousal stage is the next stage of desire and the previous orgasm stage in the linear model of female sexual response cycle, which was proposed by Masters and Johnson<sup>31</sup> then supplemented by Kaplan.<sup>32</sup> The considerable overlap of these periods was proven by Basson et al<sup>7</sup>; so, arousal might overlap with desire or orgasm. Additionally, because of the

**Table 3.** Cronbach's alpha and intraclass correlation coefficients of the FSFI in the Vietnamese sample and in the sample of the original version

Domain	Cronbach's alpha					ICC		
	Original version				Vietnamese version (n = 271)	Original version		
	Control	FSAD	FOD	HSDD		Control	FSAD	Vietnamese version (n = 107)
Desire	0.89	0.91	0.84	0.58	0.72	0.77	0.80	0.84
Arousal	0.90	0.92	0.91	0.91	0.81	0.85	0.68	0.93
Lubrication	0.95	0.93	0.95	0.94	0.85	0.89	0.71	0.94
Orgasm	0.91	0.92	0.90	0.90	0.80	0.87	0.62	0.91
Satisfaction	0.91	0.82	0.79	0.74	0.87	0.82	0.70	0.94
Pain	0.92	0.93	0.93	0.94	0.89	0.87	0.69	0.96
Full-scale	0.95	0.93	0.91	0.92	0.92	0.91	0.70	0.97

FOD = female orgasmic disorder; FSAD = female sexual arousal disorder; FSFI = Female Sexual Function Index; HSDD = hypoactive sexual desire disorder; ICC = intraclass correlation coefficient.



**Table 4.** Domain intercorrelations (Pearson's *r*) (*n* = 271)

	Desire	Arousal	Lubrication	Orgasm	Satisfaction	Pain
Desire	1.00					
Arousal	0.58	1.00				
Lubrication	0.36	0.50	1.00			
Orgasm	0.44	0.73	0.49	1.00		
Satisfaction	0.43	0.63	0.37	0.70	1.00	
Pain	0.38	0.38	0.53	0.42	0.42	1.00
Full-scale	0.67	0.82	0.71	0.84	0.79	0.70

influence of cultural differences, women may have difficulty perceiving and expressing the differences between arousal and desire or between arousal and orgasm.<sup>4</sup> On the other hand, the differences might be related to different study populations, between infertile and fertile women. In our study, sexual desire is classified into a separate construct and was not associated with content of “arousal” as in Rosen’s study. However, that was in line with the publication in Malaysia on infertility subjects whose sexual desire was considered to be changed as it was closely linked to the goal of trying to get pregnant.<sup>6,23</sup>

In relation to the separation of the 2 contents of the first factor into 2 distinct domains based on clinical consideration of the original FSFI, it has received some criticism in the literature.<sup>33</sup> However, Rosen and others believe that this is reasonable and has practical value, as it would provide the ability to assess the response to specific treatment.<sup>11,18,25,34</sup> Stephenson,<sup>34</sup> a co-author of the original FSFI after reviewing conceptualizations and empirical studies in 2016 and earlier, pointed out that the result of this debate is still unclear. However, his latest study results in “further validation of the Gender Sex Function Functionalities and Associations with clinical interview data,” has confirmed the construct validity including 6 domains of the original FSFI. In a similar way, we believe that it was suitable and useful to separate 2 contents arousal/orgasm to form the VN-FSFI version with 6 separate domains as in the original version.

The overlap in the nature of female sexual response and the influence of cultural differences described above were also sufficient to account for the item 4 (arousal level) highly cross-loading on the factor reflected desire, especially for the cross-loading of the item 13 (orgasm satisfaction). Similar to the original, item 13 was acceptable to be assigned to a specific domain, which was the orgasm domain, although item 13 loaded higher into the satisfaction domain. Because the satisfaction domain was considered as the “quality of life” domain of the scale, it was suitable for containing items related to global sexual and relationship satisfaction only. This solution was used similarly in the original version.<sup>11</sup>

Comparing the construct validity findings between studies conducted in the infertile population, our results were not consistent with those of Seen Heng et al<sup>23</sup> in Malaysia, except that “desire” was extracted into a particular domain. They showed that the factor structure is quite different, with only 3 domains, and suggested that infertility could “distort the sexual

response cycle,” which, in turn, causes sexual function of infertile women to differ from that of normal women. Our study did not support this conjecture.

With regard to reliability, our study had some better results than the original FSFI studies: the Cronbach’s alpha and ICC coefficients of all domains and the total scale were both from acceptable to excellent. The Cronbach’s alpha coefficient of the desire domain in the study conducted by Rosen in women with hypoactive sexual desire disorder only reached 0.58.<sup>10</sup> This has led to a fierce debate between Forbes and Rosen over three articles.<sup>33,35,36</sup> Forbes argued that this domain did not meet the content validity because it reflected the concept of outdated desire, which emphasizes spontaneous desires, while Basson et al<sup>7</sup> had expanded this concept apart from spontaneous desires, women also had a kind of responsive desire, which was created from their partner’s advances, fantasies, erotica, novel sexual stimuli, and one’s own body. Therefore, we added some instructions to further clarify the concept of sexual desire according to updated knowledge. Perhaps this has, in part, contributed to better results in our study. The ICC coefficients of the VN-FSFI version were also higher than those in the original version, supported by the Portuguese FSFI version, which achieves an ICC coefficient for the total scale absolute of 1.0.<sup>26</sup>

As in all studies of this issue, our results also have a few limitations. First, the sample was recruited from an infertility center, so the generalizability with other centers and with infertile women without approaching treatment might be limited. Second, test-retest reliability could have been influenced due to being carried out at the time of infertility investigation. However, at that time, the patients had not been informed and counseled on infertility causes and treatment options; so, the affect may be negligible. Third, women with no sexual activity in the past 4 weeks and ethnic minority women were excluded from this study. Therefore, we should be cautious about applying the VN-FSFI version for these women. Finally, the result was based on the infertile sample; therefore, it is impossible to apply for women with other medical conditions and healthy women in the general population. We suggest that further cross-validation studies of VN-FSFI version be conducted in women with different backgrounds and medical statuses.

However, our research also has the following strengths. First, the VN-FSFI as supported by the construct validity is in agreement with numerous previous validation studies on the FSFI<sup>15,18,19,25</sup>

and with the original version.<sup>11</sup> Second, our research is pioneering in Vietnam on this issue, so it is absolute that it makes some contribution to the field of female sexuality and infertility, for research as well as teaching and in clinical practice. Finally, our study strongly supports the original English FSFI version based on good psychometric properties, including 6 domains corresponding with the original version. The desire domain was proven to have especially satisfactory statistical results.

## CONCLUSION

With good psychometric properties, which are almost similar to those of the original English version, this Vietnamese translation version of the Female Sexual Function Index (VN-FSFI version) is proven to be a valid and reliable instrument to measure multidimensional aspects of sexual function in infertile Vietnamese women.

## DECLARATIONS

Ethics approval and consent to participate: All co-authors confirm that this work was approved by the Hue University of Medicine and Pharmacy Ethics Committee. All patients agreed to participate with a consent form.

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*Availability of data and material:* The dataset used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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### Category 2

#### (a) Drafting the Article

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### Category 3

#### (a) Final Approval of the Completed Article

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