Social, Demographical, and Clinical Correlates of Stigma in Iranian Breast Cancer Women

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Abstract

**Background:** This study aimed to assess the severity of disease-related stigma felt by Iranian women with breast cancer as well as to determine the contextual correlates of stigmatization.

**Methods:** This cross-sectional study included 223 breast cancer patients between October-2014 and May-2015, in Tehran, Iran. Eligible patients were asked to provide background data and to complete Stigma Scale for Chronic Illness 8-item (SSCI-8) questionnaire. Binomial logistic regression analysis was employed to identify stigmatized (SSCI-8 > 8) and heavily stigmatized (SSCI-8 >10) groups.

**Results:** A total of 58.3% (n=130) stated that they were stigmatized at least “rarely.” In the multi-variable models in the total sample, living with spouse, Turkic ethnicity, family history of chronic diseases were the significant associations of stigmatization, while no variable was found to be associated with heavily stigmatization. In the sub-sample having the data of spouse's education (n=185), living with spouse, lower spouse's education, and family history of chronic diseases were the significant correlates of stigmatization; while, in terms of heavily stigmatization, only the lower spouse's education was the significant indicator.

**Conclusions:** Stigmatization tails women with breast cancer especially those living with their poorly educated husbands which call for dyadic interventions.

Background

Breast cancer is the second most common cancer in the world with 2.4 million cases being diagnosed from 1999 to 2015 and owing to its prevalence, is the leading cause of cancer-related death among women [1], though by no means falls into the category of most fatal cancers [2]. In Iran, breast cancer is also estimated to be the most common cancer of women [3] and is predicted to have a five-year survival rate of 68% which is much lower than those of developed countries of USA, Europe and Japan with 80 to 90% [4], where the lifetime risk is approximated to be 4.5 percent [5]. The advancements in early detection, diagnosis, treatment and rehabilitation of breast cancer patients, as well as the efforts made to improve the clinical practice and patients’ quality of life, all mitigate the suffering imposed by this condition at large [6, 7]. However, cancer stigma still continues to cast its drastic influence on the lives of the afflicted [8, 9] and has been raised by both researchers and patients as one of their major concerns [10].

Although, when compared to other cancers’ epidemic of stigma, breast cancer-stigma has not yet become something of an epidemic [11], this may yet better fit the concept of “silent epidemic” [12]. As a social phenomenon intertwined with personal psychological features, stigma targets the identity of the individuals carrying the label of certain conditions [13]. Stigma can subject the patients to shame, anxiety, depression and workplace discrimination and reduce their overall quality of life [14, 15]. Help-seeking behaviors of patients with self-discovered or newly diagnosed cancer are also hampered by perceived stigma. For instance, stigma was found to be acting as a barrier to American black women's participation in routine screening, early detection and genetic testing programs [16], as well as a notable contributing factor to self- or other-imposed social exclusion among Hong Kong Chinese women [17].

Several unpleasant stories of stigma are reflected in a wide array of studies conducted in different countries, indicating that the concern of breast cancer stigma is not confined to any particular nation, socioeconomic or cultural background [18-20]. Recently, Trusson and Pilnick [21] urged against a sort of “pink positivity” and revealed some narrations inconsistent with the positive public image surrounding breast cancer in the UK. In some cases, the overflowing positivity was not spontaneous or effortless at all. Instead, they were forced into the minimization of their struggles in order not to get ostracized by society. They also stated that the stigma of breast cancer was avoided by patients with the cost of withdrawal from social support.

Previous research urged the need for finding patients at risk of feeling stigmatized [22] and given the factors specific to each cancer, emphasized on approaching the stigma of each cancer under the general umbrella of cancer stigma in a more distinct manner [13]. Among Iranian urban population, there are negative attitudes around cancer and cancer patients, with most of the respondents in a study reporting their unwillingness to disclose their condition to others if they were ever diagnosed with cancer [23]. In this regard, the working Iranian breast cancer women have shared their contradictory experiences of disease self-disclosure, where about 28% of them were faced with unsatisfactory consequences afterwards, making them change their perception of others and seek distance from people [24]. Moreover, Iranian women who discovered their breast cancer themselves indicated that the very nature of stigmatized cancer of breast as an incurable disease and as the herald of losing femininity made them feel fearful, intimidated and anxious [25]. Bou Khalil [26] has addressed this “silent epidemic” [12] of breast cancer stigma, in the sense that despite its paralyzing impact on the lives of countless patients, it has not yet received due attention. In his review of studies from eleven Middle Eastern countries including Iran, breast cancer was shown to be largely mixed with social stigma and misconceptions. Therefore, this study aimed to explore the social, demographic, and clinical features of Iranian breast cancer women, which could better indicate the risk of stigmatization experienced by the patients.

Methods
Setting and Sampling

The study was conducted between Oct 2014 and May 2015 at three cancer centers in Tehran, Iran, as a part of a study on health issues concerning breast cancer patients (PS-BrC2015). Inclusion criteria involved a confirmed cancer diagnosis of more than one month, age 18 years or older, and the ability to communicate in Persian. Patients who had a history of a psychiatric condition, or had metastatic brain disease were excluded. Data were collected by face-to-face interview. Only one of 224 patients who had initially consented to follow the study protocol, voluntarily withdrew from participating in the remainder of the study. All methods were carried out in accordance with relevant guidelines and regulations.

Instruments

Sociodemographic and clinical characteristics of the patients were assessed in the form of a checklist including age, marital status, ethnicity, house type, housemate, residency, geographical location, employment status, household income, work suspension, insurance status, family size, father's death, mother's death, father's education, mother's education, spouse's education, patient's education, number of children, metastasis, time since diagnosis, chemotherapy, family history of chronic diseases, menstruation pattern, body mass index (BMI), and accumulative childhood/adulthood adverse experiences, including having had an unhappy childhood, few friendships, serious conflicts with family of origin as well as having experienced serious punishments, emotional abuse and loss of first-degree family members.

The Stigma Scale for Chronic Illnesses 8-item version (SSCI-8) [27] was used to assess the experienced stigmatization. This short-form instrument was essentially developed for patients with neurological conditions in USA as its population of interest. SSCI-8 encompasses two forms of enacted and internalized stigma within a unidimensional construct. The eight items on a five-point Likert type scaling in the range of “never”, “rarely”, “sometimes”, “often”, and “always”, yields a raw total stigma score of 8 to 40. The original scale includes three items for internalized stigma (e.g. “I felt embarrassed about my illness.”) and the remaining five addressing enacted stigma (e.g. “Because of my illness, some people seemed uncomfortable with me.”). The scale showed acceptable reliability and validity among US neurological population with the Cronbach's alpha of 0.89 for the total scale. In the current dataset, the Cronbach's alpha for enacted stigma, internalized stigma, and total stigma was 0.837, 0.725, and 0.866, respectively, indicative of adequate internal consistency reliability. The scale has been validated in another publication on the same dataset [28]. To assess stigmatization experienced by breast cancer patients, two dichotomous variables were defined based on the total score, in which the patients labeled with un-stigmatized if they reported all the eight items as “Never” i.e. SSCI-8's score = 8 versus stigmatized if they reported at least one experience i.e. SSCI-8’s score ≥ 9, and fairly stigmatized if they related to up to three of the statements i.e. SSCI-8’s score ≤ 10 versus heavily stigmatized if they reported three or more stigmatizing experience i.e. SSCI-8’s score ≥ 11.

Data Analysis

Descriptive analysis was used to report the sample characteristics and stigmatization experiences. Univariate and multivariate binomial logistic regression, which estimates the probability that a characteristic is present, was employed to find the stigma risk factors. To reach the best model, the variables with higher rates of missing data (i.e. cancer stage, income level, and time since diagnosis) were excluded from the logistic analysis modelling. Twenty missing data for BMI (0.09%) was imputed by the median of the non-stigmatized and stigmatized patients separately, using the single imputation method. The recommendations suggested for model-building were employed to determine the proper covariates composing the best model [29, 30]. First, the univariate logistic regression including the nominal variables was carried out to identify the stigmatized group. The prospective correlates were included if they could identify the stigmatized group with P-0.250. Then, three sets of models were further estimated: 1) univariate model concerning heavily stigmatized group, 2) multivariate model concerning stigmatized group, 3) multivariate model concerning heavily stigmatized group. In addition, there were 38 missing data corresponding to spouse's education, including 35 patients with single marital status and three with missing value; thus, the whole sample irrespective of the spouse's education (n=223) and the sole subsample with available data regarding the spouse's education (n = 185) were tested as two separate multivariate models. P-value < 0.10 was considered for significance level.

Results

Sample Characteristics

Table 1 presents the sociodemographic and clinical characteristics of the sample. The mean age of the sample was 47.10 ± 9.10, ranging from 19 to 75 years old. They were mostly married (81.2%), unemployed (83%) and of Fars (63%) or Turkic (26%) ethnicity. The majority had a poor educational background (77.8%), received chemotherapy (61.4%) and underwent mastectomy (70%).

The rate of Stigmatization

Figure 1 presents the statements of SSCI-8 with respect to the ratings of the patients, along with the descriptive statistics of enacted, internalized and total stigma experienced by patients. The mean of total stigma was 11.75±5.56, from the attainable score range of 8 to 40, which showed a very low rate of stigmatization in the sample. This was also true for both enacted and internalized stigma with mean scores of 6.99±3.44 and
4.77±2.63, respectively. Overall, this indicates that Iranian breast cancer women had experienced a very negligible amount of stigma in association with their condition.

As it is further illustrated in figure 1, about 41.7% (n=93) reported that neither they experienced any sort of enacted stigmatization nor did they internalize the stigma of their condition. However, 58.3% (n=130) of the sample reported that they experienced stigmatization from at least "rarely" up to a more frequent basis of "always" in their course of the disease. Of them, 12% (n=27) had experiences of being avoided by people, 10.7% (n=24) felt that they were abandoned by others, 11.2% (n=25) stated that some people turned their faces away from them, 21.6% (n=48) felt embarrassed by their illness, 14.9% (n=34) stated that there were some people who seemed to feel uncomfortable at the patients’ problems, 21.5% (n=48) were in the shame of their physical limitations, 8% (n=18) were treated unkindly, and 17.9% (n=40) were treated by other people as if the fault of disease lied with the patients. Patients reported these experiences in a frequency range of sometimes to always, indicating that there were a considerable number of women who were still under influence of stigmatization.

**Correlates of Stigmatization**

As the univariate models are summarized in Table 2, having more children (OR = 1.23, 95%CI = [1.03, 1.47]), lower education of father (OR = 1.69, 95%CI = [1.00, 2.90]), lower education of spouse (OR = 3.39, 95%CI = [1.82, 6.31]), being of Turkic ethnicity (OR = 1.91, 95%CI = [1.00, 3.65]), being unemployed (OR = 1.82, 95%CI = [0.90, 3.71]), living with spouse (OR = 1.92, 95%CI = [1.00, 3.66]), lower education of patient (OR = 1.92, 95%CI = [0.98, 3.78]), higher BMI (OR = 1.06, 95%CI = [0.99, 1.22]), menstrual irregularities (OR = 1.30, 95%CI = [0.95, 1.78]), previous hospitalization (OR = 1.63, 95%CI = [0.95, 2.80]), radiotherapy (OR = 1.75, 95%CI = [1.00, 3.04]), and life history ≥ 2 (OR = 1.72, 95%CI = [0.99, 3.01]) significantly associated with the stigmatized group. However, only lower education of father (OR = 1.68, 95%CI = [0.97, 2.91]), lower education of spouse (OR = 2.84, 95%CI = [1.55, 5.21]), and radiotherapy (OR = 1.60, 95%CI = [0.93, 2.76]) remained as the significant correlates of higher stigma.

Table 3 reports the multi-variable models for the total sample and the subsample merely confined to the patients whose data regarding their spouse's education was available. In the total sample (n=223), the Turkic ethnicity (OR = 1.94, 95%CI = [1.94, 2.03]), living with spouse (OR = 2.15, 95%CI = [1.03, 4.50]), and family history of chronic diseases (OR = 1.69, 95%CI = [0.92, 3.10]) were the significant correlates of stigmatization, while no variable was found to be associated with heavily stigmatization. After exclusion of patients with missing data regarding their spouse's education, in the remaining subsample (n=185), lower education of spouse (OR = 3.23, 95%CI = [1.48, 7.04]), living with spouse (OR = 3.57, 95%CI = [1.10, 11.55]), and family history of chronic diseases (OR = 2.18, 95%CI = [1.06, 4.50]) were the significant correlates of stigmatization. BMI was also a weak yet significant correlate of the latter group (OR = 1.07, 95%CI = [0.99, 1.15]). In terms of heavily stigmatization in this subsample, only the lower education of the spouse surfaced as the significant correlate (OR = 2.85, 95%CI = [1.39, 5.86]).

**Discussion**

This study aimed to evaluate the demographic, social, and contextual factors indicating or contributing to the experience of stigmatization among Iranian breast cancer women. This sample of Iranian women mainly consisted of less educated patients from low-income families. Somewhat congruent with existing studies on cancer stigma, our study showed a polarized rate of stigmatization among Iranian breast cancer women, with 4 in 10 patients reporting no experiences of stigma, and 6 in 10 patients reporting a low to high levels of stigma experience. Using different instrument for assessment of stigma and not exclusively addressing breast-cancer stigma, over 30% of Korean cancer survivors were found holding stereotypical views of themselves [14] and about 18% of Turkic cancer patients felt socially excluded [31]. More than a quarter of Iranian cancer patients are reported to have negative attitude towards cancer [32] and 17.4% of general public have acknowledged their discomfort with being around cancer patients [23]. Although the majority of patients in our study were never or rarely subjected to stigma, a notable proportion of them reported to be stigmatized on a more frequent basis, ranging from sometimes to always.

Among the latter, there was a high rate of internalized stigma both in the forms of embarrassment of illness and physical limitations caused by either surgery or side effects of medical treatment such as weight gain [33]. Treatment of breast cancer entails salient physical alterations that negatively affects patients’ self-esteem and psychosexual functioning. A considerable proportion of Polish breast cancer women were found to be embarrassed of being naked in the presence of their partners. Patients survive cancer at the expense of disgured body, ensuing emotional strains and finally falling victim to stigmatization [34]. Triggered by their disturbed body image and with a threatened identity, they tend to resort to negative marital coping efforts such as self-blaming and avoidance [35]. Among statements related to enacted stigma, being blamed for disease by other people was the most popular one that our patients had agreed with.

In a conceptually similar study on Indian women, verbal abuse, social alienation, blaming attitudes and mistreatment by their husband, family and community at large comprised the most common manifestations of breast cancer stigma [19]. Unlike lung cancer with the widely known and avoidable risk factor of smoking that has made the afflicted patients-sometimes erroneously- easy targets for blame, in the absence of explicit lifestyle-related cancer-risk behaviors, general public rarely makes such assumptions about breast cancer [13, 22]. While women with breast cancer might be in part spared from this aspect of blame, they still have to handle the insecurity and discomfort of all their surrounding people when they are confronted with somewhat incurable disease and overwhelmed by their shattered view of a just-world [11, 36].
As an alarming finding of current study, wives of poorly educated husbands as well as those living together with their husbands were evidently more vulnerable to stigmatization. Marital issues were always of utmost concern in lives of breast cancer patients [35, 37]. Patients aside, their partners are also menaced by the diagnosis and experience great deal of emotional strain while trying to come to terms with what has befallen them and adapting to the burden of caregiving and added household responsibilities [38]. However, given the criticality of spousal relationships in providing patients with support and maintaining their overall well-being, unmet needs of these women, ensuing marital tensions or even worse being directly stigmatized by their partners would be the recipe for a full-blown psychological catastrophe [38, 39]. Not unexpectedly, cancer patients receiving a poor-quality care from their caregivers are more prone to internalize the stigma [13]. Meanwhile, psychosocially advantaged partners seem to be more efficient in tackling the challenges [40], for instance, Iranian Turkman breast cancer patients with highly educated spouses were found to have improved medical adherence [41]. With the same rationale, poor educational background of husbands in GAZA has been frequently associated with misconceptions about breast cancer screening programs that would ultimately jeopardize their wives' health [42]. It is of an especial concern in societies where an overwhelming majority of men are ignorant of cancer symptoms and the importance of a timely diagnosis, and yet hold the key to the health–related decisions of their spouses [43]. Similarly lower education of spouse was proved to be a strong predictor of hopelessness among Turkic breast cancer women [44]. By the same token, poor education, low-income, belonging to ethnic minorities, spouse role obligations and previous experiences of prejudice all acted as constraints delaying the help-seeking behavior of American women with self-discovered cancer symptoms [45]. These studies are in complete accordance with our findings where belonging to ethnic minorities (i.e. Turkic women) and living together with poorly educated husband were strong predictors of stigmatization.

Our study also revealed that a history of familial chronic diseases could increase the likelihood of stigmatization. It can be inferred that a positive family medical history adds an air of social vulnerability to the mix of marital tension with poorly educated spouse. Thus, partners of women with breast cancer need to be provided with tailored informational support which enables them to better cope with emerging issues and effectively support their family [46]. Higher BMI, albeit weekly, associated with the stigmatized group which might be attributable the additional disturbance of self-image and shame brought about by this side effect of medication [17, 33].

A number of background and clinical features that despite not making the cut for the final models, were found to be fairly correlated with stigma. Disadvantageous educational and employment status of patient or their 1st degree family member render these patients vulnerable to discriminatory treatment. Attending the exhaustive radiation therapy sessions on a regular basis as well as getting admitted to hospital not only demoralizes patients but also creates plenty of occasions to encounter prejudiced treatment in healthcare settings. It has been reported that Iranian breast cancer patients tend to rely heavily on supports from their own family and 95% of them receive support from siblings, children and friends [24]. In this sense, having more children -as a form of social support- may be protective against stigma, however, meeting their needs may also be overtaxing on their already improvised resources. Moreover, the diagnosis of cancer brings changes in dynamics of a household and the very nature of a mother-child relationship. In other words, the mere diagnosis of cancer might surpass the child's ability to assimilate, let alone unburdening his mother of her stress-riddled life. Similarly, patients who have underwent more than two major life events may lack the psychological resources essential for tackling another hurdle. All in all, whenever faced with a hurdle (i.e. cancer) that is likely to exceed the resources of a well-intentioned intimate partner, immediate family members, friends and even one's own self, help must be sought from professionals interested in public education.

Despite seemingly low rates of stigma experienced by breast cancer patients, its grave impact on various domains of patients is evident. In our study, poor educational background of father and husband, living together with husband and belonging to ethnic minorities were among the main contextual indicators of stigmatization. Collectively, the diagnostic and therapeutic advancements of medical practice should be augmented by psychosocial and individual interventions to effectively amend the misconceptions associated with breast cancer, promote sense of cooperation among patients and their partners as well as to enhance the support offered by caregivers of these patients to ultimately improve the overall quality of life of the patients and their families [47]. It seems that tailored educational interventions are needed to raise awareness of poorly educated spouses of the cancer patients and to provide them with support essential for a successful cope with the burden of complex situation they are faced with. It is worth mentioning that, the amount of social support breast cancer patients receive from family or friends affects the all-cause mortality risk of these patients [37]. Given the decisive role of knowledge and education of caregivers on the quality of their relationship with patients, the concepts of spouse-education and public-education need to receive due attention.

There are a number of limitations that should be taken into consideration for the interpretation of the results. This sample might not be a suited representative of Iranian breast cancer women and causal inferences are limited by its cross-sectional design. We suggest that future researches address the vulnerability of women to internalize the enacted stigma. For this purpose, specific domains of stigmatism experienced by women need to be evaluated using more comprehensive instruments. Moreover, more research is needed to find out the pathways through which social and contextual factors aggravate the negative aura of breast cancer both in society at large and in the lives of individuals. In addition, interventional and longitudinal studies are to be conducted with the purpose of confirming the substantial role of raising public awareness, improving public attitude towards cancer and especially educating the illiterate and low-educated spouses on health-related aspect of disease, as well as refining the misperceptions of patients themselves in decreasing the rate of cancer-stigma.

Declarations
Ethics approval and consent to participate

The study protocol was approved by ethics committee of Tehran University of Medical Sciences, Tehran, Iran. Verbal informed consent was obtained from the participant.

Consent for publication

Not Applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Competing interests

None.

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Nil.

Authors’ contributions

HZ: Conceptual design, methodology, and supervision. MAT: Data analysis, manuscript draft, data curation. MD: conceptual design and data collection management. ZJ: Data interpretation and write-up. FS, SR, BT: Data collection and data entry. All authors reviewed the manuscript and contributed intellectually. The final manuscript was approved by all authors.

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Tables
| Table 1. Sociodemographic and Clinical Information of the Study Sample (N = 223) |
|---------------------------------------------------------------|
| **Variables** | **Valid n (%)** |
| **Age** | 47.10 ± 9.10, 19 to 75 years old |
| < 45 | 84 | 37.7 |
| ≥ 45 | 139 | 62.3 |
| **BMI** | 27.78 ± 4.74 |
| **Time since diagnosis** | 18.28 ± 15.02 |
| **Marital Status** | |
| Unmarried | 42 | 18.8 |
| Married | 181 | 81.2 |
| **Housemate** | |
| Spouse | 167 | 74.9 |
| Non-spouse | 56 | 25.1 |
| **Geographical location** | |
| Urban | 196 | 87.9 |
| Rural | 27 | 12.1 |
| **Employment Status** | |
| Unemployed | 186 | 83.4 |
| Employed | 37 | 16.6 |
| **Insurance coverage** | |
| Yes | 203 | 91.0 |
| No | 20 | 9.0 |
| **Household level of Income** | |
| Poor | 93 | 52.2 |
| Moderate | 60 | 37.3 |
| High | 25 | 14 |
| **Ethnicity** | |
| Fars | 141 | 63.2 |
| Turkic | 57 | 25.6 |
| Others | 25 | 11.2 |
| **Father's Education** | |
| Illiterate | 127 | 57.00 |
| Literate | 96 | 43.00 |
| **Mother's Education** | |
| Illiterate | 138 | 61.9 |
| Literate | 85 | 38.1 |
| **Spouse's Education** | |
| Secondary school or lower | 107 | 48.00 |
| Above secondary school | 116 | 52.00 |
| **Patient's Education** | |
| Lower than diploma | 181 | 81.2 |
| Above diploma | 42 | 18.8 |
|--------------|----|------|

**Chemotherapy Status**

| Chemotherapy Status | n  | %    |
|---------------------|----|------|
| Finished Chemotherapy | 75 | 33.6 |
| Ongoing Chemotherapy  | 62 | 27.8 |
| No Chemotherapy        | 86 | 38.6 |

**Surgery History**

| Surgery History        | n  | %    |
|------------------------|----|------|
| Partial Mastectomy      | 79 | 35.4 |
| Total Mastectomy        | 77 | 34.5 |
| No Surgery              | 67 | 30.0 |

**Radiotherapy**

| Radiotherapy | n  | %    |
|--------------|----|------|
| No           | 134| 60.1 |
| Yes          | 89 | 39.9 |

**Patient History of Major Psychological disorders**

| Patient History of Major Psychological disorders | n  | %    |
|--------------------------------------------------|----|------|
| No                                               | 169| 75.8 |
| Yes                                              | 54 | 24.2 |

**Family history of chronic disease**

| Family history of chronic disease | n  | %    |
|----------------------------------|----|------|
| No                               | 94 | 42.2 |
| Yes                              | 129| 57.8 |

**Pattern of Menstruation**

| Pattern of Menstruation | n  | %    |
|-------------------------|----|------|
| Regular                 | 68 | 30.5 |
| Irregular               | 52 | 23.3 |
| Menopause               | 103| 46.2 |

**Life History ≥ 2: n = 86 (38.6%)**

| Life History | n  | %    |
|--------------|----|------|
| Unhappy childhood | 40 | 19.1 |
| Loss of a first-degree family member | 81 | 38.8 |
| Narrow circle of friends | 55 | 26.3 |
| Strong religious belief | 82 | 39.2 |
| Experience of severe punishment | 18 | 8.6 |
| Severe emotional/physical abuse | 15 | 7.2 |
| Experience of conviction | 3  | 1.4 |
| Severe familial conflict | 14 | 6.7 |

*Note. BMI: Body mass index.*
| Variables                                      | Non-stigmatized versus Stigmatized | V Lower stigma versus Higher stigma |
|-----------------------------------------------|------------------------------------|------------------------------------|
|                                               | P       | OR    | 95%C.I. | P       | OR    | 95%C.I. |
| Number of Sisters (n)                         | .144    | 1.13  | [0.96, 1.32] | .305    | 1.09  | [0.93, 1.27] |
| Number of Children (n)                        | .026    | 1.23  | [1.03, 1.47] | .601    | 1.04  | [0.89, 1.23] |
| Social Participation Frequency (n)            | .183    | .88   | [.72, 1.06]  | .993    | 1.00  | [.83, 1.21]  |
| Father's education (Lower)                    | .057    | 1.69  | [.99, 2.90]   | .064    | 1.68  | [97, 2.91]  |
| Spouse's education (Lower) n = 185            | <.001   | 3.39  | [1.82, 6.31] | .001    | 2.84  | [1.55, 5.21] |
| Ethnicity (Fars)                              | .122    | Reference |        | .368    |        |        |
| Turkic                                        | .051    | 1.91  | [1.00, 3.65] | .174    | 1.54  | [0.83, 2.87] |
| Others                                        | .319    | 1.56  | [.65, 3.78]   | .500    | 1.35  | [.57, 3.18]  |
| Employment Status (unemployed)                | .098    | 1.82  | [90, 3.71]    | .479    | 1.30  | [63, 2.72]   |
| Housemate (spouse)                            | .048    | 1.92  | [1.00, 3.66] | .286    | 1.40  | [76, 2.57]   |
| Marital Status (married)                      | .120    | 1.77  | [86, 3.62]    | .475    | 1.28  | [65, 2.52]   |
| Patient's education (lower)                   | .059    | 1.92  | [98, 3.78]    | .170    | 1.65  | [81, 3.39]   |
| Age (≥ 45)                                    | .165    | 1.48  | [85, 2.55]    | .414    | 1.26  | [72, 2.20]   |
| Family chronic disease history (yes)          | .112    | 1.55  | [90, 2.66]    | .417    | 1.25  | [73, 2.16]   |
| Patient major psychological history (yes)      | .154    | 1.60  | [84, 3.03]    | .308    | 1.38  | [74, 2.56]   |
| BMI                                           | .075    | 1.06  | [99, 1.22]    | .986    | 1.00  | [95, 1.06]   |
| Pattern of Menstruation (irregular)           | .096    | 1.30  | [95, 1.78]    | .213    | 1.22  | [89, 1.67]   |
| Hospitalization history (yes)                 | .076    | 1.63  | [95, 2.80]    | .615    | 1.15  | [67, 1.96]   |
| Mastectomy history (yes)                      | .168    | 1.27  | [91, 1.77]    | .399    | 1.16  | [83, 1.61]   |
| Radiotherapy (yes)                            | .049    | 1.75  | [1.00, 3.04]  | .091    | 1.60  | [93, 2.76]   |
| Life history (n ≥ 2)                          | .056    | 1.72  | [99, 3.01]    | .521    | 1.20  | [69, 2.07]   |

*Note: Bolded values indicate significant results (P < .10). S.E: Standard error. OR: Odds ratio. CI: Confidence interval. BMI: Body mass index.*
| Variables                                      | Total Sample                                                                 | Sample with Spouse’s education data                                                                 |
|-----------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|                                               | Non-stigmatized versus Stigmatized⁹ | Low stigma versus high stigma⁸ | Non-stigmatized versus Stigmatized⁹ | Low stigma versus high stigma⁸ |
|                                               | P OR 95%C.I.                    | P OR 95%C.I.                      | P OR 95%C.I.                      | P OR 95%C.I.                      |
| Number of Sisters (n)                         | .359 1.087 [909, 1.301]          | .578 1.050 [884, 1.248]            | .285 1.119 [910, 1.377]           | .454 1.076 [889, 1.302]            |
| Number of Children (n)                        | .249 1.150 [906, 1.460]          | .692 .960 [785, 1.174]             | .555 1.109 [787, 1.562]           | .560 .928 [721, 1.194]             |
| Social Participation Frequency (n)            | .208 .878 [717, 1.075]           | .869 1.016 [836, 1.235]            | .102 .828 [661, 1.038]            | .702 .960 [777, 1.185]             |
| Father’s education (Lower)                    | .415 1.292 [698, 2.391]          | .199 1.484 [813, 2.711]            | .585 1.221 [596, 2.500]           | .304 1.418 [729, 2.760]             |
| Spouse’s education (Lower)                    |                                               | .003 3.225 [1477, 5.187]           | .004 2.852 [1387, 5.862]           |                                       |
| Ethnicity (Fars)                              | .199 Reference                    | .423 Reference                     | .313 Reference                     | .353 Reference                     |
| Turkic                                        | .078 1.935 [930, 4.027]           | .218 1.531 [777, 3.016]            | .386 1.498 [601, 3.733]           | .825 1.096 [485, 2.477]             |
| Others                                        | .512 1.395 [515, 3.773]           | .478 1.401 [552, 3.558]            | .169 2.339 [697, 7.850]           | .149 2.135 [762, 5.983]             |
| Employment Status (unemployed)                | .912 .950 [381, 2.367]           | .775 1.143 [458, 2.851]            | .887 1.091 [327, 3.642]           | .882 1.089 [356, 3.329]             |
| Housemate (spouse)                            | .042 2.149 [1027, 4.496]          | .434 1.306 [670, 2.546]            | .034 3.567 [1101, 11.533]          | .651 1.230 [501, 3.024]             |
| Patient’s education (lower)                   | .677 1.213 [488, 3.014]           | .467 1.405 [562, 3.512]            | .827 .878 [274, 2.814]            | .827 .881 [283, 2.740]              |
| Age (≥ 45)                                    | .985 .993 [487, 2.027]           | .868 1.061 [528, 2.131]            | .664 1.204 [520, 2.786]           | .487 1.315 [607, 2.848]             |
| Family chronic disease history (yes)          | .090 1.691 [922, 3.101]           | .309 1.357 [753, 2.445]            | .034 2.184 [1059, 4.501]          | .446 1.292 [668, 2.948]             |
| Patient major psychological history (yes)      | .818 1.089 [527, 2.249]           | .761 1.109 [567, 2.169]            | .333 1.558 [635, 3.827]           | .412 1.385 [637, 3.012]             |
| BMI                                           | .139 1.049 [958, 1.118]           | .897 .996 [936, 1.059]             | .079 1.068 [992, 1.150]           | .903 .996 [927, 1.069]             |
| Pattern of Menstruation (irregular)           | .914 1.022 [689, 1.517]           | .523 1.133 [772, 1.665]            | .733 1.085 [678, 1.736]           | .367 1.223 [790, 1.893]             |
| Hospitalization history (yes)                 | .391 1.391 [654, 2.958]           | .639 .843 [412, 1.723]             | .505 1.347 [561, 3.238]           | .429 .724 [325, 1.612]              |
| Mastectomy history (yes)                      | .628 1.106 [736, 1.664]           | .839 1.042 [700, 1.552]            | .357 1.261 [770, 2.065]           | .669 1.104 [701, 1.741]             |
| Radiotherapy                                  | .250 1.572 [727, 1.740]           | .134 1.740 [843, 1.415]            | .451 1.415 [574, 1.341]           | .341 1.469 [666, 1.664]             |
| Life history (n ≥ 2) | 3.397 | 3.593 | 3.485 | 3.242 |
|---------------------|-------|-------|-------|-------|
| .149 1.608 [0.844, 3.064] | .716 1.120 [0.608, 2.064] | .377 1.413 [0.656, 3.045] | .741 .887 [0.436, 1.805] |

Note. $R_{CS}^2$: Cox & Snell $R^2$, $R_{N}^2$: Nagelkerke $R^2$. Chi-square test ($\chi^2$) pertains to Hosmer and Lemeshow test. Bolded values indicate significant results ($P < .10$). S.E: Standard error. OR: Odds ratio. CI: Confidence interval. BMI: Body mass index.

a. $RCS^2 = .15, RN^2 = .21, \chi^2 [8] = 4.378, P = .072$

b. $RCS^2 = .08, RN^2 = .10, \chi^2 [8] = 8.53, P = .384$

c. $RCS^2 = .23, RN^2 = .32, \chi^2 [19] = 49.76, P < .001$

d. $RCS^2 = .11, RN^2 = .14, \chi^2 [19] = 20.92, P = .341$