

# Socio-Economic Status Inequity in Self Rated Health in Patients with Breast Cancer

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## Abstract

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**AIM:** We investigate the evaluation of socio-economic status (SES) inequality on self-rated health (SRH) at women with breast cancer.

**STUDY DESIGN:** Cross-sectional study

**METHODS:** The current study conducted on all 270 breast cancer patients that were admitted to one of the hospitals of Arak University Medical Sciences (Arak, Iran from April to July 2018) by census (using non-random sampling (accessible sampling)). SES was calculated by asset-based questionnaire and Principle Component Analysis (PCA) was performed to estimate the families' SES. Concentration Index (C) and Curve (CC) was used to measure SES inequality in SRH. The data were analysed with Stata software.

**RESULTS:** The number of persons with good SRH by the level of SES was 165 (61.1%) and with poor SRH was 105 (38.9%). The number of persons with good SRH in comparison to same-aged people by level of SES was 135 (50%) and with poor SRH was 135 (50%). Concentration index of SRH in all level of SES was 0.061 (SE = 0.03). Also, Concentration index for SRH in comparison to same-aged people at different levels of SES was -0.044 (SE = 0.03).

**CONCLUSION:** The results of this study showed that there is inequality in SRH in a patient with breast cancer of the richest level of SES.

## Introduction

Health is certainly a basic need in all human societies [1]. Health equity is a well-accepted ethical and human rights principle; that all humans have a high level of health [2]. So, measuring health inequality is the main part of assessing the performance of a health system. Despite the significant improvements in many health indices in different countries during the past decades, health inequality has not only remained but also increased in some of them [3], [4]. Measuring levels of health and its distribution is necessary for understanding the

importance of the problem, evaluating the effect of interventions and monitoring progress [5].

In this study, we used SRH as an index to measure health [6] refers to a single item health measure that asks individuals to rate their health as excellent, good, moderate or poor. SRH is generally considered to be a valuable source of data on subjective health status and is popular due to its simplicity to collect [1], [2]. Compared to more detailed questionnaires as well as to clinical findings, SRH has been shown to have an approved validity and reliability in many studies [7]. Furthermore, its predictive value for mortality and morbidity in populations has been shown in some studies [8].

About 70% of deaths due to cancer occur in countries with a lower SES [9]. Over the past few decades, there has been a rapid growth in Asia's economic situation that has led to an increase in life expectancy and a reduction in mortality due to infectious diseases. In recent decades, the incidence of breast cancer has doubled or tripled in Japan, Korea and Singapore and has increased by more than 30% in China and India over the past few years [10], [11]. The SES and the level of education lead to a difference in the stage of breast cancer and subsequently its survival [12]. The SES refers to socio-economic factors such as education, income, and occupation, which can affect a person's or group's position in the community [13]. The relationship between inequality and health is one of the issues that is considered by many researchers. Inequality is an issue at the social level and imposes many costs on society [14].

Today, concentration index (CI) has the widest use in measuring inequity in health. This index expresses the magnitude of inequality in health or the use of health services in a single number that higher values represent higher levels of inequality [15].

The results of the studies indicate that the SRH, especially periodically, has a strong relationship with assessments of well-being, health outcomes and death [16]. So SRH has an important role in health improvement. To date, no study has been performed to assess the socioeconomic inequality in SRH in breast cancer with concentration index and decomposition method.

This study was conducted to evaluate socioeconomic inequality in SRH in women with breast cancer.

## Material and Methods

In this cross-sectional study (April to July 2018) 270 breast cancer patients that were admitted to one of the hospitals of Arak University Medical Sciences (Arak, Iran) were entered to the study using census. The inclusion criteria included patients who had the ability of communication and passed at least 1 month from the diagnosis date. Not completing the questionnaire and suffering from severe psychological illnesses that can impair the patients' cooperation were considered exclusion criteria.

We conducted a pilot study on 20 samples, and the sample size was calculated as 250 patients with indexes of  $\alpha = 0.05$ ,  $d = 1.5$ ,  $SD = 0.21$ . To counteract the possibility of sample loss during the study, 270 patients were requested to participate in the study.

After explaining the purpose of the study and the way of completing the questionnaire, the informed consent form was signed by qualified patients. Then, the necessary explanation, regarding the objectives of the study, was given to patients and the questionnaires were distributed among them.

The protocol of the study was approved by the ethics committee of the Shahid Beheshti University of Medical Sciences grant number IR.SBMU.RETECH.REC.1396.839.

Data collection was done by three questionnaires. At first, demographic and individual information of people including age, education, place of residence, etc. To examine the household social status an asset-based questionnaire used. This questionnaire including 10 questions: the level of woman education, the education of the spouse, the area of the infrastructure by households, the price per square meter of residential land, facilities and amenities (the personal car and computer) and the household income. The correlation of these factors with a total score was obtained 0.87 and the reliability was 0.88 [17].

The SRH was examined by two questions: 1) In general, what would you say your health is? It was measured with a Likert's type 5-point scale ranging from 'excellent' (score 1) to 'poor' (score 5). 2) How would you assess your general health status in comparison with your own age? Which included these responses: much worse, worse, slightly worse, not better, not worse, a little better, better and much better. Reliability and validity of this questionnaire have been assessed in other studies [18], [19], [20].

The Principle Components Analysis (PCA) was used to measure the SES. PCA is a multivariate statistical technique for reducing a set of consistent variables to a small number of non-consistent variables. The first component of the analysis of the most variance is explained among the variables and thus it is considered as an index of the SES of each individual (household). This component provides a score for each household, which reflects the SES of that household and can be used in analyzes [21], [22].

The inequity in the different levels of Socio-Economic Status (SES) in the studied patients affected to cancer was assessed by the Concentration (C) Index. C is constructed based on Concentration Curve (CC). The CC represents the SRH versus the concentration percentage of the y axis that are organized according to the SES of the poorest to the richest (axis x). CC will be a 45-degree line, which will be called the "equality line". If the SRH has more accumulation among the poor, the CC will be placed above the equality line, indicating the existence of inequality. According to the definition C is the area under the CC multiply by 2. Therefore, if the equity line and CC fit together, the C will be zero. When the CC is above the equity line, C has a negative sign and if it is bottom the equity line has a positive sign. The C

changes between the two -1 and +1 ranges [23], [24]. The C index is a common inequity measure in health outcomes and has been used continually in recent studies [23], [25], [26], [27], [28]. The C was calculated by the Kakwani *et al.*, formula [23]. [Formula 1].

$$C = \frac{2}{\mu} \sum_{t=1}^T f_t \mu_t R_t - 1,$$

In this formula,  $\mu$  is the mean of the SRH in studied patients with cancer and  $\mu_t$  is that for the  $t^{th}$  group. Also,  $f_t$  is the group share of patients. Also,  $R_t$  is the relative rank of the  $t^{th}$  educational level of the participating patients, which was obtained through formula 2:

$$R_t = \sum_{r=1}^T f_r - \frac{1}{2} f_t,$$

Therefore,  $R_t$  indicates the cumulative proportion up to the midpoint of each SES group interval. The correspondence confidence interval for C is calculated based on Wagstaff and Van Doorslaer method [23], [29], [30]. This method has been used in other studies [30], [31], [32], [33] and is as given below.

$$Var(C) = \frac{1}{n} \left[ \sum_{t=1}^T f_t a_t^2 - (1 + C) \right] + \frac{1}{n\mu^2} \sum_{t=1}^T f_t \sigma_t^2 (2R_t - 1 - C)^2$$

In this formula  $\sigma_t^2$  is the variance of  $\mu_t$ ,

$$a_t = \frac{\mu_t}{\mu} (2R_t - 1 - C) + 2q_{r-1} - q_t,$$

and  $q_t = \frac{1}{\mu} \sum_{r=1}^t \mu_r f_r$ , which is the ordinate of L (P),  $q_0 = 0$  and  $p_t = \sum_{r=1}^t f_r R_r$

## Results

Distribution of SRH by the level of SES has shown in Table 1. According to these results, 165 (61.1%) of women were with good SRH, and 105 (38.9%) persons were with poor SRH. 70% of persons with good SRH was in the richest level of SES. Between SES and SRH was a statistically significant relationship (p-value < 0.05).

**Table 1: Distribution of Self rated health by level of SES**

Education Level	Good SRH	Poor SRH	p-value
Poorest	48 (53.3)	42 (46.7)	0.046
Middle	54 (60)	36 (40)	
Richest	63 (70)	27 (30)	
Total/average	165 (61.1)	105 (38.9)	

Distribution of Self rated health in comparison to same-aged people by level of SES shown in table 2. According to these results, 135 (50%) of women were with good SRH, and 135 (50%) persons were with poor SRH. Also, distribution of persons in levels of SES was almost the same. Between SES and Self rated health in comparison to same-aged was not a statistical significant relationship (p-value > 0.05).

**Table 2: Distribution of Self rated health in comparison to same-aged people by level of SES**

Education Level	Good SRH	Poor SRH	p-value
Poorest	51 (56.7)	39 (43.3)	0.301
Middle	42 (46.7)	48 (53.3)	
Richest	42 (46.7)	48 (53.3)	
Total / average	135 (50)	135 (50)	

Concentration index, Standard error of C, and confidence interval of C, for SRH in different levels of SES shown in table 3. Concentration index of SRH in all level of SES was 0.061 (SE = 0.03). Also, this index for the poorest level of SES was 0.012 (SE = 0.053), for middle level of SES was 0.048 (SE = 0.052) and for the richest level of SES was 0 (0.048). The concentration index and 95% confidence interval for SRH was 0.061(-0.055 to 0.176) (Table 3), while table 4 showed that the C index for SRH in comparison to same-aged people was estimated as -0.044 (-0.124 to 0.036).

**Table 3: Calculation of Concentration index, Standard error of C, and confidence interval of C, for SRH in different levels of SES**

Group	f%	SE P	Quintile %	CUM-Quin	f-mu	Cum-f-mu	C Index
Poorest	0.533	0.053	0.333	0.333	0.178	0.178	0.012
Middle	0.6	0.052	0.333	0.667	0.2	0.378	0.048
Richest	0.7	0.048	0.333	1	0.233	0.611	0
Total/average	0.611	0.03	1		0.611		0.061

Concentration index, Standard error of C, and confidence interval of C, for SRH in comparison to same-aged people at different levels of SES shown in table 4. Concentration index for SRH in comparison to same-aged people at different levels of SES was -0.044 (SE = 0.03). Also, this index for the poorest level of SES was -0.022 (SE = 0.052), for middle level of SES, was -0.022 (SE = 0.053) and for the richest level of SES was 0 (0.053).

**Table 4: Calculation of Concentration index, Standard error of C, and confidence interval of C, for SRH in comparison to same-aged people at different levels of SES**

Group	f%	SE P	Quintile%	CUM-Quin	f-mu	Cum-f-mu	C Index
Poorest	0.567	0.052	0.333	0.333	0.189	0.189	-0.022
Middle	0.467	0.053	0.333	0.667	0.156	0.344	-0.022
Richest	0.467	0.053	0.333	1	0.156	0.5	0
Total/average	0.5	0.03	1		0.5		-0.044

## Discussion

Few studies have evaluated the socio-economic inequality in SRH. Our study is the first study that evaluates socioeconomic inequality in SRH

by the concentration index and decomposition methods. The results of our study showed a direct correlation between SRH inequalities with different levels of SES. In this study, two questions were asked for SRH. Also, the concentration index was evaluated at all three levels of SES. In the general SRH question, the number of 0.012 indicates an inequality in it. The positive sign shows that SRH is higher in people with higher SES. In the middle level of SES also was 0.048 that shown individuals with a higher SES have more SRH. In the question of health evaluation than same age C index was -0.022 both for weak and moderate SES which indicates the inequality at the SES levels in this question.

Similar to our results were reported in other studies. Cabieses et al. showed a significant concentration of above average SRHS favouring richer people in Chile in both years, which was less pronounced in 2013 than 2000. (Erreygers corrected CI 0.165 [Standard Error, SE 0.007] in 2000 and 0.047 [SE 0.008] in 2013). To help interpret the magnitude of this decline, adults in the richest fifth of households were 33% more likely than those in the poorest fifth to report above-average health in 2000, falling to 11% in 2013 [34]. Income is closely and strongly associated with health [35]. Previous research highlights the multidimensional effects of poor income in healthy population [36]. Absolute poverty directly affects health, including self-reported health [37]. Jung also showed how socio-demographic, socioeconomic, cancer related, and health information factors are associated with SRH by health information seeking/avoiding behaviour in a survey of 502 post-treatment cancer patients. Information avoiding behaviour, however, does not exhibit a negative contribution toward the relationship between SRH and SES [38]. McFadden et al. also showed the prevalence of poor or moderate (lower) self-rated health increased with increasing age in both men and women. There was a strong social class gradient: in manual classes, men and women under 50 years of age had a prevalence of lower self-rated health similar to that seen in men and women in non-manual social classes over 70 years old. Even after adjustment for age, educational status, and lifestyle factors (body mass index (BMI), smoking, physical activity and alcohol consumption), there was still strong evidence of a social gradient in self-rated health. There was a strong gradient of decreased SRH with age in both men and women [39].

SRH is generally considered to be a valuable source of data on health status, popular due to its simplicity to collect and its strong association with future mortality [40]. The social class gradient for chronic diseases such as cancer disease is well recognised [41].

Some qualitative studies have evaluated the processes through which individuals evaluate their health status [42], [43]. It appears that there may be important differences in people's perception of health

between socioeconomic groups. Men and women from higher social groups appeared to use a larger number of factors when assessing their health, including aspects such as being fit and active and the absence of illness, as well as aspects of well-being such as happiness and feeling in control [43].

This study has some limitations. The cross-sectional design limits conclusions on causality. Also individuals with major medical conditions that could potentially have confounded the relationship between SRH and SES. Similar to many inequality studies we use the measurement of the current status for assessment of SES (44), although the most emphasis is on the measurement of life-course SES [45]. Despite this limitation, this study provided good evaluate of SES inequality in SRH.

In conclusion, the inequality of SES affects self-rated health. High level of SES has more SRH. Also the level of SRH related to the level of SES. Regarding the importance of self-rated health in the process of improving the health of breast cancer patients, and based on the findings of this study, the impact of socio-economic inequalities on self-rated health is needed to make fundamental decisions and changes in health policy and to improve socio-economic status and to eliminate inequalities in the health field.

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