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

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Abstract

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].

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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

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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, μ is the mean of the SRH in studied patients with cancer and μ_t is that for the t^{he} group. Also, f_t is the group share of patients. Also, R_t is the relative rank of the tth educational level of the participating patients, which was obtained through formula 2:

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

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 σ_t^2 is the variance of μ_t,

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

and $q_t = \frac{1}{\mu}\sum_{r}^{t} \mu_r f_r$, 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)	
Middle	54 (60)	36 (40)	0.046
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)	
Middle	42 (46.7)	48 (53.3)	0.301
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

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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.

Acknowledgements

References

1. Marmot M, Health CoSDo. Achieving health equity: from root causes to fair outcomes. The Lancet. 2007; 370(9593):1153-63. https://doi.org/10.1016/S0140-6736(07)61385-3

2. Braveman P, Gruskin S. Defining equity in health. Journal of Epidemiology & Community Health. 2003; 57(4):254-8. https://doi.org/10.1136/jech.57.4.254 PMCid:PMC1732430

3. Ostlin P, Braveman P, Dachs N, Team WE, Health WTFoRPfEi. Priorities for research to take forward the health equity policy agenda. Bulletin of the World Health Organization. 2005; 83(12):948. PMid:16462988

4. Starfield B. Equity in health. Canadian Medical Association Journal. 2000; 162(3):346. PMid:10693592 PMCid:PMC1231015

5. Marmot M, Friel S, Bell R, Houweling TA, Taylor S, Health CoSDo. Closing the gap in a generation: health equity through action on the social determinants of health. The Lancet. 2008; 372(9650):1661-9. https://doi.org/10.1016/S0140-6736(08)61690-6

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6. Subramanian S, Ertel K. Is the use of self-rated health measures to assess health inequalities misleading? International Journal of Epidemiology. 2008; 37(6):1436-40. https://doi.org/10.1093/ije/dyn205 PMid:18812360

7. Lundberg O, Manderbacka K. Assessing reliability of a measure of self-rated health. Scandinavian journal of social medicine. 1996; 24(3):218-24. https://doi.org/10.1177/140349489602400314 PMid:8878376

8. Sugisawa H, Sugisawa A. Development of research on self-rated health in the United States. [Nihon koshu eisei zasshi] Japanese journal of public health. 1995; 42(6):366-78. PMid:7647354

9. WHO: Cancer. http//:www.who.int/cancer/en./.

10. Bhoo-Pathy N, Yip C-H, Hartman M, Uiterwaal CS, Devi BC, Peeters PH, et al. Breast cancer research in Asia: adopt or adapt Western knowledge? European journal of cancer. 2013; 49(3):703-9. https://doi.org/10.1016/j.ejca.2012.09.014 PMid:23040889

11. Porter P. "Westernizing" women's risks? Breast cancer in lower-income countries. New England Journal of Medicine. 2008; 358(3):213-6. https://doi.org/10.1056/NEJMp0708307 PMid:18199859

12. Chor JSY, Lam HCY, Chan A, Lee HM, Fok E, Griffiths S, et al. Socioeconomic disparity in breast cancer detection in Hong Kong–a high income city: retrospective epidemiological study using the breast cancer registry. PloS one. 2014; 9(10):e107630. https://doi.org/10.1371/journal.pone.0107630 PMid:25271739 PMCid:PMC4182676

13. Palència L, Espelt A, Rodríguez-Sanz M, Puigpinós R, Pons-Vigués M, Pasarín MI, et al. Socio-economic inequalities in breast and cervical cancer screening practices in Europe: influence of the type of screening program. International Journal of Epidemiology. 2010; 39(3):757-65. https://doi.org/10.1093/ije/dyq003 PMid:20176587

14. Sabbagh Kermani M. Health economics. Tehran: Samt; 2005: 31-43.

15. Doorslaer Ev, Koolman X, Jones AM. Explaining income-related inequalities in doctor utilisation in Europe. Health economics. 2004; 13(7):629-47. https://doi.org/10.1002/hec.919 PMid:15259043

16. Bath PA. Differences between older men and women in the self-rated health–mortality relationship. The Gerontologist. 2003; 43(3):387-95. https://doi.org/10.1093/geront/43.3.387 PMid:12810903

17. Garmaroudi GR, Moradi A. Socio-economic status in Iran: a study of measurement index. 2010.

18. Babones S. The consistency of self-rated health in comparative perspective. Public health. 2009; 123(2):199-201. https://doi.org/10.1016/j.puhe.2008.12.016 PMid:19201431

19. Chandola T, Jenkinson C. Validating self-rated health in different ethnic groups. Ethnicity and Health. 2000; 5(2):151-9. https://doi.org/10.1080/713667451 PMid:10984833

20. Eriksson I, Undén A-L, Elofsson S. Self-rated health. Comparisons between three different measures. Results from a population study. International journal of epidemiology. 2001; 30(2):326-33. https://doi.org/10.1093/ije/30.2.326 PMid:11369738

21. Filmer D, Pritchett L, editors. Estimating wealth effects without expenditure data—or tears. Policy Research Working Paper 1980, The World; 1998: Citeseer.

22. Vyas S, Kumaranayake L. Constructing socio-economic status indices: how to use principal components analysis. Health policy and planning. 2006; 21(6):459-68. https://doi.org/10.1093/heapol/czl029 PMid:17030551

23. Kakwani N, Wagstaff A, Van Doorslaer E. Socioeconomic inequalities in health: measurement, computation, and statistical inference. Journal of econometrics. 1997:87-103. https://doi.org/10.1016/S0304-4076(96)01807-6

24. Kakwani Nanak C, Kakwani Nanak C. Income Inequality and Poverty: Methods of Estimation and Policy Applications: Oxford University Press; 1980.

25. Hassanzadeh J, Mohammadbeigi A, Eshrati B, Rezaianzadeh A, Rajaeefard A. Determinants of inequity in health care services utilization in Markazi Province of Iran. Iranian Red Crescent Medical Journal. 2013; 15(5):363-70. https://doi.org/10.5812/ircmj.3525 PMid:24349720 PMCid:PMC3838642

26. Jadidi R, Mohammadbeigi A, Mohammadsalehi N, Ansari H, Ghaderi E. Inequity in timeliness of MMR vaccination in children living in the suburbs of Iranian cities. International Journal of Biomedical Science. 2015; 11(2):93-8. PMid:26199583 PMCid:PMC4502739

27. Kavosi Z, Mohammadbeigi A, Ramezani-Doroh V, Hatam N, Jafari A, Firoozjahantighi A. Horizontal inequity in access to outpatient services among Shiraz city residents, Iran. Journal of Research in Health Sciences. 2015; 15.

28. Ramezani Doroh V, Vahedi S, Arefnezhad M, Kavosi Z, Mohammadbeigi A. Decomposition of health inequality determinants in Shiraz, South-west Iran. Journal of Research in Health Sciences. 2015; 15(3):152-8. PMid:26411660

29. Wagstaff A, Van Doorslaer E. Measuring inequalities in health in the presence of multiple-category morbidity indicators. Health economics. 1994; 3(4):281-91. https://doi.org/10.1002/hec.4730030409 PMid:7994327

30. Mohammadbeigi A, Hassanzadeh J, Eshrati B, Mohammadsalehi N. Inequity in health; measurement indexes and application to the health care utilization data. Iranian Journal of Epidemiology. 2013; 9(2):1-14.

31. Mohammadbeigi A, Arsangjang S, Mohammadsalehi N, Anbari Z, Ghaderi E. Education-related inequity in access and utilization of oral health care in Iran. Journal of family medicine and primary care. 2015; 4(1):35-8. https://doi.org/10.4103/2249-4863.152248 PMid:25810987 PMCid:PMC4367004

32. Mohammadbeigi A, Hassanzadeh J, Eshrati B, Rezaianzadeh A. Decomposition of inequity determinants of healthcare utilization, Iran. Public Health. 2013; 127(7):661-7. https://doi.org/10.1016/j.puhe.2013.01.001 PMid:23608021

33. Mohammadbeigi A, Hassanzadeh J, Eshrati B, Rezaianzadeh A. Socioeconomic inequity in health care utilization, Iran. Journal of Epidemiology and Global Health. 2013; 3(3):139-46. https://doi.org/10.1016/j.jegh.2013.03.006 PMid:23932056

34. Cabieses B, Cookson R, Espinoza M, Santorelli G, Delgado I. Did socioeconomic inequality in self-reported health in Chile fall after the equity-based healthcare reform of 2005? A concentration index decomposition analysis. PloS one. 2015; 10(9):e0138227. https://doi.org/10.1371/journal.pone.0138227 PMid:26418354 PMCid:PMC4587959

35. Fritzell J, Rehnberg J, Hertzman JB, Blomgren J. Absolute or relative? A comparative analysis of the relationship between poverty and mortality. International journal of public health. 2015; 60(1):101-10. https://doi.org/10.1007/s00038-014-0614-2 PMid:25359309

36. Genovese C, Rezzonico A, Gualzata R. Absolute poverty and relative poverty. Krankenpflege Soins infirmiers. 2004; 97(11):65. PMid:15624607

37. Green D. Absolute poverty and child health in India. Public health. 2000; 114(6):495. https://doi.org/10.1016/S0033-3506(00)00396-6

38. Jung M. Associations of self-rated health and socioeconomic status with information seeking and avoiding behavior among post-treatment cancer patients. Asian Pac J Cancer Prev. 2014; 15(5):2231-8. https://doi.org/10.7314/APJCP.2014.15.5.2231 PMid:24716962

39. McFadden E, Luben R, Bingham S, Wareham N, Kinmonth A-L, Khaw K-T. Social inequalities in self-rated health by age: Cross-sectional study of 22 457 middle-aged men and women. BMC public health. 2008; 8(1):230. https://doi.org/10.1186/1471-2458-8-230 PMid:18611263 PMCid:PMC2491612

40. Singh-Manoux A, Dugravot A, Shipley MJ, Ferrie JE, Martikainen P, Goldberg M, et al. The association between self-rated health and mortality in different socioeconomic groups in the GAZEL cohort study. International Journal of Epidemiology. 2007; 36(6):1222-8. https://doi.org/10.1093/ije/dym170 PMid:18025034 PMCid:PMC2610258

41. Emberson JR, Whincup PH, Morris RW, Walker M. Social class differences in coronary heart disease in middle-aged British men: implications for prevention. International journal of epidemiology. 2004; 33(2):289-96. https://doi.org/10.1093/ije/dyh006 PMid:15082628

42. Idler EL, Hudson SV, Leventhal H. The meanings of self-ratings of health: A qualitative and quantitative approach. Research on aging. 1999; 21(3):458-76. https://doi.org/10.1177/0164027599213006

43. Krause NM, Jay GM. What do global self-rated health items measure? Medical care. 1994:930-42. https://doi.org/10.1097/00005650-199409000-00004 PMid:8090045

44. Pu C, Tang GJ, Huang N, Chou YJ. Predictive power of self-rated health for subsequent mortality risk during old age: analysis of data from a nationally representative survey of elderly adults in Taiwan. Journal of epidemiology. 2011; 21(4):278-84. https://doi.org/10.2188/jea.JE20100131 PMid:21606607 PMCid:PMC3899420

45. Chittleborough CR, Taylor AW, Baum FE, Hiller JE. Monitoring inequities in self-rated health over the life course in population surveillance systems. Am J Public Health. 2009; 99(4):680-9. https://doi.org/10.2105/AJPH.2008.141713 PMid:19197081 PMCid:PMC2661477

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