

# Self-Rated Health and its Impact on Survival of Older Adults

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## Abstract

**Background:** Self-rated health (SRH) is a subjective assessment of health status that results from asking a question as “How do you assess your health?”. The aim of this study was to determine the value of SRH for survival of older adults.

**Materials and Methods:** This cohort study was conducted among a population aged 60 years and over living in the north region of Iran. The participants’ characteristics including demographic information, life-style behaviors, medical history, body mass index, depressive symptoms, cognitive function, and social support were examined. SRH was categorized into two groups (1. poor or fair and 2. good or excellent). All of the study population were followed up again after 5 years to determine the survival condition.

**Results:** Totally, 1475 elderly people were included. Good or excellent SRH showed a significant association with male gender, to be married, higher physical activity, less co-morbid chronic disorders, no depressive symptoms, normal cognitive function, higher social support, smoking ( $P < 0.001$ ), and normal body mass index (BMI) ( $P = 0.021$ ); however, no significant association with age ( $P < 0.083$ ) was observed. Out of 944 elderly people expressing good or excellent SRH, 85 (9%) persons died after 5-year follow-up ( $P < 0.001$ ). Cox regression analysis revealed that SRH had a significant impact on mortality of older adults (adjusted hazard ratio = 1.447; 95% confidence interval: 1.008–2.076;  $P = 0.045$ ).

**Conclusion:** Considering health-related characteristics including age, gender, number of drugs the participant was taking, physical activity, BMI, and social support, SRH showed a significant effect on 5-year survival of older adults.

**Keywords:** Aged, quality of life, survival

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## INTRODUCTION

Self-rated health (SRH) is a subjective assessment of current health status and typically comes from asking a question such as “How do you rate your health status in general?” This simple question provides a summary measure of how an individual evaluates of his/her own health.<sup>[1-3]</sup>

The scale a person rates his/her current state of health might be affected by several factors, such as demographic, social, cultural, economic, and behavioral characteristics and physical, mental, and spiritual well-being. In senior adults, this scenario is more complex because of the physiologic and pathologic bio-psycho-social changes related to the ageing and the impact

of these changes on a person’s opinion about his/her own health status.<sup>[4-8]</sup>

A recent study among nearly 730.000 adults aged 40 years and over in the United States revealed that poor SRH more significantly affected the survival of younger persons compared to older peers, and the life expectancy of adults with an age less than 65 years who had poor SRH was approximately 5 to 15 years shorter than that of older adults.<sup>[1]</sup> Another research on nearly 12.000 middle- and old-age Chinese population reported a hazard ratio of 1.12–1.91 for the individuals with fair or poor SHR compared to those with better SRH.<sup>[9]</sup>

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Consideration of SRH for predicting the survival in old age has a long history; Mossey and Shapiro (1982) reported the significant effect of SRH for prediction of the mortality in old age, independently of objective health status. They showed that the risk of early and late mortality for persons with poor SRH was about three times that of those with excellent SRH.<sup>[10]</sup> Subsequent studies on different age groups of the adult population in different regions provided various findings.<sup>[1-3,5,7,9]</sup>

Although SRH consists of an easily understood and answered single item, it can be easily evaluated by the health team or researchers and does not require complex tools for assessment; little information about its use, especially in the elderly population, is available.<sup>[1]</sup> This research was conducted to assess the SRH of older adults and its value for predicting their survival.

## MATERIALS AND METHODS

### Study design

This cohort study was carried out on a population of 60 years and over living in Amirkola, north of Iran.

All the older adults ( $\geq 60$ ) in this region were invited to participate in the research; this invitation was conducted via a public announcement and through their related health centers (where they received health-care services) and family physicians. All people who agreed to participate in the research would include by census, if they had the research criteria. No sampling was performed.

### Participants

Inclusion criteria were an age of 60 years and over; living in Amirkola city, north of Iran; no decision to migrate from this region during the next 5 years; and to provide a written informed consent for participation in this cohort project.

Exclusion criteria were existence of severe or debilitating physical or mental illnesses that deprive the person to participate in the research examination programs and older adults (or their proxies) who did not want to contribute in the research.

### Study variables and measurement

Demographic and general characteristics including age, sex, level of education, marital status, smoking, and number of co-morbid chronic disorders were collected via direct interviews with the senior adults and/or a family member who had enough information about the participant. The number and type of drugs taken by the older adults were also recorded through interviews and observation of the physician prescribed and/or over-the-counter medications.

This question was asked to assess the SRH, "How do you rate your current health status?". Answers were classified into two groups: poor or fair and good or excellent.

The living condition was assessed by asking the question whether the elderly lives alone or with another person.

The body mass index (BMI) was calculated as weight (kg)/height (m)<sup>2</sup>. According to the classification of the World Health Organization, BMI in the range of 18.50 to 24.99 kg/m<sup>2</sup> was considered as normal, 25.00 to 29.99 as overweight, and more or equal to 30 as obese persons.<sup>[11]</sup>

Physical activity was assessed using the 12-item PASE (Physical Activity Scale for the Elderly) questionnaire. This scale examines three domains of physical activity: 1, recreational activity and the time spent for it; 2, home activities; and 3 workplace activities. The total score will be ranged from 0 to 400. A higher score indicates a higher level of physical activity.<sup>[12]</sup>

Depressive symptoms were examined using the 15-item GDS (Geriatric Depression Scale) questionnaire. Based on the scores obtained, people were categorized into the normal group (score 0–4), mild depression,<sup>[5-8]</sup> moderate,<sup>[9-11]</sup> and severe depression.<sup>[12-15,13]</sup>

Cognitive function was assessed with the Persian translation of the Mini-Mental State Examination (MMSE) questionnaire. This scale scores from 0 to 30; the score  $\geq 25$  is considered normal; 24–21, 20–10, and  $< 10$  indicate mild, moderate, and severe cognitive impairment, respectively. The validity and reliability of this scale have been approved in the Iranian population.<sup>[14]</sup>

Social support was measured using the 11-item Duke Social Support Index (DSSI), which consists two sub-scales: social interaction (four questions) and social satisfaction (seven items). For each question, a Likert scale is considered: score 1 means (rarely, or very dissatisfied), score 2 (sometimes, dissatisfied), and score 3 (most of the time, satisfied). Total social support will have a score of 11 to 33, and higher scores indicate a higher level of social support.<sup>[12]</sup>

The study variables were assessed in two times: baseline examination and 5 years (60 months) later.

In order to assess the research primary outcome (survival of the elderly), the participants were followed with various methods, including the databank of death registration system of Babol University of Medical Sciences, phone call to the participant's home, and obtaining information from the regional health centers and related family physicians.

### Statistical methods

Data were statistically analyzed using the SPSS-18 software package. The effect of SRH on the survival of older adults was assessed using the Kaplan–Meyer method and the log rank test. Chi-square test, *t*-test, and Pearson's correlation coefficient were also used to examine the relationship between SRH and other collected data. A *P* value less than 0.05 was considered significant.

## RESULTS

Totally, 1475 senior adults with a mean age of  $69.04 \pm 7.25$  (range of age from 60 to 92) years were included in the study.

Baseline characteristics of the participants are presented in Table 1. This table shows that male gender ( $P < 0.001$ ), to be married ( $P < 0.001$ ), and higher level of education ( $P = 0.007$ ) had a significant association with a better status of SRH in the elderly. With increasing age (up to 80 years old), SRH decreased, although the association of age with SRH was not statistically significant.

The association of SRH with BMI, living condition, physical activity, smoking, the number of chronic co-morbidities, drugs the participant was taking, social support, depressive symptoms, and cognitive function [Table 2] showed that living with others, higher level of physical activity, the lower number of drugs used and co-morbid chronic diseases, the absence of depressive symptoms, the higher level of social support ( $P = 0.001$ ), the normal range of BMI ( $P = 0.021$ ), and also normal cognitive function ( $P < 0.001$ ) had a significant association with better SRH levels.

Five-year follow-up of the participants revealed a significant difference about the survival between the two study groups. Among the participants with good or excellent SRH ( $n = 944$ ), 85 persons (9.00%) died; however, among the elderly with poor or fair SRH ( $n = 531$ ), 83 individuals (15.63%) died during this period ( $P = 0.001$ ) [Figure 1].

The results of the Cox regression analysis with entering the study variables (age, gender, number of drugs the participant was taking, physical activity, body mass index, and social support) in the equation revealed a significant effect of SRH on 5-year mortality of the older adults (adjusted hazard ratio: 1.447; 95% CI: 1.008–2.076;  $P = 0.045$ ).

## DISCUSSION

This research showed a significant association between better SRH and younger age, male gender, higher level of education, to be married, not living alone, smoking, higher

level of physical activity, normal BMI, less number of drugs the elderly was taking, less co-morbid chronic diseases, absence of depressive disorder or cognitive impairment, and higher social support. The older adults with the mentioned characteristics had a more favorable perception of their health status compared to others.

The association of SRH with age is similar to other studies such as Tetteh *et al.* in the population over 50 years of age in China,<sup>[15]</sup> Tajvar *et al.* in the central part of Iran,<sup>[16]</sup> and Hajian *et al.* in northern Iran<sup>[17]</sup> that SRH was declined with increasing age. Age impacts physical, mental, and social health, and with increasing age, different disorders and their complications are expected to be increased. Also, the elderly might have difficulties to carry out daily activities, and the

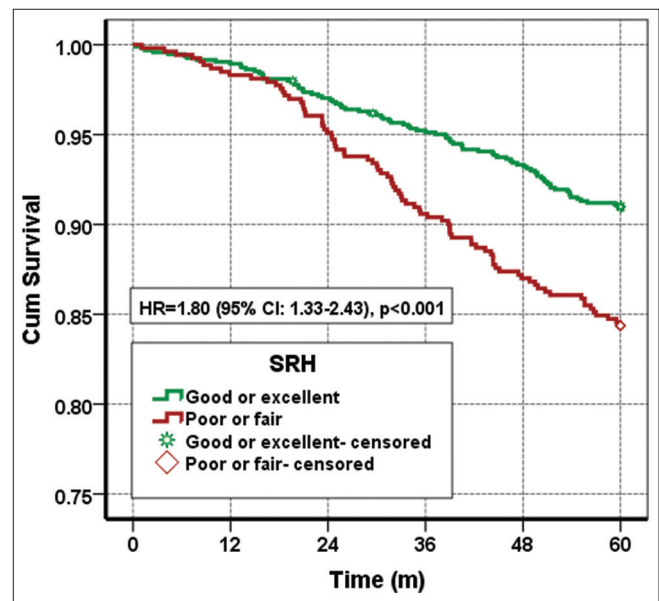


Figure 1: Mean survival rate in two groups of SRH

Table 1: Baseline characteristics of the study participants according to their SRH					
Characteristics	Total number	The status of SRH		P (t-test)	
		Good or excellent n=944 n (%)	Poor or fair n=531 n (%)		
Age (year)	60-64	544	365 (67.10)	0.083	
	65-69	312	209 (67.00)		
	70-74	256	158 (61.70)		
	75-79	227	129 (56.80)		
	80-84	93	56 (60.20)		
	≥85	43	27 (62.80)		
Gender	Male	810	620 (76.50)	<0.001	
	Female	665	324 (48.70)		
Level of education	Up to diploma	947	587 (62.00)	0.007	
	Diploma	426	278 (65.30)		
	College education	102	79 (77.50)		
Marital status	Married	1254	843 (67.20)	<0.001	
	Single, widowed, or divorced	221	101 (45.70)		

**Table 2: Association of SRH with living condition, life-style behaviors, social support, medical condition, and comorbidities of older adults**

Characteristics	Total number	The status of SRH		P (t-test)
		Good or excellent n=944 n (%)	Poor or fair n=531 n (%)	
BMI (kg/m <sup>2</sup> )	<25	479	314 (65.60)	0.021
	25-29.99	632	419 (66.30)	
	≥30	364	211 (58.00)	
Living condition	Living alone	103	50 (48.5)	0.001
	Living with other person	1372	894 (65.2)	
Physical activity (PASE* score)	<150	1160	702 (60.50)	0.001
	≥150	315	242 (76.80)	
Smoking	Yes	282	212 (75.20)	0.001
	No	1193	732 (61.40)	
The number of drugs the participant was taking	≤ 4	1055	745 (70.60)	0.001
	>4	420	199 (47.40)	
The number of chronic comorbidities	< 3	762	596 (78.20)	0.001
	≥3	713	348 (48.80)	
Social support (DSSI** score)	≤ 28	755	427 (55.80)	0.001
	>28	710	517 (72.80)	
Depressive disorders (based on GDS***)	Yes	630	283 (44.90)	0.001
	No	845	661 (78.2)	
Cognitive function	Normal	1012	721 (71.2)	<0.001
	Impaired	463	223 (48.2)	

\*PASE: Physical Activity Scale for the Elderly; \*\*DSSI: Duke Social Support Index; \*\*\*GDS: Geriatric Depression Scale

mentioned conditions cause a lower SRH at an older age compared to the younger group. In this study, with increasing age up to the age of 80, the SRH declined, but at older ages, this trend was no longer observed, perhaps because after the age of 80, the elderly have a less negative view of his/her existing conditions and adapt to different factors which influence the health.

In this study, males had a better status of SRH than females. Consistent with this finding, other studies such as Li *et al.*<sup>[18]</sup> and Tetteh *et al.* in China,<sup>[15]</sup> Ryou in South Korea,<sup>[19]</sup> Falk in some Asian and Latin American countries,<sup>[20]</sup> and Tajvar<sup>[16]</sup> and Hajian<sup>[17]</sup> in Iran reported better SRH in men compared with women. Iranian older women have more unfavorable socio-economic conditions including education and occupation than men. Also, inadequate physical activity might have a negative effect on their leisure time. Furthermore, higher prevalence of chronic diseases and depression<sup>[17]</sup> and more exaggerating health-related problems in women<sup>[21]</sup> can justify this difference between the two sexes.

In our study, the persons with a higher level of education reported their health better than people with a lower educational status. Some previous studies, including Li *et al.* in China,<sup>[18]</sup> Assari *et al.*<sup>[22]</sup> and Schellekens *et al.*<sup>[23]</sup> in the United States; Tiller in Germany,<sup>[24]</sup> and Hassanzadeh *et al.*,<sup>[25]</sup> Maharlouei *et al.*,<sup>[26]</sup> Tajvar *et al.*,<sup>[16]</sup> and Hajian *et al.*<sup>[17]</sup> in different regions of Iran also reported similar results. Education is an important measure directly and indirectly impacts a

person's health and the satisfaction with his/her situation. People with higher education usually have a more precise understanding of health condition and subsequently better recognition of diseases, adherence to preventive principles, and follow-up for treatment protocols, which can lead to health promotion and better SRH.<sup>[27]</sup>

The current study revealed that married elderly and individuals living with others reported their health status better than people who were single or living alone. Similar results have been reported in other studies such as Tetteh *et al.* in China<sup>[15]</sup> and Hajian in Iran<sup>[17]</sup>; however, the effect of marriage or living with others on the SRH may be different depending on the cultural, social, and economic characteristics of people.

Our finding showed a significant positive effect of smoking on SRH. A similar result was reported in a study conducted by Li *et al.* in China.<sup>[18]</sup> People who use tobacco may have a more prosperous life condition than non-smokers due to their economic and cultural status. Smoking may reduce a person's stress and keep him away from life's problems. Also, due to the lower level of education among smokers, they may not have a correct understanding of the adverse effects of smoking, and they do not consider tobacco use as an important cause of various diseases. These people attribute different disorders to aging, not to smoking.<sup>[18]</sup> On the other hand, in another study in this region, tobacco users were mostly men, and men reported better SRH than women.<sup>[28]</sup>



Contrary to us, Bazargan's research among older African American adults reported a worse SRH in smokers compared with non-smokers.<sup>[29]</sup>

In this study, people with a normal BMI and higher physical activity reported their health status better than individuals with overweight/obesity or inactivity. Similar results about the association of SRH and BMI have been reported in other studies such as Hellgren in Sweden<sup>[30]</sup> and Eun-sung in Korea.<sup>[31]</sup> Noh *et al.* demonstrated a different relationship between BMI and SRH in different East-Asian countries.<sup>[32]</sup> Similar findings about physical activity and SRH have been reported in the research of Fernandes in Brazil<sup>[33]</sup> and Johansson in Sweden.<sup>[34]</sup> It seems that inactivity and overweight or obesity predispose the elderly to different disorders and subsequently worse SRH. Fernandes *et al.*<sup>[33]</sup> and Johansson *et al.* reported better SRH in people with higher physical activity. Physical activity is mentioned as an important preventive factor of various disorders and can increase the person's well-being due to improvement to do daily activities and social participation.<sup>[35]</sup> However, in the study of Fonta *et al.* for investigating the factors influencing the SRH of elderly people in Ghana, an opposite finding was reported. In that research, older adults with obesity were ridiculed by others during exercise, and this caused them to not enjoy their free time; it gave a bad feeling to the person, and finally, the elderly had an inappropriate rating of his health condition.<sup>[36]</sup>

The elderly who took more drugs had a poorer self-rated health than others. This finding is similar to the results of other studies such as Bazargan *et al.* in the American elderly population.<sup>[29]</sup> Increasing age impacts consumption of various drugs due to the co-morbidity of chronic diseases.<sup>[33]</sup> Furthermore, drug interactions and side effects are expected to be more prevalent in old age, and it can even lead to higher health expenditure for the individual and his/her family. In addition, individuals with a higher number of co-morbid chronic diseases had worse SRH either as a result of the disease itself or because of the drugs used. The occurrence of the disease and its related problems limits the elderly's functional performance to do daily activities as well as frequent medical visits, and multiple and long-term hospitalizations impose financial impact and predispose them to have worse SRH.

This study revealed that SRH had a greater impact on mortality of the elderly than other research variables. Wuorela *et al.*, who conducted a prospective study in the Finnish elderly population, reported that individuals with poor SRH had an eight-fold increased risk of mortality, and SRH was reported as an important predictor of mortality.<sup>[3]</sup> In a study among Norwegian elderly, poor SRH had a hazard ratio as 2.51 for old age death.<sup>[2]</sup> In other studies among Polish<sup>[37]</sup> and Dutch,<sup>[38]</sup> elderly population SRH has been introduced as a strong predictor affecting the mortality of older adults. People with lower SRH have a higher mortality rate due to different physical conditions and lack of welfare and proper lifestyle.

SRH can be used as a dynamic assessment approach that shows the course of health, not just the current health of a person at a certain time, and since the subjective perception of a person is created by taking into account various effective factors during his life, it can be used as a screening method for high-risk people to promote their health condition.

### **Strengths and limitations**

The most important limitation of this study is not considering some other characteristics such as monthly income, insurance status, and geographical location of residence, which can have impacts on SRH. A large sample size, considering multiple factors affecting SRH, prospective design, and 5-year follow-up of the elderly, can be presented as strong points of this research.

### **Recommendations for future studies**

Large-scale projects with more long-term follow-up setting are recommended for future studies.

### **Practical implications and policymaking**

Given multiple factors which are associated with SRH of older adults, they should be considered in the health-care package of this population.

## **CONCLUSION**

Considering health-related characteristics including age, gender, number of drugs the participant was taking, physical activity, BMI, and social support, SRH showed a significant effect on 5-year survival of the older adults and can be presented as a proper predictor for mortality in old age.

### **Ethics approval and consent to participate**

Considering the inclusion and exclusion criteria of the project, all individuals were recruited, if they signed a written consent form.

This project has been approved by the Ethics Committee of Babol University of Medical Sciences with registration code IR-MUBABOL.HRI.REC.1399.121.

### **Availability of data and material**

The data are available with reasonable request.

### **Authors' contribution**

AB, SRH, and RG contributed in concepts and study design. SM and ZSH contributed in literature search. AB, ZSH, SRH, RG, and SM contributed in data acquisition. AB analyzed data. All authors contributed to the drafting and critical review of the manuscript and have approved the final draft of the manuscript to be published.

### **Data reproducibility**

The dataset presented in this research is available on request after the final publication.

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## Conflicts of interest

There are no conflicts of interest.

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