Original Article

Self-rated Health, Associated Factors and Diseases: A Community-based Cross-sectional Study of Singaporean Adults Aged 40 Years and Above

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Abstract

Introduction: Subjective indicators of health like self-rated health (SRH) have been shown to be a predictor of mortality and morbidity. We determined the prevalence of poor SRH in Singapore and its association with various lifestyle and socioeconomic factors and disease states. Materials and Methods: Cross-sectional survey by interviewer-administered questionnaire of participants aged 40 years and above. SRH was assessed from a standard question and categorised into poor, fair, good or excellent. Lifestyle factors, socioeconomic factors and presence of disease states were also assessed. Results: Out of 409 participants, 27.6% rated their health as poor or fair, 53.1% as good and 19.3% as excellent. Smaller housing-type (PRR: 1.64, 95% CI: 1.10-2.44) and lack of exercise (PRR: 1.54, 95% CI: 1.06-2.22) were found to be associated with poor SRH. Presence of chronic diseases such as coronary artery disease (PRR: 1.89, 95% CI: 1.13-3.17), diabetes mellitus (PRR: 1.85, 95% CI: 1.18-2.91), history of cancer (PRR: 2.15, 95% CI: 1.05-4.41) and depression (PRR: 1.73, 95% CI: 1.13-2.65) were associated with poor SRH. Conclusion: Prevalence and factors associated with poor SRH in Singapore was comparable to other developed countries. SRH is an important subjective outcome of health and has the potential for wider use in clinical practice in Singapore.

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Key words: Chronic diseases, Socioeconomic factors, Subjective health indicators

Introduction

Subjective health indicators including self-rated health (SRH) have been shown to improve patient care in the clinical setting[1] and are also useful in measuring quality of life and planning health policy.[2] Poor SRH is also a consistent predictor of cardiovascular disease and mortality across several populations.[3] Mossey and Shapiro first demonstrated that global self-rating of health was a better predictor of 7-year survival than medical records or self-reports of medical conditions in the Manitoba Longitudinal study.[4] Studies have also shown that the prevalence of poor SRH was higher in less developed countries[5] compared to more developed ones.[6-9] From studies conducted in Singapore,[10,11] the prevalence of poor SRH in Singapore in 2001 was reported at about 23%.[11] Several predictors of poor SRH have been previously reported, including lower education, socioeconomic status and lack of exercise.[12-14]

The last study on SRH among Singaporeans was done almost 6 years ago. To assess if this has changed over the last few years, we conducted a community-based study to provide information on the prevalence of poor or fair SRH among Singaporean adults aged 40 years and older, possible factors and disease states associated with poor SRH.

Materials and Methods

This was a community-based, cross-sectional survey in a local housing estate. The study area comprised of 26 blocks of Housing and Development Board (HDB) flats. Singapore citizens and permanent residents ≥40 years old were eligible. We excluded vacant flats, individuals with physical or mental illness that impaired their ability to communicate, pregnant and bedridden individuals. We selected study participants by 2-stage random sampling. First, 921 out of 3,000 (30.7%) households were randomly selected. For each selected household, we randomly selected 1 participant from each household out of all eligible individuals. Out of 921 households, 208 refused to be interviewed and 86 were non-contactable after 3 attempts. Two hundred and eighteen were excluded based on our exclusion criteria and a total of 409 participants were enrolled (response rate: 58.2%).

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At the time of recruitment, a face-to-face interview was conducted in the subject's home by a trained interviewer using a structured questionnaire in English/Chinese or English/Malay. The questionnaire took about 10 minutes to complete and was formulated based on questions from the National Health Survey.[15] Interviewer training was conducted with an emphasis on standardising the phrasing of questions with minimal prompting. The questionnaire also requested information on demographics, socio-economics and lifestyle practices. Selected chronic diseases and other risk factors in relation to SRH were also assessed.

SRH was assessed by asking a question with 4 possible answers on a numerical scale: "In general, how would you rate your overall health?" Respondents were asked to rate their health with a scale from 1 to 4, with 1 being 'poor' and 4 being 'excellent'. Age was defined as the age in years at the time of interview; education status was categorised into tertiary education and secondary education or below. Cigarette smoking was classified into never, past and current smokers based on related questions in the questionnaire. We measured the height, weight, waist and hip circumference and blood pressure (BP) of all participants. We standardised the procedures for obtaining these measurements among the interviewers.[16] Body mass index (BMI) was calculated as weight (kilogrammes) divided by the square of height (metres). Waist-hip ratio (WHR) was calculated by dividing the waist circumference by the hip circumference. Three readings of systolic and diastolic BP were taken and the mean of the last 2 values was used as the final value. Physical activity was assessed by asking the question if respondents performed any activities lasting more than 30 minutes each time or strenuous enough to work up sweat at least once a week. Physical activities also included housework or recreational activities that fulfilled the criteria. Hypertension and diabetes mellitus was defined as positive if it was physician diagnosed.

Statistical Analysis

Data analyses were performed by SPSS (Statistical Package for Social Sciences SPSS version 15.0, Chicago, Ill, USA). Certain continuous variables such as age were recorded into categorical variables (age groups). The prevalence rate, prevalence rate ratios (PRR) and 95% confidence intervals (CI) of poor SRH were calculated

Table 1. Characteristics of Study Population According to SRH Status

	Self-Rated Health Status (N = 409)					
	n	**Poor (%)**	**Fair (%)**	**Good (%)**	**Excellent (%)**	***P* value**
Gender						
Male	169	11(6.5%)	32(18.9%)	94(55.6%)	32(18.9%)	0.382
Female	240	10(4.1%)	60(25.0%)	123(51.3%)	47(19.6%)	
Total	409	21(5.1%)	92(22.5%)	217(53.1%)	79(19.3%)	
Race						
Chinese	342	17(5.0%)	84(24.5%)	184(53.8%)	57(16.7%)	0.051
Malay	44	2(4.5%)	4(9.1%)	22(50.0%)	16(36.4%)	
Indian/Others	23	2(8.7%)	4(17.4%)	11(47.8%)	6 (26.1%)	
Age group (y)						
40-49	96	3(3.1%)	25(26.1%)	53(55.2%)	15(15.6%)	0.121
50-59	107	5(4.7%)	25(23.4%)	56(52.3%)	21(19.6%)	
60-69	113	6(5.3%)	15(13.3%)	70(61.9%)	22(19.5%)	
≥70	93	7(7.5%)	27(29.0%)	38(40.9%)	21(22.6%)	
Type of HDB housing*						
1-2 room	88	9(10.2%)	26(29.6%)	31(35.2%)	22(25.0%)	0.002
3-room	214	7(3.3%)	42(19.6%)	122(57.0%)	43(20.1%)	
4-room and above	103	4(3.9%)	24(23.3%)	63(61.2%)	12(11.6%)	

* numbers do not add up to total due to missing values

Table 2. Determinants of Poor SRH by Socio-Demographic Variables

Variable	No. at risk	Poor SRH	Prevalence (%)	PRR	95% CI	*P* value
Living status*						
With other person(s)	349	93	26.7	1.00		0.22
Alone	58	20	34.5	1.29	(0.80-2.10)	
Marital status*						
With spouse	236	60	25.4	1.00		0.22
Without spouse	171	53	31.0	1.22	(0.84-1.76)	
Gender						
Male	169	43	25.4	1.00	(0.78-1.68)	0.41
Female	240	70	29.2	1.15		
Age groups (y)						
<70	316	79	25.0	1.00		0.06
≥70	93	34	35.6	1.46	(0.98-2.19)	
Race						
Non-Chinese	67	12	17.9	1.00		0.05
Chinese	342	101	29.5	1.65	(0.91-3.00)	
Qualifications obtained						
Tertiary education	78	15	19.2	1.00		0.07
Secondary School and below	330	97	29.9	1.53	(0.89-2.63)	
Working status						
Currently employed	175	43	24.6	1.00		0.434
Unemployed	89	25	28.1	1.14	(0.70-1.87)	
Housewives	145	45	31.0	1.26	(0.83-1.92)	
Household income						
Above $2000	161	38	23.6	1.00		0.243
Below $2000	219	64	29.2	1.24	(0.83-1.85)	
Housing type						
3-room and above	317	77	24.3	1.00		0.007
1-2 room	88	35	39.8	1.64	(1.10-2.44)	

* numbers do not add up to total due to missing values

for demographic factors, socioeconomic factors, lifestyle factors, chronic diseases and anthropometric measurements. For categorical variables, tests of significance were performed with the chi-square test to generate *P* values with significance set at 0.05. For continuous variables, we used analysis of variance and compared the mean value of the variable by SRH categories and tested for trends using multiple linear regression.

Results

Table 1 shows the characteristics of the study population according to SRH status. Of the 409 participants, 5.1% rated their health as poor, 22.5% as fair, 53.1% as good and 19.3% as excellent. We dichotomised the results into poor (poor and fair) and good (good and excellent) SRH, with 27.6% reporting poor SRH.

Table 2 shows the determinants of poor SRH by socio-demographic variables. We found no association between age, race, living arrangements, marital status, gender, level of education, working status and household income for poor SRH. The only variable found to be significantly associated with poor SRH was housing-type. Individuals living in 1 to 2 room flats (PRR, 1:64; 95% CI, 1.10-2.44) were more likely to report poor SRH as compared to those living in bigger flat-types.

Table 3 shows the determinants of poor SRH by lifestyle factors. For levels of physical activity, those who did not

Table 3. Determinants of Poor SRH by Lifestyle Factors

Lifestyle factor	No. at risk	No. with poor SRH	Prevalence (%)	PRR	95% CI	*P* value
Smoking						
Past/ Never smoker	349	95	27.2	1.00		0.899
Current smoker	60	18	30.0	1.10	(0.66-1.85)	
Amount smoked						
Heavy (>20 sticks/day)	26	4	15.4	1.00		0.031
Light (1-20 sticks/day)	34	14	41.2	2.68	(0.88-8.13)	
Alcohol consumption						
Yes	94	20	21.28	1.00		0.117
No	315	93	29.52	1.39	(0.86-2.25)	
Exercise						
Yes	246	56	22.76	1.00		0.007
No	163	57	34.97	1.54	(1.06-2.22)	

* numbers do not add up to total due to missing values

exercise were more likely to have poor SRH as compared to those who exercised at least once a week (PRR, 1.54; 95% CI, 1.06-2.22). There was no significant difference in proportion of poor SRH between current smokers when compared to past or never smokers. However, among current smokers, more light smokers (1 to 20 sticks/day) reported poor SRH (PRR, 2.92; 95% CI, 1.15-7.39) when compared to heavy smokers (>20 sticks/day). Other lifestyle variables such as alcohol consumption were not found to be significantly associated with poor SRH.

Table 4 shows determinants of poor SRH by disease states and anthropometric measurements. Those with previously known medical conditions were more likely to have poor SRH (PRR, 1.72; 95% CI, 1.12-2.64). Specific disease states significantly associated with poor SRH were coronary artery disease (PRR, 1.89; 95% CI, 1.13-3.17), diabetes mellitus (PRR, 1.85; 95% CI, 1.18-2.91), cancer (PRR, 2.15; 95% CI, 1.05-4.41) and depression (PRR, 1.73; 95% CI, 1.13-2.65). Individuals with diabetes mellitus, presence of complications, stroke and hypertension were not significantly associated with poor SRH in our study.

Individuals who were hospitalised in the last 6 months reported poor SRH (PRR, 1.52; 95% CI, 1.02-2.27). Individuals on long-term medication reported poor SRH (PRR, 1.65; 95% CI, 1.13-2.42), specifically those on long-term lipid lowering medications (PRR, 1.58; 95% CI, 1.05-2.37). We did not find associations between poor SRH and visits to a general practitioner in the last 6 months and long-term use of aspirin or anti-hypertensive medications. We also did not find any positive association between poor SRH and anthropometric measurements.

Discussion

Our community-based study of adults aged more than 40 years in Singapore showed the prevalence of poor SRH to be 27.6%. The following were found to be associated with poor SRH: smaller housing type, lack of exercise, presence of chronic diseases such as coronary artery disease, cancer, type 2 diabetes mellitus, depression and intake of cholesterol-lowering medication.

The prevalence of poor SRH in Singapore was generally similar or slightly higher than other developed countries.[7,17,18] However, it differed substantially from the findings of another study carried out in Pakistan[5] where 65.1% reported poor SRH. Similarities in lifestyle between Singaporeans and the developed world probably explain the lower prevalence of poor SRH in Singapore, a newly industrialised Asian country. We postulated that SRH could be an indicator of the comparable subjective health status of Singaporeans to other developed nations as well as an indirect indicator of similarities in socioeconomic status and public health investment by the government compared to other developed nations.

The prevalence of poor SRH was also higher when compared to a local study in 2001 among respondents above 18 years old where 23.2% reported poor SRH.[11] This difference between the 2 local studies may be due to factors such as differences in the study design, age distribution of study subjects, ethnic composition, socioeconomic status or it could be due to a true difference across time periods.

In our study, housing type was the only socioeconomic factor that had a statistically significant association with poor

Table 4. Determinants of Poor SRH by Disease States and Anthropometric Measurements

	No. at risk	No. with poor SRH	Prevalence (%)	PRR	95% CI	*P* value
Visited General Practitioner in past 6 months						
No	197	49	24.87	1.00		0.23
Yes	212	64	30.19	1.21	(0.84-1.76)	
Hospitalised in last 6 months						
No	316	78	24.68	1.00		0.014
Yes	93	35	37.63	1.52	(1.02-2.27)	
Presence of medical condition						
No	148	28	18.92	1.00		0.003
Yes	261	85	32.57	1.72	(1.12-2.64)	
Long-term medication						
No	210	44	20.95	1.00		0.002
Yes	199	69	34.67	1.65	(1.13-2.42)	
Coronary artery disease						
No	374	96	25.67	1.00		0.004
Yes	35	17	48.57	1.89	(1.13-3.17)	
On cholesterol / lipid lowering medication						
No	327	81	24.77	1.00		0.01
Yes	82	32	39.02	1.58	(1.05-2.37)	
On aspirin regularly within last 6 months						
No	378	102	26.98	1.00		0.453
Yes	30	10	33.33	1.24	(0.65-2.37)	
Hypertension*						
No	150	37	24.67	1.00		0.326
Yes	243	71	29.22	1.18	(0.80-1.76)	
Stroke						
No	396	109	27.53	1.00		0.759
Yes	13	4	30.77	1.12	(0.41-3.03)	
Diabetes mellitus						
No	357	89	24.93	1.00		0.001
Yes	52	24	46.15	1.85	(1.18-2.91)	
Diabetes mellitus with complications						
No	24	9	37.50	1.00		0.153
Yes	26	15	57.69	1.54	(0.67-3.52)	
History of cancer						
No	395	105	26.58	1.00		0.012
Yes	14	8	57.14	2.15	(1.05-4.41)	
Depression or depressive symptoms†						
No	340	86	25.29	1.00		
Yes	64	28	43.75	1.73	(1.13-2.65)	0.003
Anthropometric Measurements						
Body mass index (kg/m2)*						
Less than 25.0	266	70	26.3	1.00		0.888
25.0-29.9	97	27	27.8	1.06	(0.68-1.65)	
30.0 and above	37	11	29.7	1.13	(0.60-2.13)	
Waist-hip ratio						
If male ≤1.0 or female ≤0.85	278	69	24.82	1.00		0.114
If male >1.0 or female >0.85	110	36	32.73	1.32	(0.88-1.97)	
Waist circumference (cm)*						
For male <102 cm or female < 88 cm	299	77	25.75	1.00		0.177
If male ≥102 cm or female ≥88 cm	91	30	32.96	1.28	(0.84-1.95)	

* numbers do not add up to total due to missing values

†Depression categorised based on either clinical diagnosis or presence of depressive symptoms

SRH. Unlike previous studies, socioeconomic parameters associated with poor SRH such as household income levels[19] and level of education[14] did not have a significant association in our study. It is possible that housing type is a more reliable subjective health-related socioeconomic variable in Singapore as compared to income and educational status.[20] Alternatively, the lack of association between other socioeconomic variables and poor SRH in the current study could be due to a low sample size causing low statistical power to detect any association.

For lifestyle factors, lack of exercise was found to be associated with poor SRH. This was similar to other research.[10] Current smoking was not associated with poor SRH in the comparison with 'never' or 'former' smokers. On further analysis amongst current smokers, light smoking (1 to 20 sticks/day) was statistically associated with poor SRH when compared to heavy smoking (>20 sticks/day). A previous large study that examined the relation between smoking and poor SRH suggested that compared to 'never' smokers, only 'former' smokers were significantly associated with poor SRH but not current smokers.[12] Our sample size did not allow categorisation of smoking into 'current', 'former' and 'never' groups in the analysis. From our results, we hypothesise that light smokers in our study might be smoking to a lesser extent as a consequence of poor health.

We found statistically significant associations between poor SRH and a number of disease states – coronary artery disease,[21] diabetes mellitus,[22] cancer[23] and depression[7] as well as for intake of cholesterol lowering medication. Conditions which were associated with poor SRH tended to have direct and easily observable manifestations of morbidity. However, we did not find a significant association between poor SRH and hypertension.[23] In our study, a substantial proportion of participants (20%) were classified as having hypertension based on our BP measurements. Hence, these participants could have made choices regarding their SRH without knowing their hypertensive status. As hypertension is largely a silent disease,[15] we postulated that hypertensive patients from our study might be unaware of the possible complications and morbidities associated with hypertension. These 2 factors may explain the lack of association between hypertension and poor SRH. This could also be interpreted that SRH might not predict morbidity for persons who were 'unaware' of their chronic conditions.

Several potential confounders including age, gender and race could be associated with poor SRH. For coronary artery disease (age-adjusted PRR, 1.75; 95% CI, 1.03-2.96), the magnitude of confounding was 7.4%. We therefore concluded that the confounding effect of age is not substantial (less than 10%).

The main limitation in our study is the small sample size which might not allow for sufficient power to detect potential associations. Due to age-restriction (≥40 years old), our findings might not be generalisable to younger age-groups. We minimised selection bias by random sampling and cluster bias was also reduced by a 2-staged random sampling. Interviewer bias was minimised by providing training for all involved on the exact method of questionnaire administration and usage of instruments. The non-response bias was minimised by visiting non-contactable houses at least 3 times. Temporal bias, which is inherent in all cross-sectional studies, meant that our results could not show any causal association.

Our study is one of few studies on SRH in Singapore and provides a platform for future studies, both locally and around the region. It explores another method of exploring differences in health status among different population groups. Subjective health outcomes have the potential to be incorporated into clinical practice in future as it gains a wider acceptance among clinicians as a quick and accurate method to assess patients' perception of overall health status. Population health surveys have started incorporating SRH together with objective health indicators. Improving subjective indicators, along with objective ones, should be considered as a potential long-term public health strategy by national health agencies. Future research could provide evidence of cause-effect relationships of various factors with poor SRH and the association between poor SRH and mortality among Singaporeans.

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Conflict of interest

There are no conflicts of interest related to this manuscript

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