

Self-rated health of institutionalized elderly in Kuala Lumpur

Abstract

Aims: There is a growing number of institutionalized elderly in Malaysia. This group of elderly are commonly not included in population based surveys, thus little is known about their health and well-being. This study aims to determine the self-rated health of the elderly living in institutions and the associated factors.

Methodology: This cross-sectional study was conducted in 2014, in eight elderly institutions in Kuala Lumpur. The institutions were selected randomly, and the participants were selected through stratified proportionate sampling. A total of 203 residents participated in this study. Chi-square test was used for univariate analysis and binary logistic regression was used for multivariate analysis. *P*value less than 0.05 were considered statistically significant.

Results: The prevalence of poor self-rated health was 39.9%, while 60.1% had good self-rated health. Factors significantly associated with self-rated health included educational level (OR=2.1, 95%CI=1.18-3.74), adequate physical activity (OR=0.4, 95%CI=0.22-0.81) outdoor leisure activity (OR=0.4, 95%CI= 0.21-0.82), visual impairment (OR=1.9, 95%CI= 1.06-3.52), chronic pain (OR= 2.4, 95%CI=1.35-4.27), diabetes (OR=1.9, 95%CI=1.03-3.49) heart disease (OR=4.2, 95%CI=1.25-13.74), renal failure (OR=11.5, 95%CI= 1.38-94.89), fall (OR=2.9, 95%CI= 1.28-6.48) hospitalization (OR=4.9, 95%CI= 2.43-9.86) co-morbidities (OR=3.2, 95%CI=1.30-761), and satisfaction with access to healthcare (OR=0.3 95%CI= 0.17-0.79).

Conclusion: This study revealed a high prevalence of poor self-rated health among residents in these institutions. Factors significantly associated with self-rated health were mostly co-morbidities. There is need for interventions targeted at improving healthcare services and leisure activities for residents of these institutions.

Key words: Elderly, Kuala Lumpur, Self-rated health, Institutionalized, Malaysia

50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98

1. Introduction

In most nations of the world, the population of people aged 60 years and above is increasing rapidly than the other age groups. Thus ageing has become a global phenomenon, with an estimated population of two billion elderly in 2050 [1]. Asia is forecasted to become one of the oldest geographical regions of the world with an elderly population of one billion half way through the 21st century [1]. In Malaysia, the population of the elderly was 2.4 million (8.2%) in 2012. This is further anticipated to increase exponentially, and by 2030 the country will become an ageing nation with the elderly population constituting about 15% of the entire population [2].

This gradual demographic shift in Malaysia has resulted to a rise in the prevalence of non-communicable diseases (NCDs), as well as other profound consequences on various social, economic and political processes [1]. Aging can bring about a gradual deterioration of not only physical and mental health, but also a reduction in social participation and increased dependence [3, 4]. Thus the elderly usually require special care than the younger age groups, and as a result, there has been a growing interest in the wellbeing of the elderly.

Self-rated health (SRH) has become a well know indicator for general health. Among the elderly, it is a vital predictor of survival [5]. It is a subjective measurement of health, denoting an individual's perception of their general health, and encompassing the biological, mental, social and functional aspects of health [6]. The subjective nature of SRH implies that it can be influenced by the norms and expectations that people (individuals, groups and societies) have about health, as well as cultural factors, and as a result may not reflect objective health status [7]. However, subjective ratings of general health have been reported to be a good predictor of objective health status [8]. Rohrer et al. [9] reported that SRH is a central patient-oriented outcome, and an essential outcome indicator in primary care. SRH is also an important disease risk screening tool [10]. Evidence from previous studies have linked SRH to diseases, disability, functional decline, future health, demographics, rate of aging, and mortality [6, 11, 12, 13, 14]

Studies on SRH have focused more on developed countries. Due to the recognition of the importance of assessing SRH in developing countries, researchers are beginning to evaluate it in Asia and other developing parts of the world. Debpuur et al. [15] in a study among elderly residents of Kassena-Nankana District in Ghana found an association between SRH and gender, household wealth and functional ability. A study conducted in Thailand [16] reported psychosocial symptoms, chronic diseases, and functional status as the most significant factors associated with SRH. Another study conducted in Singapore [17] found out that socioeconomic variables as well as health behaviors are significantly associated with SRH. Despite this growing research on SRH in Asia, it remains under researched in Malaysia [18]. The few studies conducted in Malaysia have only targeted community dwelling elderly and focused mainly on the association between socio-demographic variables and SRH. There is therefore the need to assess the SRH of elderly living in institutions because they are usually not included in population based surveys. Furthermore, a paramount environmental factor in the life of an elderly is the place of residence. It determines access to health care, and other social norms. Place of residence has the capacity to affect health and perception of health. This implies that the health and perception of health of elderly in institutions would differ from those living in communities. Therefore it is imperative to determine the general health of this group of elderly who not only live in these institutions, but mostly depend on them to provide the needed care. Knowledge of this would guide the planning and delivery of health interventions aimed at improving the overall health and wellbeing of this population. This

99 study aims to determine the SRH of institutionalized elderly in Malaysia, and also determine
100 factors associated with it.

101

102 **2. Materials and methods**

103 2.1 Study population

104 This study was conducted in elderly institutions in Kuala Lumpur, Malaysia. These
105 institutions are elderly homes managed by non-governmental and non-profit organizations.
106 The homes are managed mostly in a similar manner. They do not provide nursing services,
107 thus they mostly accept people who are self-manageable. They depend mostly on charitable
108 donations from the public which could be in the form of cash donations, services, clothing,
109 and food. The residents in these homes share certain common characteristics; they were either
110 abandoned in hospitals within the capital or they were poor and unable to pay for a home.
111 They are transferred to these homes by the hospitals, some are taken to the homes by friends,
112 relatives, neighbors, and in some cases by the department of social welfare Malaysia. Health
113 services are mostly provided by medical volunteers free of cost. These medical volunteers
114 visit intermittently, and their activities are mostly limited to physical examination

115 2.2 Sampling and data collection

116 This cross-sectional study was carried out in eight institutions in Kuala Lumpur, Malaysia.
117 The research data was collected in September through November 2014. Using a sampling
118 frame of thirteen elderly homes, eight homes were selected by simple random
119 sampling. About 420 elderly resided in the selected homes. Following this, stratified
120 proportionate sampling was used to select the participants, using each home as a strata. A
121 total of 203 residents participated in this study. Those excluded in this study were residents
122 aged less than 60 years, residents unable to understand Chinese, Malay or English, residents
123 who did not give written consent and those that had cognitive impairment. Information on
124 cognitive impairment was obtained from the files of residents. Participants in each home were
125 selected randomly using a sampling frame of eligible participants of each home. All those
126 selected participated in the study. Data collection was by face interview and it was conducted
127 by trained research assistants. Detailed information about the study methodology, including
128 sample size calculation and the services and facilities in these institutions have been reported
129 in a previous study by Onunkwor et al. [19].

130 2.3 Outcome variable

131 SRH was determined by asking participants whether they perceived their general health as
132 excellent, good, fair, or poor. This variable was dichotomized to good (excellent and good)
133 and poor (fair and poor) for the purpose of analysis. Previous studies [6, 15] have evaluated
134 SRH similarly. The question on SRH was asked first before questions on other health
135 conditions.

136 2.4 Independent variables

137 The socio-demographic variables in this study included age, gender, ethnicity, marital status
138 (married, unmarried, separated, widowed, divorced) educational level (primary education
139 refers to completion of 5-6 years of basic education, secondary education refers to completion
140 of 5-7 years of junior and senior secondary education, tertiary education refers to completion
141 of post-secondary education leading to conferment of an academic degree or professional
142 certification), pension, economic status (poor, intermediate, good), and previous employment
143 sector (unemployed, self-employed, government sector, private sector). Other variables
144 included physical activity, hospitalization, falls, outdoor-leisure activity, accommodation type
145 (twin-sharing, ward-type), duration of residence in the home, satisfaction with conditions of
146 living place, satisfaction with healthcare access and chronic co-morbidities. For the purpose
147 of data analysis some variables were dichotomized; age was categorized into 60-69 years and
148 70 years and over, marital status was grouped into married and single (single included

149 unmarried, separated and widowed, divorced), economic status was grouped into good and
150 poor (poor and intermediate), educational level was grouped into none/primary and
151 secondary/tertiary education, satisfaction with condition of living place was grouped into
152 satisfied (very satisfied and satisfied) and dissatisfied (very dissatisfied, dissatisfied and
153 neither satisfied nor dissatisfied), satisfaction with access to healthcare was also grouped into
154 satisfied (very satisfied and satisfied) and dissatisfied (very dissatisfied, dissatisfied and
155 neither satisfied nor dissatisfied). Data on pension was obtained by asking participants
156 whether they received pension or not. Data on economic status was obtained by asking
157 participants whether they perceived their present economic status as good, intermediate or
158 poor. Adequate Physical activity in this study was defined as weekly performance of not less
159 than 75 minutes of high-intensity exercise or 150 minutes of moderate-intensity exercise [20].
160 Data on hospitalization was obtained by asking participants if they had been hospitalized in
161 the last six months. Regarding history of falls, participants were asked if they had
162 experienced falls in the past six months. Leisure activities that occurred outside the elderly
163 home not less than two times a month, which could include trips to recreational parks, movie
164 theatre among others was defined as outdoor leisure activity, with the exception of hospital
165 visits. For accommodation type, twin sharing accommodation housed two people in a room
166 while ward-type accommodation housed over two people in a room. Data on satisfaction with
167 condition of living place and satisfaction with access to health services was obtained
168 similarly by asking residents whether they were very satisfied, satisfied, neither satisfied nor
169 dissatisfied, dissatisfied or very dissatisfied with the condition of their living place and access
170 to health care. Data on chronic diseases was obtained through self-report of previous
171 diagnosis by a doctor or healthcare professional. Reported co-morbidities included; stroke,
172 heart disease, renal failure, hearing impairment, visual impairment, chronic pain, diabetes and
173 hypertension. For chronic pain, participants were asked if they have had any persistent pain
174 for over six months [21]. “Co-morbidities yes” represent participants who reported at least
175 one chronic co-morbidity while “co-morbidity no” represent participants that did not report a
176 co-morbidity. Data was collected through face to face interview in Chinese, Malay and
177 English languages, using trained speakers of each language. Before the commencement of the
178 actual study, a pilot study was carried out.

179 2.5 Ethical approval and consent to participate

180 This research was approved by the International Medical University Joint-Committee on
181 Research and Ethics in August 2014. Prior to the commencement of the study, the
182 management of each elderly home gave permission for the study to be conducted in the
183 homes. The purpose of the study was clearly explained to all participants and each participant
184 signed a written consent sheet.

185 2.6 Statistical analysis

186
187 Data was analyzed using Statistical Package for Social Sciences (version 20.0) for Windows.
188 Categorical variables were expressed as proportions and frequencies. Chi-square test was
189 used for univariate analysis while binary logistic regression was used for multivariate
190 analysis. Results of the analysis were expressed as odds ratios (OR) and 95% confidence
191 interval (CI) of the OR. The OR represents odds of having poor SRH. From the univariate
192 analysis, only statistically significant variables with p-value less than 0.05 were included in
193 the multivariable analysis. The variables were all included at the same time in one model for
194 the multivariate analysis. The independent variables included in the multivariate analysis
195 were; educational level, adequate physical activity, outdoor leisure activity, visual
196 impairment, chronic pain, diabetes, heart disease, renal failure, fall, stroke, hospitalization,
197 co-morbidities, and satisfaction with access to healthcare. The dependent variable was SRH.

198 Also in the multiple logistic regression analysis only variables with p-value less than 0.05
 199 were considered statistically significant. Multicollinearity was checked for.

200 **3. Results**

201 The minimum age for this study was 60 years and the maximum was 95 years. The average
 202 age was 71.5 (± 6.8). Table 1 shows some of the characteristics of the participants. Over half
 203 of the participants were females (64.5%). Only 13.3% of the participants attained tertiary
 204 level of education, 46.8% had secondary level of education, 22.2% had primary level of
 205 education, and 17.7% had no formal education. Thirty-six percent (36%) were satisfied with
 206 the conditions of their living place, and 45.8% had resided in an elderly home for two years
 207 or more. Only 13.3% of the participants rated their health as excellent. Majority (46.8%) had
 208 good SRH while 30% and 9.9% had fair and poor SRH respectively. After dichotomizing
 209 SRH, 60.1% had good SRH (excellent and good), while 39.9% had poor SRH (fair and poor).

210 **Table 1: Characteristics of participants**

| Variable | Groups | Excellent N (%) | Good N (%) | Fair N (%) | Poor N (%) | Total N (%) |
|-----------------------------------|-----------------|--------------------|---------------|---------------|---------------|----------------|
| Age | 60-69 years | 15 (16) | 42 (44.7) | 28 (29.8) | 9 (9.6) | 94 (46.3) |
| | ≥ 70 years | 12 (11) | 53 (48.6) | 33 (30.3) | 11 (10.1) | 109 (53.7) |
| Gender | Female | 6 (8.3) | 33 (45.8) | 25 (34.7) | 8 (11.1) | 72 (35.5) |
| | Male | 21 (16) | 62 (47.3) | 36 (27.5) | 12 (9.2) | 131 (64.5) |
| Ethnicity | India | 5 (29.4) | 9 (52.9) | 1 (5.9) | 2 (11.8) | 17 (8.4) |
| | Malay | 0 (0) | 4 (66.7) | 1 (16.7) | 1 (16.7) | 6 (3.0) |
| | Chinese | 21 (11.9) | 81 (45.8) | 58 (32.8) | 17 (9.6) | 177 (87.2) |
| | Others | 1 (33.3) | 1 (33.3) | 1 (33.3) | 0 (0) | 3 (1.5) |
| Marital status | Unmarried | 11 (16.9) | 27 (41.5) | 21 (32.3) | 6 (9.2) | 65 (32.2) |
| | Married | 14 (11.2) | 65 (52) | 34 (27.2) | 12 (9.6) | 125 (61.6) |
| | Widowed | 0 (0) | 2 (50) | 1 (25) | 1 (25) | 4 (2) |
| | Separated | 0 (0) | 0 (0) | 4 (80) | 1 (20) | 5 (2.5) |
| | Divorced | 2 (50) | 1 (25) | 1 (25) | 0 (0) | 4 (2.0) |
| Educational level | Tertiary | 3 (11.1) | 10 (37) | 12 (44.4) | 2 (7.4) | 27 (13.3) |
| | Secondary | 12 (12.6) | 49 (51.6) | 27 (28.4) | 7 (7.4) | 95 (46.8) |
| | Primary | 6 (13.3) | 25 (55.6) | 10 (22.2) | 4 (8.9) | 45 (22.2) |
| | None | 6 (16.7) | 11 (30.6) | 12 (33.3) | 7 (19.4) | 36 (17.7) |
| Previous employment sector | Unemployed | 2 (33.3) | 2 (33.3) | 2 (33.3) | 0 (0) | 6 (3.0) |
| | Self | 8 (13.3) | 25 (41.7) | 20 (33.3) | 7 (11.7) | 60 (29.6) |
| | Private | 12 (9.7) | 64 (51.6) | 37 (29.8) | 11 (8.9) | 124 (61.1) |
| | Government | 5 (38.5) | 4 (30.8) | 2 (15.4) | 2 (15.4) | 13 (6.4) |

211

212

213 **Table 1: Characteristics of participants cont.**

| Variable | Groups | Excellent N (%) | Good N (%) | Fair N (%) | Poor N (%) | Total N (%) |
|------------------------|--------------|--------------------|---------------|---------------|---------------|----------------|
| Pension | Yes | 5 (26.3) | 8 (42.1) | 3 (15.8) | 3 (15.8) | 19 (9.4) |
| | No | 22 (12) | 87 (47.3) | 58 (31.5) | 17 (9.2) | 184 (90.6) |
| Economic status | Good | 1 (7.7) | 4 (30.8) | 6 (46.2) | 2 (15.4) | 13 (6.4) |
| | Intermediate | 3 (17.6) | 7 (41.2) | 7 (41.2) | 0 (0) | 17 (8.4) |

| | | | | | | |
|---|--------------|-----------|-----------|-----------|-----------|------------|
| | Poor | 23 (13.3) | 84 (48.6) | 48 (27.7) | 18 (10.4) | 173 (85.2) |
| Accommodation type | Twin-sharing | 1 (5) | 16 (80) | 3 (15) | 0 (0) | 20 (9.9) |
| | Ward-type | 26 (14.2) | 79 (43.2) | 58 (31.7) | 20 (10.9) | 183 (90.1) |
| Duration of residence | < 2 years | 14 (12.7) | 52 (47.3) | 31 (28.2) | 13 (11.8) | 110 (54.2) |
| | ≥ 2 years | 13 (48.1) | 43 (46.2) | 30 (32.3) | 7 (7.5) | 93 (45.8) |
| Outdoor leisure activity | Yes | 23 (14.5) | 80 (50.3) | 42 (26.4) | 14 (8.8) | 159 (78.3) |
| | No | 4 (9.1) | 15 (34.1) | 19 (43.2) | 6 (13.6) | 44 (21.7) |
| Physical activity | Yes | 16 (25) | 31 (48.4) | 11 (17.2) | 6 (9.4) | 64 (31.5) |
| | No | 11 (7.9) | 64 (46) | 50 (36) | 14 (10.1) | 139 (68.5) |
| Satisfaction with conditions of living place | Satisfied | 8 (11) | 38 (52.1) | 18 (24.7) | 9 (12.3) | 73 (36) |
| | Dissatisfied | 19 (14.6) | 57 (43.8) | 43 (33.1) | 11 (8.5) | 130 (64.0) |

214

215 Table 2 showing the medical history of the participants indicates that 45.3% had
 216 hypertension, 8.4% had history of stroke, 6.9% had history of heart disease, 3.9% had history
 217 of renal failure, 16.7% had hearing impairment, 32% had visual impairment, 48.8% had
 218 chronic pain, 30% had diabetes, and 14.3% had history of falls. Only 17.2% of the
 219 participants reported no chronic co-morbidity, 12.8% reported one chronic co-morbidity,
 220 20.7% reported two, and 49.3% reported three or more chronic co-morbidity. Only 23.6% of
 221 the participants were hospitalized in the past three months. Majority of the participants
 222 (76.8%) were dissatisfied with access to healthcare.

223 **Table 2: Medical history of participants**

| Variable | Groups | Excellent N (%) | Good N (%) | Fair N (%) | Poor N (%) | Total N (%) |
|---------------------------|--------|--------------------|---------------|---------------|---------------|----------------|
| Stroke | Yes | 1 (5.9) | 5 (29.4) | 6 (35.3) | 5 (29.4) | 17 (8.4) |
| | No | 26 (14) | 90 (48.4) | 55 (29.6) | 15 (8.1) | 186 (91.6) |
| Heart disease | Yes | 1 (7.1) | 3 (21.4) | 8 (57.1) | 2 (14.3) | 14 (6.9) |
| | No | 26 (13.8) | 92 (48.7) | 53 (28) | 18 (9.5) | 189 (93.1) |
| Renal failure | Yes | 0 (0) | 1 (12.5) | 6 (75) | 1 (12.5) | 8 (3.9) |
| | No | 27 (13.8) | 94 (48.2) | 55 (28.2) | 19 (9.7) | 195 (96.1) |
| Hearing impairment | Yes | 2 (5.9) | 17 (50) | 11 (32.4) | 4 (11.8) | 34 (16.7) |
| | No | 25 (14.8) | 78 (46.2) | 50 (29.6) | 16 (9.5) | 169 (83.3) |
| Visual impairment | Yes | 3 (4.6) | 29 (44.6) | 24 (36.9) | 9 (13.8) | 65 (32.) |
| | No | 24 (17.4) | 66 (47.8) | 37 (26.8) | 11 (8) | 138 (68) |
| Chronic pain | Yes | 8 (8.1) | 41 (41.4) | 40 (40.4) | 10 (10.1) | 99 (48.8) |
| | No | 19 (18.3) | 54 (51.9) | 21 (20.2) | 10 (9.6) | 104 (51.2) |
| Diabetes | Yes | 3 (4.9) | 27 (44.3) | 24 (39.3) | 7 (11.5) | 61 (30) |
| | No | 24 (16.9) | 68 (47.9) | 37 (26.1) | 13 (9.2) | 142 (70) |
| Falls | Yes | 1 (3.4) | 10 (34.5) | 13 (44.8) | 5 (17.2) | 29 (14.3) |
| | No | 26 (14.9) | 85 (48.9) | 48 (27.6) | 15 (8.6) | 174 (85.7) |
| Hypertension | Yes | 12 (13) | 40 (43.5) | 30 (32.6) | 10 (10.9) | 92 (45.3) |
| | No | 15 (13.5) | 55 (46.8) | 31 (27.9) | 10 (9.0) | 111 (54.7) |

224 **Table 2: Medical history of participants cont.**

| Variable | Groups | Excellent | Good | Fair | Poor | Total |
|-----------------------|--------|-----------|-----------|-----------|------|------------|
| co-morbidities | Yes | 17 (10.1) | 77 (45.8) | 56 (33.3) | 18 | 168 (82.8) |

| | | | | | | |
|---|--------------|-----------|-----------|-----------|-----------|------------|
| | | | | | (10.7) | |
| | No | 10 (28.6) | 18 (51.4) | 5 (14.3) | 2 (5.7) | 35 (17.2) |
| Satisfaction with access to healthcare | Satisfied | 10 (21.3) | 26 (55.3) | 8 (17) | 3 (6.4) | 47 (23.2) |
| | Dissatisfied | 17 (10.9) | 69 (44.2) | 53 (34) | 17 (10.9) | 156 (76.8) |
| Hospitalization | Yes | 0 (0) | 15 (31.3) | 25 (52.1) | 8 (16.7) | 48 (23.6) |
| | No | 27 (17.4) | 80 (51.6) | 36 (23.2) | 12 (7.7) | 155 (76.4) |

225

226 3.1 Factors associated with SRH in **Univariate analysis**

227 Table 3 shows the Univariate analysis. Educational level was significantly associated with
 228 SRH, those with no education or primary education were two times more likely to have poor
 229 SRH compared to those with secondary or tertiary education (OR= 2.1, 95%CI= 1.18-3.74,
 230 $P= .01$). Those who had adequate physical activity were significantly less likely to have poor
 231 SRH (OR= 0.4, 95% CI= 0.22-0.81, $P= 0.008$). Those who engaged in outdoor leisure
 232 activity were less likely to have poor SRH, and this association was significant (OR= 0.4,
 233 95% CI= 0.21-0.82, $P= 0.01$). Among the chronic co-morbidities, there was a significant
 234 association between SRH and stroke (OR=3.0, 95% CI= 1.08-8.57, $P= 0.03$), visual
 235 impairment (OR= 1.9, 95% CI= 1.06-3.52, $P= 0.03$), chronic pain (OR= 2.4, 95% CI= 1.35-
 236 4.27, $P= 0.003$), diabetes (OR= 1.9, 95% CI= 1.03-3.49, $P= 0.04$), heart disease (OR= 4.2,
 237 95% CI= 1.25-13.74, $P= 0.01$), renal failure (OR= 11.5, 95% CI= 1.38-94.89, $P= 0.005$).
 238 Those that had one or more chronic co-morbidity were three times more likely to have poor
 239 SRH compared to those without chronic co-morbidity, and this association was statistically
 240 significant (OR= 3.2, 95% CI= 1.30-7.61, $P= 0.008$). Those satisfied with access to
 241 healthcare were less likely to have poor SRH compared to those dissatisfied, and this
 242 association was statistically significant (OR= 0.3, 95% CI= 0.17-0.79, $P= 0.008$). Falls (OR=
 243 2.8, 95% CI= 1.28-6.48, $P= 0.008$), and recent history of hospitalization (OR= 4.9, 95% CI=
 244 2.43-9.86, $P= 0.001$) were significantly associated with SRH.

245 **Table 3: Factors associated with SRH in univariate analysis**

| Variable | Poor SRH N (%) | Good SRH N (%) | OR | 95% CI of OR | P-value |
|--------------------------|-------------------|-------------------|-----|-----------------|---------|
| Age | | | | | |
| 60-69 years | 37 (39.4) | 57 (60.6) | 0.9 | 0.55-1.69 | 0.88 |
| ≥ 70 years | 44 (40.4) | 65 (59.6) | | | |
| Gender | | | | | |
| Female | 33 (45.8) | 39 (54.2) | 1.5 | 0.82-2.62 | 0.20 |
| Male | 48 (36.6) | 83 (63.4) | | | |
| Marital status | | | | | |
| Single | 35 (44.9) | 43 (55.1) | 1.4 | 0.78-2.48 | 0.25 |
| Married | 46 (36.8) | 79 (63.2) | | | |
| Educational level | | | | | |
| None/primary | 41 (50.6) | 40 (49.4) | 2.1 | 1.18-3.74 | 0.01 |
| Secondary/tertiary | 40 (32.8) | 82 (67.2) | | | |
| Economic status | | | | | |
| Poor | 73 (38.4) | 117 (61.6) | 0.4 | 0.12-1.23 | 0.1 |
| Good | 8 (61.5) | 5 (38.5) | | | |
| Pension | | | | | |
| Yes | 6 (31.6) | 13 (68.4) | | | |

| | | | | | |
|-----------------------------------|-----------|------------|-----|-----------|-------|
| No | 75 (40.8) | 109 (59.2) | 0.7 | 0.24-1.84 | 0.43 |
| Adequate physical activity | | | | | |
| Yes | 17 (26.6) | 47 (73.4) | 0.4 | 0.22-0.81 | 0.008 |
| No | 64 (46.0) | 75 (54.0) | | | |
| Outdoor leisure activity | | | | | |
| Yes | 56 (35.2) | 103 (64.8) | 0.4 | 0.21-0.82 | 0.01 |
| No | 25 (56.8) | 19 (43.2) | | | |

246

247

Table 3: Factors associated with SRH in univariate analysis cont.

| Variable | Poor SRH N (%) | Good SRH N (%) | OR | 95% CI | P-value |
|---|-------------------|-------------------|------|------------|---------|
| Duration of residence | | | | | |
| < 2 years | 44 (40.4) | 66 (60.0) | 1.0 | 0.57-1.77 | 0.97 |
| ≥ 2 years | 37 (39.8) | 56 (60.2) | | | |
| Satisfaction with conditions of living place | | | | | |
| Satisfied | 27 (37.0) | 46 (63.0) | 0.8 | 0.46-1.48 | 0.52 |
| Dissatisfied | 54 (41.5) | 76 (58.5) | | | |
| Hypertension | | | | | |
| Yes | 40 (43.5) | 52 (56.5) | 1.3 | 0.74-2.31 | 0.34 |
| No | 41 (36.9) | 70 (63.1) | | | |
| Hearing impairment | | | | | |
| Yes | 15 (44.1) | 19 (55.9) | 1.2 | 0.58-2.59 | 0.58 |
| No | 66 (39.1) | 103 (60.9) | | | |
| Visual impairment | | | | | |
| Yes | 33 (50.8) | 32 (49.2) | 1.9 | 1.06-3.52 | 0.03 |
| No | 48 (34.8) | 90 (65.2) | | | |
| Chronic pain | | | | | |
| Yes | 50 (50.5) | 49 (49.5) | 2.4 | 1.35-4.27 | 0.003 |
| No | 31 (29.8) | 73 (70.2) | | | |
| Diabetes | | | | | |
| Yes | 31 (50.8) | 30 (49.2) | 1.9 | 1.03-3.49 | 0.03 |
| No | 50 (35.2) | 92 (64.8) | | | |
| Renal failure | | | | | |
| Yes | 7 (87.5) | 1 (12.5) | 11.5 | 1.38-94.89 | 0.005 |
| No | 74 (37.9) | 121 (62.1) | | | |

248

249

250

Table 3: Factors associated with SRH in univariate analysis cont.

| Variable | Poor SRH N (%) | Good SRH N (%) | OR | 95% CI | P-value |
|---------------|-------------------|-------------------|-----|-----------|---------|
| Fall | | | | | |
| Yes | 18 (62.1) | 11 (37.9) | 2.9 | 1.28-6.48 | 0.008 |
| No | 63 (36.2) | 111 (63.8) | | | |
| Stroke | | | | | |
| Yes | 11 (64.7) | 6 (35.3) | | | |

| | | | | | |
|---|-----------|------------|-----|------------|--------|
| No | 70 (37.6) | 116 (62.4) | 3.0 | 1.08-8.57 | 0.02 |
| Satisfaction with access to healthcare | | | | | |
| Satisfied | 11 (23.4) | 36 (76.6) | 0.3 | 0.17-0.79 | 0.008 |
| Dissatisfied | 70 (44.9) | 86 (55.1) | | | |
| Hospitalization | | | | | |
| Yes | 33 (68.8) | 15 (31.3) | 4.9 | 2.43-9.86 | 0.0001 |
| No | 48 (31.0) | 107 (69.0) | | | |
| Heart disease | | | | | |
| Yes | 10 (71.4) | 4 (28.6) | 4.2 | 1.25-13.74 | 0.013 |
| No | 71 (37.6) | 118 (62.4) | | | |
| Chronic comorbidities | | | | | |
| Yes | 74 (44.0) | 94 (56.0) | 3.2 | 1.30-7.61 | 0.008 |
| No | 7 (20.0) | 28 (80.0) | | | |

251 OR (Odds ratio) represents the odds of having poor SRH and 95%CI represents the 95% confidence interval of
252 the OR

253 3.2 Factors associated with SRH in multivariable analysis

254 The multivariable analysis is shown in table 4. From the **univariate** analysis, the statistically
255 significant variables were all included at the same time in one model for the multivariable
256 analysis. The variables in table 4 are the statistically significant variables from the
257 multivariable analysis. The total sample size (N) included in this model was 203. Those with
258 chronic pain were twice more likely to have poor SRH compared to those without chronic
259 pain (OR= 2.2, 95% CI= 1.15-4.31, *P*= 0.01). Those with heart disease were four times more
260 likely to have poor SRH compared to those without heart disease (OR= 4.7, 95% CI= 1.33-
261 17.27, *P*= 0.02). Those with renal failure were thirteen times more likely to have poor SRH
262 compared to those without renal failure (OR= 9.9, 95% CI= 2.56-10.7, *P*= 0.05). Those with
263 history of fall were twice more likely to have poor SRH (OR= 2.6, 95% CI= 1.09-6.56, *P*=
264 0.03). Those with history of hospitalization were four times more likely to have poor SRH
265 (OR= 3.0, 95% CI= 1.94-8.78, *P*= 0.0001). Those satisfied with access to healthcare were
266 less likely to have poor SRH (OR= 0.3, 95% CI= 0.15-0.86, *P*= 0.02). These associations
267 were statistically significant.

268 **Table 4: Factors associated with Poor SRH in multivariate analysis**

| Variable | OR | 95% CI | P-value |
|--|-----|------------|---------|
| Chronic pain (Yes) | 2.2 | 1.15-4.31 | 0.01 |
| Heart disease (Yes) | 4.7 | 1.33-17.27 | 0.02 |
| Renal failure (Yes) | 9.9 | 2.56-10.7 | 0.05 |
| Fall (Yes) | 2.6 | 1.09-6.56 | 0.03 |
| Hospitalization (Yes) | 3.0 | 1.94-8.78 | <0.0001 |
| Satisfaction with access to healthcare (satisfied) | 0.3 | 0.15-0.86 | 0.02 |

269 Binary logistic regression was used for data analysis, N=203, the reference group was “no” for the first five
270 variables and “dissatisfaction” was the reference group for the last variable. OR (Odds ratio) represents the odds
271 of having poor SRH and 95%CI is the 95% confidence interval of the odds ratio

272

273

274 4. Discussion

275 The prevalence of good SRH in this study was 60.1% while 39.9% had poor SRH. The
276 prevalence of poor SRH is considerable higher in this study compared to that reported in a
277 study by Chan et al. [18] among community dwelling adults in Malaysia (20.1%). A possible
278 reason for the difference could be because the study by Chan et al. [18] was conducted
279 among adults eighteen years and above while the present study was conducted among older

280 adults 60 years and above. Older adults are more susceptible to chronic diseases which could
281 have a negative impact on health and perception of health. Another possible reason could be
282 because the residents in these homes had poor access to healthcare. They mostly depend on
283 medical volunteers to provide health services. These medical volunteers visit intermittently,
284 and their activities are mostly limited to physical examination. The difference in prevalence
285 rates between both studies could also be attributed to the variances in the wording of the
286 response categories of the outcome variable. It has been reported that SRH scales using
287 different measures are not directly comparable [22], thus comparing such scales should be
288 done with caution. On the other hand, the prevalence of poor SRH in this study is
289 comparable to that reported in a study by Damian et al. [23] which reported a 45% prevalence
290 of poor SRH among institutionalized elderly people in Spain.

291 4.1 Sociodemographic variables and SRH

292 Age was not significantly associated with SRH in this study, however those aged 60-69 years
293 were less likely to have poor SRH compared to those aged 70 years or more. The odds of
294 developing chronic diseases increases with age thus health usually deteriorates with age, and
295 this could impact perception of general health. Previous studies have also reported poorer
296 health status among older age groups when compared to younger groups [24, 25]. Gender was
297 not significantly associated with SRH in this study although women were more likely to have
298 poor SRH compared to men. Previous studies [26, 27] have reported poorer SRH among
299 women when compared to men. This gender differences in SRH has been attributed to higher
300 prevalence rates of chronic diseases and other mental disorders such as depression and
301 anxiety among women when compared to men. There was no association between economic
302 status and SRH in this study. Previous studies [28, 29] have reported an association between
303 economic status and SRH. A good economic status could improve access to healthcare,
304 reduce the incidence and prevalence of diseases, and even mortality. Although some residents
305 perceived their economic status as good, they were still incapable of meeting most of their
306 health needs. As a result of this, they were mostly dependent on the elderly homes and the
307 medical volunteers to provide the needed medical services. Educational level was
308 significantly associated with SRH. Those with no education or primary education were
309 twice more likely to have poor SRH compared to those with secondary/tertiary level of
310 education. This is because of the positive impact of higher educational level on health. Higher
311 educational level has been linked to healthy behaviors [30], better coping strategies and
312 mental resilience [31]. Therefore it is possible that the residents in these homes with higher
313 educational level are better informed about healthy behaviours and ways they could improve
314 their health. Ocampo-Chaparro et al. [6] in a study in Colombia and Chan et al. [18] in a
315 study in Malaysia reported a similar relationship between education and SRH. Physical
316 activity was significantly associated with SRH in this study. Previous studies [32, 33] have
317 also found an association between physical activity and SRH. The benefits of physical
318 activity among the elderly includes reduced risk of cardiovascular diseases, diabetes, cancers,
319 risk of falling, functional limitations, improved cardiorespiratory and muscular fitness,
320 cognitive function, bone health among others [20]. Outdoor leisure activity was significantly
321 associated with SRH. Those that participated in outdoor leisure activities were less likely to
322 have poor SRH compared to those that did not. This is probable because those that were able
323 to participate in outdoor leisure activities had more opportunities to interact with people
324 outside the home and in a friendlier environment. This could improve psychological feelings.
325 A study by Ryan et al. [34] reported that outdoor activities can bring about increased energy
326 and sense of vitality, which can lead to increased resilience to physical and mental illness. It
327 is also important to note that participation in outdoor leisure activity and physical activity
328 may be directly hampered by poor health

329 4.2 Health conditions and SRH

330 History of falls was significantly associated with SRH in this study. Falls could be
331 deleterious. It could lead to injuries (fractures, and brain injuries) and hospitalization. It also
332 leads to “Post-fall Syndrome”, a condition characterized by depression, restriction in routine
333 activities, dependence, and confusion [35]. In the absence of proper medical care those that
334 experience falls are likely going to suffer some of these consequences associated with falls
335 and this could affect their general health. A study by Confortin et al. [36] also reported better
336 SRH among participants without history of falls. The authors attributed the poor SRH among
337 participants with history of falls to loss of autonomy, dependence on others for activities of
338 daily living, and feelings of insecurity and low self-esteem which occurs as a result of falls.
339 Those with visual impairment were more likely to have poor SRH, and this association was
340 statistically significant. This is perhaps because visual impairment can limit participation in
341 certain activities such as exercises, trips to movie theatres or even trips to the recreational
342 park. Visual impairment can also increase risk of falls, and dependence in certain activities of
343 daily living. Previous studies [37, 38] have also found a significant association between
344 visual impairment and SRH. Wang et al. [37] in his study in Australia linked visual
345 impairment to greater independence in activities of daily living, increased loneliness and
346 hospitalization. Hypertension was not significantly associated with SRH in this study. This
347 could be because residents perceive hypertension to be a condition that is naturally associated
348 with aging rather than a serious medical condition, thus when they compare themselves with
349 people with other health conditions they consider severe, they are likely to perceive their
350 health as good. A study by Rahman et al. [39] conducted in eight Asian countries including
351 Malaysia reported a lack of urgency in the control of hypertension among participants due to
352 the perception of the disease. A study by Ocampo-Chaparro et al. [6] also found an
353 insignificant association between SRH and hypertension. In contrast, other studies [18, 29]
354 have reported a significant association between hypertension and SRH. This study reported
355 an association between some health conditions and SRH. Chronic pain, heart disease, renal
356 failure, stroke, and diabetes were significantly associated with SRH. Renal failure was one of
357 the most significant predictors of poor SRH. Previous studies [18, 29, 40, 41, 42] have also
358 found a significant association between SRH and chronic conditions such as heart diseases,
359 renal failure, diabetes, chronic pain and stroke. This is because people with chronic diseases
360 suffer physically and mentally. They experience pain, discomfort, physical limitations which
361 could lead to increased dependence and social isolation, anxiety, depression and stress.
362 Chronic diseases could also lead to adjustment of lifestyle and life aspirations. Studies have
363 also shown that chronic diseases negatively affect quality of life [43, 44]. Those that had
364 recent history of hospitalization were four times more likely to have poor SRH and this
365 association was statistically significant. This is perhaps because those with recent history of
366 hospitalization had a co-morbidity which negatively affects their general health. For some of
367 the residents that were previously abandoned in hospitals, returning to such environment
368 could trigger negative feelings and cause distress. Confortin et al. [36] reported a link
369 between hospitalization and SRH in a study in Brazil.

370 Satisfaction with access to healthcare was significantly associated with SRH in this study.
371 Those satisfied with access to healthcare were less likely to have poor SRH. This could be
372 because those dissatisfied with access to healthcare have a co-morbidity or some other health
373 conditions and are not getting the desired medical care. In contrast, those satisfied with access
374 to health care could be free of any severe medical condition thus would be content with the
375 physical examination provided by medical volunteers that visit these homes occasionally.
376 Goins et al. [45] in a study conducted in USA reported an association between SRH and
377 access to healthcare.

378 This study provides an insight into the health status of elderly in these institutions. The
379 findings of this study show residents in these institutions have poor access to health care, and

380 comparatively poorer health when compared to the general populace. Poor access to
381 healthcare will invariably lead to increased chronic diseases morbidity and mortality. This
382 emphasis the need for proper management of chronic diseases, improved healthcare and
383 welfare services for residents in these institutions. There is need for policy makers to step in
384 and incorporate residents of these homes in holistic interventions targeted at improving their
385 health and wellbeing. The interventions should strive to improve access to healthcare and
386 should also include health education programs to teach and improve healthy behavior. This
387 could provide an opportunity for the residents to know more about their health, improve
388 practice of preventive medicine, prevent deterioration of health and unnecessary
389 hospitalization. Credit must be given to the medical volunteers and the administrators of these
390 homes who endeavor to provide as much medical care as they can.

391 The limitations of this study include the study design, which is cross-sectional in which the
392 causal relationship between the variables cannot be established. In addition, dichotomizing
393 SRH did not provide information about individual differences between the different response
394 categories. The study only included institutions in Kuala Lumpur and as a result of this, the
395 findings may not reflect the situation in the entire country. Future research should include a
396 representative sample from the whole country. Longitudinal studies will better clarify the
397 direction of association between SRH and the associated factors. In addition future studies
398 should clinically examine residents to determine the true prevalence of chronic diseases.

399 **Conclusion**

400 This study revealed a high prevalence of poor SRH among residents of these institutions.
401 Among the socio-demographic variables, only educational level was significantly associate
402 with SRH. Physical activity, outdoor-leisure activity, chronic diseases, chronic pain, and
403 dissatisfaction with access to healthcare were all significantly associated with SRH. These
404 findings highlight the impact of co-morbidities on the general health of residents in these
405 institutions. There is a need for improved health access to meet some of the needs of these
406 residents.

407 **References**

- 408 1. United Nations Department of Economic and Social Affairs, Population Division.
409 World Population Ageing 2013.
- 410 2. Zawawi R. Active ageing in Malaysia. The second meeting of the committee on
411 international cooperation on active ageing. Malaysia 2013.
- 412 3. World Health Organization. Mental health and older adults. Available from
413 <http://www.who.int/mediacentre/factsheets/fs381/en/>. 2017.
- 414 4. American Psychological Association. Older adults' health and age-related changes.
415 Available from <http://www.apa.org/pi/aging/resources/guides/older.aspx>. 2017
- 416 5. Burstrom B, Fredlun P. Self-rated health: Is it as good a predictor of subsequent
417 mortality among adults in lower as well as in higher social classes? *Journal of*
418 *Epidemiology & Community Health*. 2001; 55(11), 836-840.
- 419 6. Ocampo-Caparro. Self-rated health: Importance of use in elderly adults. *Colombia*
420 *Medica*. 2010; 41(3), 275-289.
- 421 7. Van Ginneken JK, Groenewold G. A Single vs. Multi-Item Self-Rated Health Status
422 Measure: A 21-Country Study. *The Open Public Health Journal*. 2012; 5(1):1-9.
423
- 424 8. Meng Q, Xie Z, Zhang T. A Single-Item Self-Rated Health Measure Correlates with
425 Objective Health Status in the Elderly: A Survey in Suburban Beijing. *Frontiers in*
426 *Public Health*. 2014.
- 427 9. Rohrer JE, Arif A, Denison A, Young R, Adamson S. Overall self-rated health as an
428 outcome indicator in primary care. *Journal of Evaluation of Clinical Practice*. 2007;
429 13:882-888.
430

- 431 10. May M, Lawlor DA, Brindle, Patel R, Ebrahim S. Cardiovascular disease risk
432 assessment in older women: can we improve on Framingham? British Women's Heart
433 and Health prospective cohort study. *Heart*. 2006; 92:1396-1401.
- 434 11. Jylhä M, Guralnik JM, Balfour J, Fried LP. Walking difficulty, walking speed, and
435 age as predictors of self-rated health. *The Journals of Gerontology Series A:
436 Biological Sciences and Medical Sciences*. 2001; 56:M609-M617.
- 437 12. Lee Y. The predictive value of self-assessed general, physical, and mental health on
438 functional decline and mortality in older adults. *Journal of Epidemiology and
439 Community Health*. 2000; 54:123-129.
- 440 13. Wilcox VL, Kasl SV, Idler EL. Self-rated health and physical disability in elderly
441 survivors of a major medical event. *Journal of Gerontology Series B: Psychological
442 Sciences and Social Sciences*. 1996; 51B:S96-S104.
- 443 14. Idler L, Kasl S. Self-ratings of health: Do they also predict change in functional
444 ability? *Journal of Gerontology Series B: Psychological Sciences and Social Sciences*.
445 1995; 50B:S344-S353.
- 446 15. Debpuur C, Welaga P, Wak G, Hodgson A. Self-reported health and functional
447 limitations among older people in the Kassena-Nankana District, Ghana. *Global
448 Health Action Supplement*. 2010; 2, 54-63.
- 449 16. Haseen F, Adhikari R, Soonthorndhada K. Self-assessed health among Thai elderly.
450 *BMC Geriatrics*. 2010; 10:30.
- 451 17. Lim W, Ma S, Heng D, Bhalla V, Chew SK. Gender, ethnicity, health behaviour &
452 self-rated health in Singapore. *BMC Public Health*. 2007; 7:184.
- 453 18. Chan Y, Teh C, Lim K, Lim KH, Yeo PS, Kee CC. et al. Lifestyle, chronic diseases
454 and self-rated health among Malaysian adults: results from the 2011 National Health
455 and Morbidity Survey (NHMS). *BMC Public Health*. 2015; 15(1).
- 456 19. Onunkwor O, Al-Dubai S, George P, Arokiasamy J, Yadav H, Barua A, et al. A cross-
457 sectional study on quality of life among the elderly in non-governmental
458 organizations' elderly homes in Kuala Lumpur. *Health and Quality of Life Outcomes*.
459 2016; 14(1).
- 460
- 461 20. World Health Organization. Physical activity and older adults. Available from
462 http://www.who.int/dietphysicalactivity/factsheet_olderadults/en/. 2014.
- 463 21. Rosenblum A, Joseph H, Fong C. Prevalence and Characteristics of Chronic Pain
464 among Chemically Dependent patients in Methadone maintenance and residential
465 treatment facilities. *AMA*. 2003;289(18):2370-2378
- 466
- 467 22. Jurges H, Avendano M Mackenbach JP. Are different measures of self-rated health
468 comparable? An assessment in five European Countries. *European Journal of
469 Epidemiology*. 2008; 23:773-781.
- 470
- 471 23. Damián J, Pastor-Barriuso R, Valderrama-Gama E. Factors associated with self-rated
472 health in older people living in institutions. *BMC Geriatrics*. 2008; 8(1):5.
- 473 24. Shi J, Liu M, Zhang Q, Lu M, Quan H. Male and Female Adult Population Health
474 Status in China: A Cross-Sectional National Survey. *BMC Public Health*. 2008;
475 8(1):277.
- 476 25. Zimmer Z. Poverty, wealth inequality and health among older adults in rural
477 Cambodia. *Social Science & Medicine*. 2008; 66(1):57-71.
- 478 26. Ahmad K, Jafar, T, Chaturvedi N. Self-rated health in Pakistan: results of a national
479 health survey. *BMC Public Health*. 2005; 5:51.

- 480 27. Arnadottir S, Gunnarsdottir E, Stenlund H, Lundin-Olsson L. Determinants of self-
481 rated health in old age: A population-based, cross-sectional study using the
482 International Classification of Functioning. *BMC Public Health*. 2011; 11(1):670.
- 483 28. Haron S, Sharpe D, Masud J, Abdel-Ghany M. Health Divide: Economic and
484 Demographic Factors Associated with Self-Reported Health Among Older
485 Malaysians. *Journal of Family and Economic Issues*. 2010; 31(3):328-337.
- 486 29. Rathnayake S, and Siop S. Self-rated health and its determinants among older people
487 living in the rural community in Sri Lanka. *Journal of Nursing and Health Science*.
488 2015; 4(6): 39-45.
- 489 30. Van-Oort F, van-Lenthe F, Mackenbach J. Cooccurrence of lifestyle riskfactors and
490 the explanation of education inequalities in mortality: results from the GLOBE study.
491 *Preventive Medicine*. 2004; 39(6):1126-34.
- 492 31. Christensen U, Schmidt L, Kriegerbaum M, Hougaard C, Holstein B. Coping with
493 Unemployment: Does educational attainment make any difference? *Scandinavian*
494 *Journal of Public Health*. 2006; 34:363-70.
- 495 32. Rosenkranz R, Duncan M, Rosenkranz S, Kolt G. Active lifestyles related to excellent
496 self-rated health and quality of life: cross sectional findings from 194,545 participants
497 in the 45 and up study. *BMC Public Health*. 2013; 13:1071.
- 498 33. Sodergren M, Sundquist J, Johansson S, Sundquist K. Physical activity, exercise and
499 self-rated health: a population-based study from Sweden. *BMC Public Health*. 2008;
500 8:352.
- 501 34. Ryan R, Weinstein N, Bernstein J, Grown K, Mistretta L, Gagne M. Vitalizing effects
502 of being outdoors and in nature. *Journal of Environmental Psychology*. 2010;
503 30(2):159-168
- 504 35. World Health Organization. WHO Global Report on Falls Prevention in Older Age.
505 2007
- 506 36. Confortin S, Giehl M, Antes D, Schneider IJ, D'Orsi E. Positive self-rated health in
507 the elderly: a population-based study in South of Brazil. *Cad. SaudePublica*. 2015;
508 31(15), 1-11.
- 509 37. Wang J, Mitechell P, Smith W. Vision and low self-rated health: the Blue Mountains
510 eye study. *Investigative Ophthalmology and Visual science*. 2000; 41(1), 45-54.
- 511 38. Jacobs J, Hammerman-Rozenberg R, Maaravi Y, Cohen A, Stessman J. The impact of
512 visual impairment on health, function and mortality. *Aging Clinical and Experimental*
513 *Research*. 2005; 17(4), 281-286.
- 514 39. Rahman A, Wang J, Kwong G, Morales D, Sritara P, Sukmawan R. Perception of
515 hypertension management by patients and doctors in Asia: potential to improve blood
516 pressure control. *Asia Pacific Family Medicine*. 2015; 14(1).
- 517 40. Molarius A, Janson S. Self-rated health, chronic diseases, and symptoms among
518 middle-aged and elderly men and women. *Journal of Clinical Epidemiology*. 2002;
519 55(4), 364-370.
- 520 41. Mavaddat N, Van Der Linde R, Parker R, Sawa G, Linmonth A, Brayne C. et al.
521 Relationship of Self-Rated Health to Stroke Incidence and Mortality in Older
522 Individuals with and without a History of Stroke: A Longitudinal Study of the MRC
523 Cognitive Function and Ageing (CFAS) Population. *PLOS ONE*. 2016 11(2).
- 524 42. Mäntyselkä P. Chronic Pain and Poor Self-rated Health. *JAMA*. 2003; 290(18).
- 525 43. Tsai S, Chi L, Lee L, Chou P. Health related quality of life among urban, rural, and
526 island community elderly in Taiwan, *Journal of Formosan Medical Association*
527 Taiwan. 2004; 103 (3), 196-204.
- 528 44. Centre for Disease control and Prevention. Chronic diseases; Notes and reports. 2003;
529 16(1).

530 45. Goins R, Hays J, Landerman L, Hobbs G. Access to Health Care and Self-Rated
531 Health Among Community-Dwelling Older Adults. *Journal of Applied Gerontology*.
532 2011; 20(3):307-321.
533
534