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Health-related quality of life of the elderly after natural disasters: a scoping review

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ABSTRACT

Every nation on earth is experiencing an increase in the number and proportion of elderly people. This vulnerable population may experience a decline in health-related quality of life (HRQOL) following a natural disaster. This scoping review aimed to have a better understanding on the elderly's HRQOL following natural disasters, its influencing factors, and the state of the research on this topic. A literature search was conducted using four databases (PubMed/MEDLINE, Cochrane Library, Science Direct, and ProQuest) for the last 10 years (2013–2022). The summary of the selected relevant articles and analysis data were used to present the findings. There were seven articles included in our review. One article was about floods and the rest was about earthquake. Two out of the six earthquake articles involved tsunamis. All of the studies were conducted during the recovery phase and revealed that the elderly had poor HRQOL after natural disasters. Several aspects, including demographics, physical, psychological, social, and environmental factors, were identified as having impacts on the elderly's HRQOL following a disaster. The relocation had a significant negative impact on the mental health of the elderly, with a mean difference of -3.69 (-5.60, -1.77). In conclusion, the HRQOL of the elderly after a natural disaster is low and affected by several factors. To improve it, a stronger research agenda and disaster management programs that take these factors into account are required.

ABSTRAK

Setiap negara di dunia mengalami peningkatan jumlah dan proporsi lanjut usia. Populasi rentan ini dapat mengalami penurunan kualitas hidup terkait kesehatan setelah bencana alam. Tinjauan pelingkupan ini bertujuan untuk lebih memahami kualitas hidup terkait kesehatan lansia (HRQOL) setelah bencana alam, faktor-faktor yang mempengaruhinya, dan gambaran penelitian tentang topik tersebut saat ini. Penelusuran literatur dilakukan menggunakan empat database (PubMed/MEDLINE, Cochrane Library, Science Direct, dan ProQuest) selama 10 tahun terakhir (2013–2022). Penyajian temuan pada studi ini menggunakan ringkasan artikel terpilih dan analisis data yang relevan. Terdapat tujuh artikel yang disertakan dalam tinjauan ini, yaitu satu artikel tentang banjir dan enam tentang gempa bumi, dengan dua dari enam artikel gempa yang disebutkan melibatkan gempa bumi yang diikuti oleh tsunami. Semua studi dilakukan selama fase pemulihan bencana dan mengungkapkan bahwa lansia memiliki HRQOL yang buruk setelah bencana alam. Beberapa aspek, termasuk faktor demografi, fisik, psikologis, sosial, dan lingkungan memiliki dampak terhadap kualitas hidup terkait kesehatan lansia setelah bencana. Relokasi memiliki pengaruh negatif yang signifikan terhadap kesehatan mental lansia, dengan selisih rerata -3,69 (-5,60, -1,77). Dapat disimpulkan, kualitas hidup terkait kesehatan lansia pasca bencana alam tergolong rendah dan dipengaruhi oleh beberapa faktor. Untuk memperbaikinya, diperlukan penelitian-penelitian berikutnya dan program penanggulangan bencana yang mempertimbangkan faktor-faktor tersebut.

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INTRODUCTION

The Centre for Research on the Epidemiology of Disasters (CRED) defines a disaster as a situation or event that overwhelms local capacity, necessitating a request at the national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction, and human suffering.[1] The international classification of disasters distinguishes two generic categories for disasters (natural and technological). The natural disaster category is divided into six sub-groups: biological (e.g., epidemic), geophysical (e.g., earthquake), climatological (e.g., drought, wildfire), hydrological (e.g., flood, landslide); meteorological (e.g., storm), and extraterrestrial (e.g., impact, space weather).[1,2] In 2000—2019, CRED's Emergency Events Database (EM-DAT) recorded 7,348 natural disaster events which claimed approximately 1.23 million lives and affected a total of over 4 billion people, many on more than one occasion.[3] These numbers represent a sharp increase compared to 20 years ago.[3]

Meanwhile, every country in the world is experiencing growth in the number of the elderly people.[4] In between 2017 and 2050, the global population aged 60 or over is expected to increase from 962 million to nearly 2.1 billion.[4] As a result, to ensure that health and social systems are prepared for this demographic shift is one of the global key concerns,[5] including disaster response.[6] Considering the importance of this topic, some review articles have been published, such as one about the post-disaster elderly's health needs[7] and resilience.[8] To the authors' knowledge, no review articles have looked into the health-related quality of life (HRQOL) of the elderly following natural disasters.

Health-related quality of life is an individual or group's perceived physical and mental health over time.[9] The inquiries about HRQOL focus on physical, mental health, and function, have grown to be a crucial component of health surveillance and may provide a complete picture of the burden of diseases, injuries, and impairments.[9,10] The HRQOL is widely regarded as a reliable indicator of service needs and intervention outcomes.[9,10] In the case of a disaster, research on HRQOL may offer specific insights and practical knowledge that might improve healthcare services, psychological support programs, disaster preparedness, policies, and management.[11]

The elderly are more vulnerable to a decreasing HRQOL following a natural disaster, they are likely facing challenges as a result of physical impairments, decreased mobility, and impaired cognitive abilities.[12-14] Chronic diseases, psychological problems, specific nutritional demands, social isolation, and disruptions in health care access and services are other factors that increase the vulnerability of the elderly.[5,6] Minor aging-related deficits in the intrinsic capacity that were previously compensated may suddenly become a significant burden in the event of a disaster.[5]

This scoping study was conducted to find out more about the state of research on the health-related quality of life of the elderly following natural disasters as well as its affecting factors.

MATERIAL AND METHODS

A scoping review was conducted to quickly map the core concepts that underpin the research field as well as the main sources and types of evidence available. The advantages of this approach can be used to assess the extent, range, and nature of research activity, determine the value of undertaking a full systematic review, summarize and disseminate research findings, or

identifying research gaps in the existing literature.[15] The review objective served as the foundation for the PICO elements' formulation. Our research question was "in the elderly population (P), what is the effect of natural disaster (I) on their health-related quality of life (O)?". This PICO would be used for developing search strategies and selecting the studies. The synthesis of the findings was undertaken through an iterative process by three reviewers.

Data sources

On May 21, 2022, medical and health science electronic databases (PubMed/ MEDLINE, Cochrane Library, Science Direct, and ProQuest) were searched for the period of 2013-2022 for the purposes of this review. Hand-searching of relevant journals from the reference lists of those obtained in the initial search was undertaken for additional references.

Search strategy

The following key concepts were used to develop a search strategy: natural disasters, elderly people, and health-related quality of life. Using the advanced search, data were limited to title, abstract, and keywords (TABLE 1).

TABLE 1. Search term used in PubMed/MEDLINE, Cochrane Library, Science Direct and ProQuest

Category	PubMed/MEDLINE, Cochrane Library, Science Direct and ProQuest strategy
Natural disasters	"disaster" OR "earthquake" OR "flood" OR "hurricane" OR "tsunami"
Elderly	"elderly" OR "older" OR "aged"
Health quality of life	"quality of life" OR "health-related quality of life"

Eligibility criteria

Articles linked with the HRQOL of the elderly people following natural disasters were included in this review. Articles must also be original research published in English to be considered for inclusion. In this review article, studies were limited to natural hazard-related disasters, excluding biological and extraterrestrial disasters, as in the report of CRED and United Nations Office for Disaster Risk Reduction's (UNDRR).[1,3] Articles that did not focus addressing the elderly population (aged ≥60 years) and HRQOL were excluded. The age of 60 is the threshold age for defining the elderly,

as used by the United Nations (UN) and the World Health Organization (WHO) in their previous reports.[4,5]

RESULTS

Through the database search, 149 articles were identified. After removing duplicates, 125 articles were screened. Based on the abstract screening, 109 articles were excluded because they were irrelevant to the research question. Sixteen articles were selected for full article evaluation, with 9 of them failing to meet the eligibility criteria. Thus, the final sample for the review was seven articles (FIGURE 1).
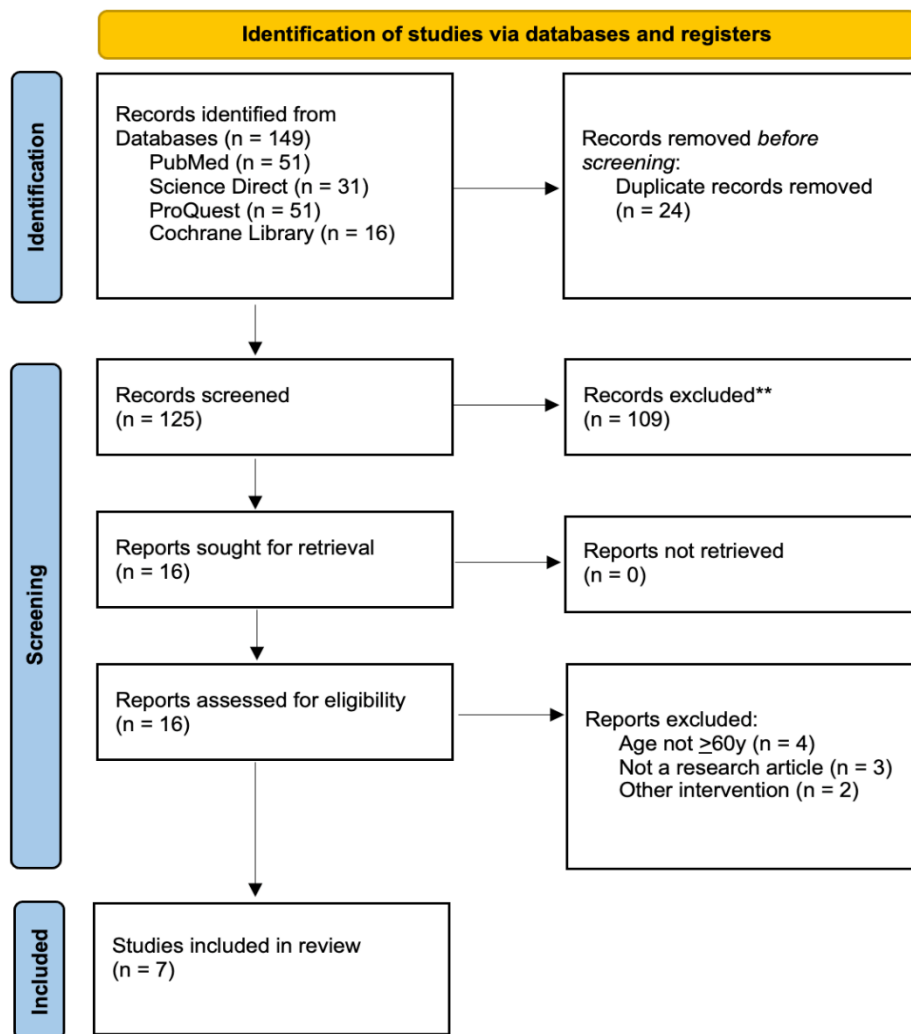
FIGURE 1. PRISMA flow diagram
**records excluded based on the abstract screening

To determine which variables to extract from the included research, a data graphing form was created.[16] This review is focusing on: 1) the study of descriptive characteristics, such as the authors' names, year of publication, article type, type of disaster, study location, and time of data collection (years after the disaster), 2) sample size and demographic characteristics (age and gender); 3) HRQOL instruments; 4) results summary; 5) factors influencing HRQOL; and 4) other outcomes that were examined in the study. The data were retrieved and entered into a spreadsheet to be compiled and synthesized.[17] (TABLE 2)

TABLE 2. Findings of the included studies

Study's descriptive characteristics	Number of subjects & demographic characteristics	HRQOL instrument	Results summary	Factors affecting HRQOL	Other outcome (s)
Moriyama *et al.*,[18]; earthquake followed by tsunami; Japan; 3 yr	128 subjects: 64 temporary housing group: 45 females; mean age female 76.4 ±7.3 yr; mean age male 78.1±6.9 yr 64 control group: 31 females; mean age female 74.6± 6.9 yr; mean age male 75.1±6.1 yr	SF-36v2	Prevalence of low PCS (%) Men: temporary housing group: 36.8 (19.2–59.0); control group: 30.3 (17.4–47.3) Women: temporary housing group: 20.0 (10.9–33.8); control group: 41.9 (26.4–59.2) Prevalence of low MCS (%) Men: temporary housing group: 36.8 (19.2–59.0); control group: 30.3 (17.4–47.3) Women: temporary housing group: 28.9 (17.7–43.4); control group: 38.7 (23.7–56.2)	Gender and Residency Women in the temporary housing group had lower prevalence of a low PCS ($p < 0.05$) and higher bodily pain score (72.0; 95% CI: 61.0–84.0) than women in the control group (62.0; 95%CI: 52.0-84.0) $p<0.01$.	• Physical activity • Timed Up and Go Test • Grasping power
Cao *et al.*,[19]; earthquakes; China; 5 yr	268 subjects (relocated: 112 nonrelocated: 1560; mean age: 72 yr; gender: 50.7% female	SF-36	PCS score: nonrelocated: 51.92± 8.53; relocated 47.80± 8.62; t or Z: 3.87 (p.<.001) MCS score: nonrelocated 55.36±7.18; relocated 51.93± 8.96; t or Z: -3.33 ($p <.001$)	4 predictors for poor PCS (adjusted R^2= 0.304, $p < .001$): 1) older age (β=–0.31; $p< 0.001$); 2) relocation (β=–0.25; $p < 0.001$); 3) chronic illnesses (β=–0.23; $p= 0.003$) 4) educational level (β=0.23; $p=0.002$) 6 predictors for poor MCS (adjusted R^2= .373; $p < .001$): 1) older age (β=–0.20; $p=0.001$); 2) relocation (β=–0.21; $p< 0.001$); 3) the death of a spouse ($\beta = –0.20$; $p<0.001$); 4) educational level (β=0.19; $p=0.004$); 5) the loss of family members (β=–0.16; $p<0.005$); 6) chronic illnesses (β=–0.14; $p<0.002$)	Psychological distress
Yabuki *et al.*,[20]; earthquake followed by tsunami, Japan, 1.5 yr	71 subjects: assembled group (in temporary housing):60; individual group (in their residence):11 Mean age: 75.9 yr; gender: 77.5% female	SF-36	PCS score: overall: 40.6 ± 15.9*; individual group (nonrelocated): 28.5±17.9; assembled group (relocated): 42.9±14.5 MCS score: overall: 51.7 ± 10.4; individual group (nonrelocated): 57.1±10.1; assembled group (relocated): 50.7±10.3 Overall subscales: physical functioning: 36.9±17.6*; role physical: 41.8±15.6*; body pain: general health: 46.5±10.3*; vitality; social functioning: 45.9 ± 11.9*; role emotional: 44.1±14.8*; mental health: 46.3±10.8*; *(p < 0.01) lower than national standard	Temporary housing. If compared to the assembled group who live in temporary housing, the individual group had significantly lower scores in physical functioning (18.8 ± 20.0**); role physical (29.7 ± 19.3***); Social functioning (40.0 ± 9.7***); physical component summary (28.5 ± 17.9***); **(p < 0.01); ***(p < 0.05)	• Chronic pain • Activity

TABLE 2. Findings of the included studies (cont.)

Study's descriptive characteristics	Number of subjects & demographic characteristics	HRQOL instrument	Results summary	Factors affecting HRQOL	Other outcome (s)
Wagle et al.,[21]; earthquakes; Nepal; 1.5 yr	362 subjects, Mean age 70 y Gender: 53% female	SF-12v2	Overall score: 46.55±14.74; 59% poor HRQOL (score <50) PCS: 45.92±17.80; 54.4% poor PCS (score <50) MCS: 47.18±15.25; 44.8% poor MCS (score <50) Subscales: physical functioning: 47.99±30.59; role physical: 49.10 ±23.11; bodily pain: 54.41±29.26; general health: 32.18±21.70; vitality: 43.02±24.14; social functioning: 48.96±23.32; role emotional: 47.51±24.84; mental health: 49.24±18.33.	Age ($\beta = -0.116$, $p< 0.001$); injury ($\beta = -0.104$, $p= 0.014$); distance to health care facility ($\beta = -0.101$, $p= 0.026$); access to safety information related to an earthquake ($\beta=0.134$, $p=0.007$); social support ($\beta=0.120$, $p=0.019$); chronic disease ($\beta = -0.168$, $p< 0.001$); PTSD ($\beta = -0.225$, $p< 0.001$); functional status ($\beta = 0.295$, $p< 0.001$); difficulty of accessibility to health care services ($\beta = -0.177$, $p< 0.001$).	• PTSD and depression • Functional ability • Coping strategies • Social support • Resilience
Wu et al.,[22]; flood; China; 1 yr	1183 subjects : mean age: 69 yr; gender: 41.2% female	SF-36	Overall score median: 64.5 (IQR: 53.3- 74.2); PCS score median: 64.2 (IQR: 51.2-75.3); MCS score median: 64.9 (IQR 53.1-77.1) Subscales scores: physical functioning: 62.5 (48.5-79.0); role physical: 62.5 (35.0-87.5); bodily pain: 78.8 (61.3-93.8); general health: (57.0 (46.5-67.5); vitality: 59.0 (47.0-73.0); social functioning: 76.3 (58.8-92.5); role emotional: 76.7 (43.3-100.0); mental health: 62.0 (48.0-78.0) All dimension scores among Bazhong elderly were significantly lower than the rural elderly	Physical domain: older age: OR 2.331 (1.535 ~ 3.539) $p<0.001$; marital status: married OR 0.403 (0.276 ~ 0.590) $p<0.001$; sleep patterns: moderate sleep pattern 0.456 (0.310 ~ 0.670) $p<0.001$; good 0.393 (0.256 ~ 0.603) $p<0.001$; no chronic diseases: OR 0.606 (0.416 ~ 0.884) $p<0.001$; no hospitalization in the past year: (0.597 (0.383 ~ 0.931) $p<0.05$; living with spouse: OR 0.475 (0.264 ~ 0.856) $p<0.05$. Mental domain: older age: OR 2.536 (1.610 ~ 3.994) $p<0.001$; female: OR 1.754(1.232 ~ 2.499) $p<0.01$; marital status: married OR 0.225 (0.152 ~ 0.333) $p<0.001$; sleep patterns: moderate OR 0.442 (0.291 ~ 0.672) $p<0.001$) and good OR 0.368 (0.231 ~ 0.586) $p<0.001$; no illness in the past two weeks: OR 0.392 (0.265 ~ 0.578) $p<0.001$; no chronic diseases: OR 0.512 (0.345 ~ 0.761) $p<0.001$; no hospitalization in the past year: OR 0.597 (0.383 ~ 0.931) $p<0.05$; living with spouse: OR 0.319 (0.169 ~ 0.603) $p<0.001$. Other: correlations between physical and mental health were significantly found in both genders (male: $r = 0.612$, $p < 0.001$; female: $r = 0.600$, $p < 0.001$, respectively)	Health status (two-week healthcare-seeking rate & chronic disease prevalence)

TABLE 2. Findings of the included studies (cont.)

Study's descriptive characteristics	Number of subjects & demographic characteristics	HRQOL instrument	Results summary	Factors affecting HRQOL	Other outcome (s)
Xie *et al.*,[23] earthquake; China; 1 yr	191 subjects Mean age: 74y Gender: 62% female	WHOQOL-BREF	Physical domain 56.2±20.3*; psychological domain 45.7±12.1**; social relationship domain 64.2±15.0; environment domain 52.9±14.0. *p<0.001 significantly lower compared to national standard **p<0.001 significantly lower compared to national standard	Physical domain: IADL (β =−0.479, p< 0.001); interest/hobbies (β = 0.194, p= 0.002); family function (β = 0.134, p= 0.028) Psychological domain: depression (β= −0.255, p<0.001); family function (β= 0.220, p= 0.001); IADL (β = −2.835, p= 0.005) Social relationship domain: subjective support (β = 0.373, p< 0.001); family function (β = 0.225, p= 0.002). Environment domain: depression (β= −0.211, p= 0.002); subjective support (β= 0.162, p=0.017); ADL (β=−0.208, p= 0.003); chronic conditions (β=0.183; p= 0.007)	• Social support • Depression • Activity of Daily Living • Family function
Kim *et al.*,[11]; earthquake; Korea; 2 yr	312 subjects: Mean age: 78 yr Gender: 69.6% female	WHOQOL-BREF	The mean overall HRQOL score: 51.39±14.60; physical health 49.85±18.07; psychological health 50.16±18.75; social relations 61.93±19.20; environment: 49.53±16.37; general quality of life: 53.44±20.00; general health state: 43.42±26.91.	Depression: significant negative direct (β = − 2.21; p < 0.001), indirect (β =−0.23; p< 0.001), and total effects on HRQOL (β =− 2.44; p < 0.001). Community resilience: significant direct and total effects on HRQOL (β =6.05; p= 0.001) Social support: significant direct and total effects on HRQOL (β = 0.12, p = 0.008) Disaster preparedness: significant indirect and total effects on HRQOL (β = 0.40; p < 0.001 and β = 0.69, p = 0.031, respectively)	• Depression • PTSS • Community resilience • Social support • Disaster preparedness

Effects of relocation

It was found three studies that compared the effects of disaster-related relocation and temporary housing on elderly people's HRQOL.[18-20] It was unlikely to synthesize the data in the Moriyama *et al.*,[18] study because they were presented as medians and interquartile ranges. The data from the studies conducted by Cao *et al.*,[19] and Yabuki *et al.*,[20] was presented using a forest plot. The mental component summary score indicated a significantly poorer psychological condition of the elderly living in a relocation area with a mean difference of -3.69 (-5.60, -1.77) (FIGURE 2). Meanwhile, physical component summary scores revealed inconsistent findings. Cao *et al.*,[19] found that relocated elderly had lower scores than non-relocated elderly, while Yabuki *et al.*,[20] found the contrary to be the case (mean difference: 4.29 (-13.78, 22.36)) (FIGURE 3).
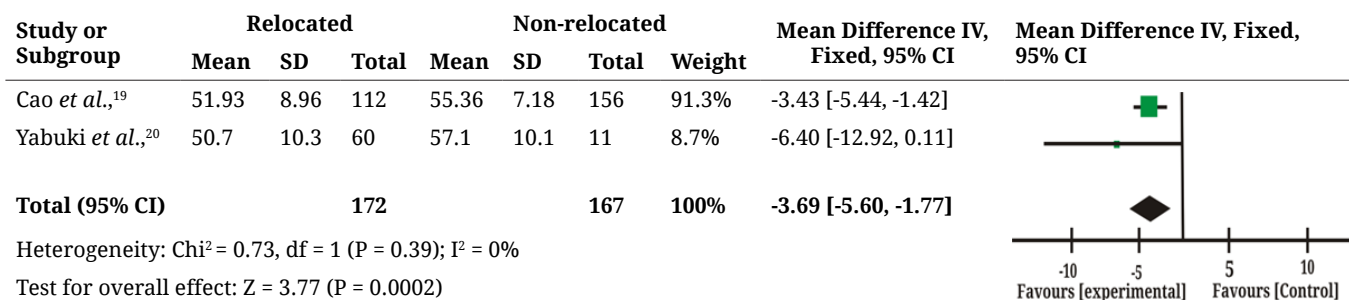
Study or Subgroup	Relocated			Non-relocated			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Cao et al.,[19]	51.93	8.96	112	55.36	7.18	156	91.3%	-3.43 [-5.44, -1.42]	
Yabuki et al.,[20]	50.7	10.3	60	57.1	10.1	11	8.7%	-6.40 [-12.92, 0.11]	
Total (95% CI)			172			167	100%	-3.69 [-5.60, -1.77]	

Heterogeneity: Chi^2 = 0.73, df = 1 (P = 0.39); I^2 = 0%

Test for overall effect: Z = 3.77 (P = 0.0002)

FIGURE 2. Effects of relocation on mental component summary score

Study or Subgroup	Relocated			Non-relocated			Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference IV, Fixed, 95% CI
	Mean	SD	Total	Mean	SD	Total			
Cao, et al.,[19]	47.8	8.62	112	51.9	8.53	156	54.6%	-4.12 [-6.20, -2.04]	
Yabuki, et al.,[20]	42.9	14.5	60	28.5	17.9	11	45.4%	14.40 [-3.20, 25.60]	
Total (95% CI)			172			167	100.0%	4.29 [-13.78, 22.36]	

Heterogeneity: Tau^2 = 154.61 Chi^2 = 10.6, df = 1 (P = 0.001); I^2 = 90%
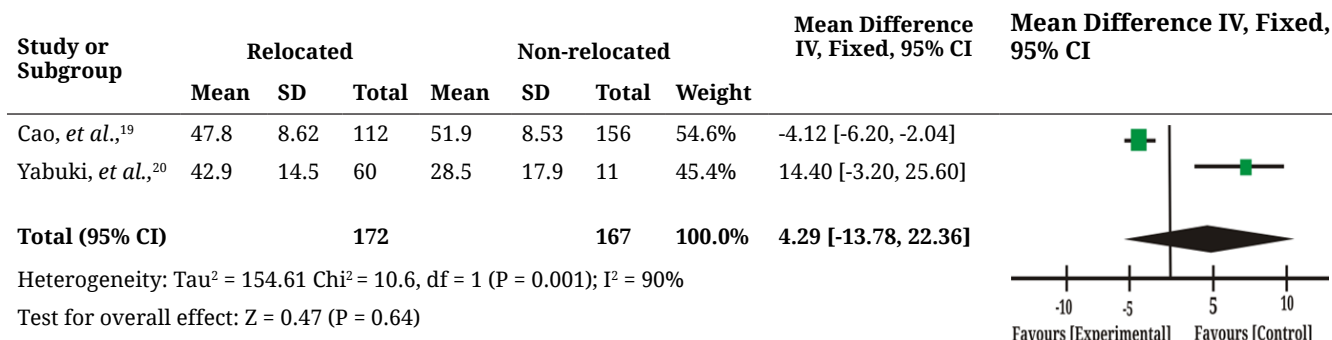
Test for overall effect: Z = 0.47 (P = 0.64)

FIGURE 3. Effects of relocation on physical component summary score

DISCUSSION

This scoping review examined the elderly's HRQOL and its factors following a disaster. We also reviewed common research settings and HRQOL instruments that were used. Notably, Wu et al.[22] discovered that the elderly in Bazhong after the flood had considerably poorer HRQOL ratings across all dimensions than the overall elderly population as a reference in Sichuan province and other regions of China.[22] In general, the elderly had poorer HRQOL after disasters, which is consistent with the previous studies.[12-14]

Factors affecting HRQOL

Based on the gathered studies, a number of variables that have a substantial impact on elderly HRQOL after a disaster have been found. These variables are categorized into four categories: demographic, physical, psychological, and social-environmental factors.

Demographic factors

Demographic factors that affected elderly HRQOL after disasters were gender, age, marital status, and education level.[20-30]

Gender

Moriyama et al.,[18] and Wu et al.,[22] revealed that elderly women had lower levels of HRQOL. It could happen may be due to the fact that women frequently endure more mental stress and trauma than male participants following disasters.[24] In a healthy elderly population, women reported lower levels of HRQOL, and these differences were

statistically significant between the ages of 66 and 75.[25] Another study, however, found that when the other factors were taken into account, gender disparities in HRQOL disappeared.[26]

Age

Age may determine the physical and mental health of older victims' HRQOL.[18,21,22] In the general elderly population, there is a steady drop in HRQOL related to age, with a significantly more profound decline in the physical domain than in other domains.[27,28] Among the general elderly population, the lowest HRQOL was observed in the group of people over 80 years old.[25] We were unable to acquire comparable information addressing age group comparisons of elderly HRQOL in a post-disaster setting.

Marital status

According to Wu *et al.*,[22] married couples had considerably greater HRQOL than singles during the flood disaster in Sichuan, China, as a result of the couples' shared emotional and physical support.[22] This outcome was also discovered in a study of elderly Iranians.[27] However, a prior study indicated that among healthy senior populations, marital status had no discernible impact on HRQOL.[25] Wu *et al.*,[22] also revealed that older people who live with their spouses have higher HRQOL than those who live alone or with other family members or relatives after a disaster. Low HRQOL in the elderly who live alone may be impacted by other factors such as chronic illness, limited income, and rural residence.[29]

Education level

Higher education among older persons was associated with greater HRQOL in both the mental and physical domains, according Cao *et*

al.,[19] This finding is consistent with earlier research, which revealed that education significantly improved overall HRQOL.[25,27,30] Education has an indirect impact on elderly people's quality of life by affecting their nutritional intake,[30] income,[29] and social support.[29] Lower levels of education were linked to worsening life quality, strained social connections, dissatisfaction, and sensory issues.[30]

Physical factors

Physical factors that had a negative impact on the elderly HRQOL after a disaster were chronic illness,[18,22,23] hospitalization within the previous year,[21] illness within the last two weeks,[21] and injury,[22] Multimorbidity in elderly may have an impact on the reduced ability to carry out daily tasks, increased social isolation, and reduced well-being.[31,32] Chronic medical issues in older individuals necessitate ongoing support from the healthcare system.[33] Since this system is disturbed both during and after disasters, the elderly are in greater danger.[33,34] The elderly are more at risk since this system is disrupted both during and after disasters.[33,34] Elderly people who have certain pre-existing medical conditions, such as dementia, electrolyte imbalances, diabetes, visual or hearing impairment, mobility issues, dialysis patients, and those who require prescription medications or depend on others for daily activities, are particularly vulnerable.[33,35]

Psychological factors

Psychological problems such as depression and post-traumatic stress disorder (PTSD) had a detrimental impact on HRQOL levels in the elderly victim, according to Kim *et al.*,[11] Wagle *et al.*,[21] and Xie *et al.*[23] Previous studies discovered that the elderly who had survived a disaster had higher rates of

depression,[36,37] PTSD,[36,37] and adjustment disorders.[36] Depression or other mental illnesses may affect HRQOL by impairing one's willingness to seek treatment, changing how one response to difficult external circumstances, and impairing one's capacity for decision-making.[33] Furthermore, it has been noted that a large number of disaster victims do not ask for help, and that only a small proportion of people with serious mental problems receive treatment.[38]

Social-environmental factors

Social-environmental factors which were associated with HRQOL include relocation status,[18-20] social support,[11,21,23] community resilience,[11] disaster preparedness,[11] and accessibility to health care services.[21] According to research by Cao *et al.*,[19] and Yabuki *et al.*,[20] elderly people who had relocated had significantly lower mental component scores, with a mean difference of -3.69 (-5.60, -1.77). These results were in line with Uscher-Pines' systematic review.[39] The physical component summary scores, however, showed contradictory results. Relocated elderly had lower physical component scores than non-relocated elderly, according to Cao *et al.*,[19] while the opposite was discovered by Moriyama *et al.*,[18] and Yabuki *et al.*[20] Although there are few studies on the physical health effects of relocation, researchers have shown that relocated elderly had more severe physical health effects over time.[39,40] However, Moriyama *et al.*,[18] and Yabuki *et al.*[20] found that the relocated group had better physical component scores, particularly in women. They proposed that the elderly support groups and social gatherings in the relocation area may account for their maintenance of HRQOL.[18] Additionally, the elderly who have not relocated may have lower physical component scores due to their decreased level of activity.[20]

In the event of a disaster, social isolation and decreased social support may increase the elderly vulnerability and decrease their HRQOL.[23] A previous study showed that increased pre-disaster social support has been correlated with less psychological distress related to hurricanes.[41] It is expected that social support and community resilience will improve elderly victims' HRQOL by easing personal psychological and financial burdens.[21,42,43]

HRQOL was also favorably correlated with disaster preparedness, which includes disaster risk reduction efforts and health-protective behaviours.[44] The elements of the disaster management strategy should take older persons' particular needs in disaster situations into account.[6,34] On the other hand, the elderly could contribute as population-specific experts.[34]

Difficulty accessing health care services was significantly associated with HRQOL among the elderly.[21] According to a prior study, those who resided further from medical facilities reported lower health outcomes than those who did.[45]

Research settings

Studies on HRQOL in the older population after disaster are frequently conducted in the aftermath of earthquakes. There were seven articles included in our review: one about floods and six about earthquakes[11,18-21,23] with two out of the six earthquake articles cited involving earthquakes followed by tsunamis.[19,20] Other natural disaster settings that researchers sought for analyzing HRQOL in the general population, but not notably the elderly, were hurricane,[46,47] tsunami,[48] and wildfire.[49] In general, earthquakes continued to be the subject of most investigation. The discovery that earthquakes were discussed in 6 out of 7 articles demonstrates that they are the most well-studied disaster setting and highlights a need for greater research

on various types of disasters with an emphasis on the elderly population.

The recovery phase is when all investigations were completed. All of the selected studies were conducted between one and five years after the disaster. It was not surprising, however, because the recovery phase entails damage assessment, rehabilitation, and reconstruction in order to improve living conditions in the impacted areas.[50] Conducting randomized or prospective cohort studies that capture the before, during, and after phases of a disaster is frequently problematic due to its unpredictable nature.[51]

HRQOL measures

In the included studies, the SF-36, SF-12, and WHOQOL-BREF were the instruments utilized to assess HRQOL. The SF-36 has a total of 36 items over eight different quality-of-life domains: physical functioning (10 items); role limitations due to physical illness (4 items); bodily pain (2 items); general health perceptions (5 items); vitality (4 items); social functioning (2 items); role limitations due to emotional problems (3 items); and mental health (5 items).[52] Physical functioning, role limitations due to physical illness, bodily pain, and general health perceptions reflect the physical component summary (PCS) score.[52] Vitality, social functioning, role limitations due to emotional problems, and mental health reflect the mental component summary (MCS) score.[52] Each SF-36 domain's score was linearly translated into a standard score between 0 and 100, with a higher score indicating greater self-perceived health.[52] Due to the high homogeneity of SF-36 components and reliability, the SF-36 questionnaire was the most widely used questionnaire in groups of the elderly.[25] The SF-36 is available in more than 50 different languages and has been extensively tested for cultural equivalence.[53-55]

The SF-12 questionnaire consists of 12 questions that evaluate one's general quality of life as well as physical and mental health.[56] Since it is a condensed version of the SF-36, the PCS and MCS are scored similarly.[56] The scores range from 0 to 100, with 0 denoting the lowest level of health determined by the scales and 100 denoting the highest level of health.[56] This instrument generally showed acceptable validity and reliability to measure the quality of life among older people.[56]

WHOQOL-BREF, a condensed version of the 100-item World Health Organization Quality of Life Scale, consists of 26 items.[57] The WHOQOL-BREF comprises two individual items about subjective quality of life and health conditions in addition to domains measuring physical health, psychological health, social relationships, and environmental factors.[57] A Likert scale with five points was used to score the responses.[57] Higher scores correlate with higher quality of life.[57] WHOQOL-BREF may be more useful to evaluate changes in the elderly's quality of life than SF-36 since it prioritizes responses to aging and avoids emphasizing impairment.[58] However, the WHOQOL-BREF examines overall quality of life, while the SF-36 assesses specifically HRQOL.[59] Before deciding which instrument to use, clinicians and researchers should define their study questions carefully.[59] We proposed using a standardized instrument with a uniform data presentation to have a better indicator to compare HRQOL scores.

CONCLUSION

HRQOL of the elderly after natural disaster is low and affected by several factors such as demographic (gender, age, marital status, and education level), physic (chronic illness, hospitalization, illness within the last two weeks, and injury), psychology (depression

and PTSD), and social environment (relocation status, community resilience, disaster preparedness, and accessibility to health care services). Post-disaster relocation had a significant negative impact on the mental health of the elderly. A stronger research agenda and disaster management programs that take these factors into account are needed to improve elderly HRQOL following disasters.

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REFERENCES

1. CRED. 2021 Disasters in Numbers. Brussels: CRED; 2022.
https://doi.org/10.1787/eee82e6e-en

2. Guha-Sapir D, Hoyois P, Below R. Annual Disaster Statistical Review 2012: The Numbers and Trends. Brussels: CRED; 2013. http://www.cred.be/sites/default/files/ADSR_2012.pdf

3. CRED, UNDRR. Human Cost of Disasters: An Overview of the Last 20 Years, 2000-2019. Geneva; 2020.

4. United Nations, Department of Economic and Social Affairs, Population Division. World Population Ageing 2017 - Highlights. New York: 2017.

5. World Health Organization. World Report on Ageing and Health. Geneva: WHO; 2015.

6. International Federation of Red Cross and Red Crescent Societies. World Disasters Report 2018: Leaving No One Behind. IFRC; 2018.

7. Ahmadi S, Khankeh H, Sahaf R, Dalvandi A, Hosseini SA, Jalilvand S. Health needs of older adults after natural disasters: A systematic literature review. Trauma Mon 2018; 23(4):
https://doi.org/10.5812/traumamon.60622

8. Kwan C, Walsh CA. Seniors' disaster resilience: a scoping review of the literature. Int J Disaster Risk Reduct 2017; 25:259-73.
https://doi.org/10.1016/j.ijdrr.2017.09.010

9. Centers for Disease Control and Prevention. Measuring Healthy Days Population Assessment of Health-Related Quality of Life. Atlanta, Georgia: CDC; 2000.
http://www.cdc.gov/nccdphp/brfss/

10. Yin S, Njai R, Barker L, Siegel PZ, Liao Y. Summarizing health-related quality of life (HRQOL): development and testing of a one-factor model. Popul Health Metr 2016; 14:22.
https://doi.org/10.1186/s12963-016-0091-3

11. Kim EM, Kim GS, Kim H, Park CG, Lee O, Pfefferbaum B. Health-related quality of life among older adults who experienced the Pohang earthquake in South Korea: a cross-sectional survey. Health Qual Life Outcomes 2022; 20(1):37.
https://doi.org/10.1186/s12955-022-01944-8

12. Fauzan, Nur R, Masni, Mallongi A, Sridani NW, Devi R. Factors related to quality of life of elderly victims of natural disasters in Palu City. Enferm Clin 2020; 30(Supll 4):178-81.
https://doi.org/10.1016/j.enfcli.2019.10.064

13. Cherry KE, Sampson L, Galea S, Mark LD, Boudoin KH, Nezat PF, *et al.* Health-related quality of life in older coastal residents after multiple disasters. Disaster Med Public Health Prep 2017; 11(1):90-6.
https://doi.org/10.1017/dmp.2016.177

14. Ardalan A, Mazaheri M, Vanrooyen M, Mowafi H, Nedjat S, Naieni K, *et al.* Post-disaster quality of life among older survivors five years after the Bam earthquake: Implications for recovery policy. Ageing Soc 2011; 31(2):179-96.
https://doi.org/10.1017/

S0144686X10000772

15. Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. International Journal of Social Research Methodology: Theory and Practice 2005; 8(1):19-32. https://doi.org/10.1080/13645570320.00119616

16. Levac D, Colquhoun H, O'brien KK. Scoping studies: advancing the methodology. Implementation Science 2010; 5(69). https://doi.org/10.1186/1748-5908-5-69

17. Weeks LC, Strudsholm T. A scoping review of research on complementary and alternative medicine (CAM) and the mass media: Looking back, moving forward. BMC Complement Altern Med 2008; 8:43. https://doi.org/10.1186/1472-6882-8-43

18. Cao X, Chen L, Tian L, Jiang X. Psychological distress and health-related quality of life in relocated and nonrelocated older survivors after the 2008 Sichuan Earthquake. Asian Nurs Res (Korean Soc Nurs Sci) 2015; 9(4):271-7. https://doi.org/10.1016/j.anr.2015.04.008

19. Moriyama N, Urabe Y, Onoda S, Maeda N, Oikawa T. Effect of residence in temporary housing after the Great East Japan Earthquake on the physical activity and quality of life of older survivors. Disaster Med Public Health Prep 2017; 11(6):701-10. https://doi.org/10.1017/dmp.2017.19

20. Yabuki S, Ouchi K, Kikuchi SI, Konno SI. Pain, quality of life and activity in aged evacuees living in temporary housing after the Great East Japan earthquake of 11 March 2011: a cross-sectional study in Minamisoma City, Fukushima prefecture Clinical rheumatology and osteoporosis. BMC Musculoskelet Disord 2015; 16:246. https://doi.org/10.1186/s12891-015-0711-2

21. Wagle S, Amnatsatsue K, Adhikari B, Kerdmongkol P, van der Putten M, Silpasuwan P. Health-related quality of life after the 2015 gorkha earthquakes, among older adults living in lalitpur district of central Nepal. Disaster Med Public Health Prep 2021; 15(3):298-307. https://doi.org/10.1017/dmp.2019.154

22. Wu J, Xiao J, Li T, Li X, Sun H, Chow EPF, *et al.* A cross-sectional survey on the health status and the health-related quality of life of the elderly after flood disaster in Bazhong city, Sichuan, China. BMC Public Health 2015; 15:163. https://doi.org/10.1186/s12889-015-1402-5

23. Xie X, Chen Y, Chen H, Au A, Guo H. Predictors of quality of life and depression in older people living in temporary houses 13 months after the Wenchuan earthquake in western China: A cross-sectional study. Nurs Health Sci 2017; 19(2):170-5. https://doi.org/10.1111/nhs.12333

24. Yilmaz V, Cangur S, Çelik HE. Sex difference and earthquake experience effects on earthquake victims. Pers Individ Dif 2005; 39(2):341-8. https://doi.org/10.1016/j.paid.2005.01.014

25. Krawczyk-Suszek M, Kleinrok A. Health-related quality of life (HRQoL) of people over 65 years of age. Int J Environ Res Public Health 2022; 19(2):625. https://doi.org/10.3390/ijerph19020625

26. Lee Y, Shinkai S. A comparison of correlates of self-rated health and functional disability of older persons in the Far East: Japan and Korea. Arch Gerontol Geriatr 2003; 37(1):63-76. https://doi.org/10.1016/S0167-4943(03)00021-9

27. Tajvar M, Arab M, Montazeri A. Determinants of health-related quality of life in elderly in Tehran, Iran. BMC Public Health 2008; 8:323. https://doi.org/10.1186/1471-2458-8-323

28. Walters SJ, Munro JF, Brazier JE. Using the SF-36 with older adults: a cross-sectional community-based survey. *Age Ageing* 2001; 30:337-347.

29. Liu N, Zeng L, Li Z, Wang J. Health-

related quality of life and long-term care needs among elderly individuals living alone: a cross-sectional study in rural areas of Shaanxi Province, China. BMC Public Health. 2013;13(313). http://www.biomedcentral.com/1471-2458/13/313

30. Lasheras C, Patterson AM, Casado C, Fernandez S. Effects of education on the quality of life, diet, and cardiovascular risk factors in an elderly Spanish community population. Exp Aging Res 2001;27(3):257-70. https://doi.org/10.1080/03610730130-0208691

31. Chen C, Liu GG, Shi QL, Sun Y, Zhang H, Wang MJ, *et al.* Health-related quality of life and associated factors among oldest-old in China. J Nutr Health Aging 2020; 24(3):330-338. https://doi.org/10.1007/s12603-020-1327-2

32. Dev R, Zaslavsky O, Cochrane B, Eagen T, Woods NF. Healthy aging through the lens of community-based practitioners: A focus group study. BMC Geriatr 2020; 20(1). https://doi.org/10.1186/s12877-020-01611-x

33. Kar N. Care of older persons during and after disasters: meeting the challenge. J Geriatr Care Res 2016;3(1). https://www.researchgate.net/publication/304497407

34. Johnson HL, Ling CG, McBee EC. Multi-disciplinary care for the elderly in disasters: An integrative review. Prehosp Disaster Med 2014; 30(1). https://doi.org/10.1017/S1049023X14001241

35. Malik S, Lee DC, Doran KM, Grudzen CR, Worthing J, Portelli I, *et al.* Vulnerability of Older Adults in Disasters: Emergency Department Utilization by Geriatric Patients after Hurricane Sandy. Disaster Med Public Health Prep 2018; 12(2):184-193.

https://doi.org/10.1017/dmp.2017.44

36. Viswanath B, Maroky AS, Math SB, John JP, Benegal V, Hamza A, *et al.* Psychological impact of the tsunami on elderly survivors. Am J Geriatr Psychiatr 2012; 20(5):402-7. https://doi.org/10.1097/JGP.0b013e318246b7e9

37. Jia Z, Tian W, Liu W, Cao Y, Yan J, Shun Z. Are the elderly more vulnerable to psychological impact of natural disaster? A population-based survey of adult survivors of the 2008 Sichuan earthquake. BMC Public Health 2010;10. https://doi.org/10.1186/1471-2458-10-172

38. Rodriguez JJ, Kohn R. Use of mental health services among disaster survivors. Curr Opin Psychiatry 2008; 21:370-378.

39. Uscher-Pines L. Health effects of relocation following disaster: a systematic review of the literature. Disasters 2009;33(1):1-22. http://doi.org/10.1111/j.0361-3666.2008.01059.x

40. Sanders S, Bowie SL, Bowie YD. Lessons learned on forced relocation of older adults: The impact of hurricane andrew on health, mental health, and social support of public housing residents. J Gerontol Soc Work 2004; 40(4):23-35. https://doi.org/10.1300/J083v40n04_03

41. Hamama-Raz Y, Palgi Y, Shrira A, Goodwin R, Kaniasty K, Ben-Ezra M. Gender differences in psychological reactions to hurricane sandy among New York metropolitan area residents. Psychiatric Quarterly 2015;86(2):285-296. https://doi.org/10.1007/s11126-014-9333-3

42. Cui K, Han Z, Wang D. Resilience of an earthquake-stricken rural community in southwest china: Correlation with disaster risk reduction efforts. Int J Environ Res Public Health 2018; 15(3). https://doi.org/10.3390/ijerph15030407

43. Xu J, Ou L. Resilience and quality of

life among Wenchuan earthquake survivors: The mediating role of social support. Public Health 2014; 128(5):430-437. https://doi.org/10.1016/j.puhe.2014.03.002

44. Gowan ME, Kirk RC, Sloan JA. Building resiliency: A cross-sectional study examining relationships among health-related quality of life, well-being, and disaster preparedness. Health Qual Life Outcomes 2014; 12(1). https://doi.org/10.1186/1477-7525-12-85

45. Kelly C, Hulme C, Farragher T, Clarke G. Are differences in travel time or distance to healthcare for adults in global north countries associated with an impact on health outcomes? A systematic review. BMJ Open 2016; 6(11):e013059. https://doi.org/10.1136/bmjopen-2016-013059

46. Stanley E, Muntner P, Re RN, Frohlich ED, Holt E, Krousel-Wood MA. Quality of life in hypertensive clinic patients following hurricane Katrina. Ochsner J 2011; 11(3):226-31.

47. Barile JP, Binder SB, Baker CK. Recovering after a Natural Disaster: Differences in Quality of Life across Three Communities after Hurricane Sandy. Appl Res Qual Life 2020; 15(1):1151-9. https://doi.org/10.1007/s11482-019-09722-3

48. Siqveland J, Nygaard E, Hussain A, Tedeschi RG, Heir T. Posttraumatic growth, depression and posttraumatic stress in relation to quality of life in tsunami survivors: A longitudinal study. Health Qual Life Outcomes 2015; 13(1). https://doi.org/10.1186/s12955-014-0202-4

49. Rodney RM, Swaminathan A, Calear AL, Christensen BK, Lal A, Lane J, *et al.* Physical and mental health effects of bushfire and smoke in the Australian capital territory 2019–20. Front Public Health 2021; 9:682402. https://doi.org/10.3389/fpubh.2021.682402

50. Poser K, Dransch D. Volunteered geographic information for disaster management with application to papid flood damage estimation. Geomatica. 2010; 64(1):89-98. www.nrcresearchpress.com

51. Généreux M, Schluter PJ, Takahashi S, Usami S, Mashino S, Kayano R, *et al.* Psychosocial management before, during, and after emergencies and disasters-results from the Kobe expert meeting. Int J Environ Res Public Health 2019; 16(8):1390. https://doi.org/10.3390/ijerph16081309

52. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). Med Care 1992; 30(6):473-83.

53. Anderson RT, Aaronson NK, Bullinger M, McBee WL. A review of the progress towards developing health-related quality-of-life instruments for international clinical studies and outcomes research. Pharmacoeconomics 1996; 10(4):336-55. https://doi.org/10.2165/00019053-199610040-00004

54. Wagner AK, Gandek B, Aaronson NK, Acquadro C, Alonso J, Apolone G, *et al.* Cross-cultural comparisons of the content of SF-36 translations across 10 countries: results from the IQOLA Project. International Quality of Life Assessment. J Clin Epidemiol 1998; 51(11):925-32. https://doi.org/10.1016/s0895-4356(98)00083-3

55. Lam CLK, Tse EYY, Gandek B, Fong DYT. The SF-36 summary scales were valid, reliable, and equivalent in a Chinese population. J Clin Epidemiol 2005; 58(8):815-822. https://doi.org/10.1016/j.jclinepi.2004.12.008

56. Jakobsson U. Using the 12-item short form health survey (SF-12) to measure quality of life among older people. Aging Clin Exp Res 2007; 19(6):457-464.

57. Skevington SM, Lotfy M, O'Connell

KA. The World Health Organization's WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial. A report from the WHOQOL Group. Qual Life Res 2004; 13(2):299-310. https://doi.org/10.1023/B:QURE.0000018486.91360.00

58. Castro PC, Driusso P, Oishi J. Convergent validity between SF-36 and WHOQOL-BREF in older adults. Rev Saude Publica 2014;48(1):63-67. https://doi.org/10.1590/S0034-8910.2014048004783

59. Huang IC, Wu AW, Frangakis C. Do the SF-36 and WHOQOL-BREF measure the same constructs? Evidence from the taiwan population*. Qual Life Res 2006; 15(1):15-24. https://doi.org/10.1007/s11136-005-8486-9