

## REVIEW ARTICLE

# Malnutrition, Quality of Life and Their Relationship among Older Adults: A Scoping Review

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## ABSTRACT

Malnutrition and poor quality of life (QoL) in older adults are becoming a public health concern. Therefore, this review article summarised significant studies which investigated the assessment of malnutrition and QoL and its relation. A literature research on academic journals published from 2011 to 2021 was conducted by using electronic databases, which were Google Scholar, PubMed, Science Direct and SCOPUS. A total of 21 studies with 26,569 participants were identified and included in this review. The prevalence of malnutrition ranged from 1.6% to 26.5%, and poor QoL was significant amongst malnourished older adults. In conclusion, malnutrition is associated with poor QoL amongst older adults. Future studies regarding factors that influence malnutrition and its relation towards the QoL amongst older adults are needed as it will help in assisting the healthcare professions to combat these health problems.

*Malaysian Journal of Medicine and Health Sciences* (2023) 19(1):286-295. doi:10.47836/mjmhs19.1.37

**Keywords:** Malnutrition, Quality of life, Older Adults

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## INTRODUCTION

The world's population is currently ageing. Almost every country in this world is experiencing an increased proportion and number of older adults in its population. According to the World Health Organisation (WHO), the proportion of older adults between 60 years and above is expected to be approximately doubled from 12% to 22% between the year 2015 and 2050 (1). The cut-off age for the older adults population proposed by the United Nations was 60 years and above.

Malnutrition amongst the elderly is becoming one of the emerging concerns due to the demographic shift. Malnutrition contributes to the worsening of health, a decline in the physical and cognitive functional status, increased healthcare services and unfortunate death (2,3). Older people are at higher risk of developing malnutrition due to various factors such as the emergence of many chronic diseases, loss of sensory function, gastrointestinal problems, problems with chewing or swallowing and many others (4). These factors will

alter the dietary intake, leading to inability to meet the nutrient needs or energy requirements amongst older adults, and eventually causing malnutrition amongst them (2). In addition, the malnourished older adults who experience a decrease in muscle strength may cause functional impairment and further increase dependency in their daily living activities (5).

Quality of life is sometimes referred to as the life satisfaction of an individual (6,7). It is a concept of multiple dimensions which includes general behavioural competence, physical status, mental well-being and other environmental factors such as living alone which may influence a person's satisfaction in life (8). In addition, the WHO stated that quality of life is a person's perception regarding their position in life in terms of culture and value systems that they live in, as well as their goals, expectations and concerns. Changes in biological and psychological aspects during older age will decrease the health-related quality of life and well-being of a person (9). The assessment of malnutrition and quality of life is considered a clinically important outcome measure when evaluating new alternative treatments in older adults (10). This understanding has resulted in the emergence of several tools to precisely assess malnutrition and health-related quality of life. For example, mini nutritional assessment (MNA) (11)

and malnutrition universal screening tool (MUST) (12) has been developed to examine for malnutrition. Meanwhile, short form medical outcome questionnaire (SF-36) (13) and EuroQoL EQ-5D health-related quality of life instrument (14) has been designed to evaluate the quality of life.

In 2020, a recent study evaluated the relation between malnutrition, diet quality and health-related quality of life amongst older adults. Findings showed that an increase in age was related to an increased risk of malnutrition, which comprised physical and mental aspects that reduced the quality of life components (15). In addition, a study which explored the relation between risk of malnutrition and quality of life in a large sample size found that those at risk of malnutrition significantly reduced the HRQoL amongst older adults (16). A systematic review and meta-analysis discovered different studies that showed an relation between nutritional status and quality of life amongst older adults. Results found that those with malnutrition experienced poor quality of life (10).

Despite this, there are limited reviews on the assessment of malnutrition and quality of life in older adults and its relation that have been published. A literature analysis was conducted to facilitate further research and to combine the existing volume of evidence obtained through individual studies into a comprehensive overview. The purpose of this article review was to analyze the commonly used tools in measuring malnutrition and QoL; and to explore evidence on the prevalence of malnutrition and identify the quality of life in older adults and its relation.

**METHODS**

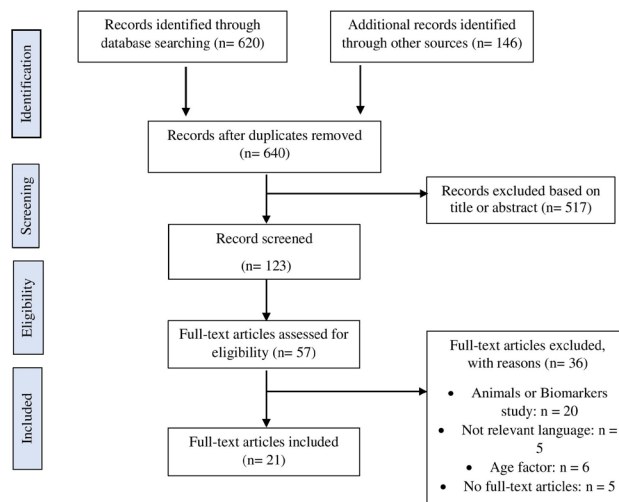
Scoping review study design was used in this study to identify the assessment of malnutrition and quality of life and its relation. The methodological framework by Tricco and colleagues (2018) was used in conducting this scoping review. A flow diagram following the preferred reporting items for systematic reviews and meta analyses extension for Scoping Reviews (PRISMA-ScR) showed the flow of articles from the search to its final selection as shown in Fig. 1 (17).

**Identifying the research questions**

The review questions were: (1) What are the assessment tools used to measure malnutrition and quality of life in older adults?; (2) What is the prevalence of malnutrition in older adults? (3) What is the relation between malnutrition and quality of life amongst older adults? (4) Is the quality of life in older adults poor or good?;

**Identifying relevant studies**

An electronic search was performed by using electronic databases, such as Google Scholar, PubMed, Science Direct and SCOPUS. A comprehensive search was



**Figure 1: Flow chart of scoping review [based on framework by Tricco et al. 2018 (17)]**

conducted on the full-text accessibility academic journals (English) that were published from 2011 to 2021 and related to the topic. All types of study design were included in the search, either an observational study like cohort, randomized study, longitudinal, cross-sectional, and case control study, retrospective or a prospective cohort study among older adults, or reviews such as systematic review.

During the selection of studies, two researchers independently performed the data extraction process, and consensus was obtained for all eligible studies. All retrieved articles’ reference lists were hand-searched for further eligible studies. The titles of the studies were screened first, followed by the abstracts. The key terms used for searching articles are listed in Table 1. Studies that were relevant during this initial screening were read in their entirety. Any disagreements that arose during the selection of studies were discussed and reviewed by the researchers before being included in this review.

**Study selection**

After careful consideration, the reviewed studies were selected if the information about: (1) profile of participants (i.e. age and gender); (2) assessment of malnutrition and quality of life; and (3) prevalence of malnutrition, quality of life or, the relation between malnutrition and quality of life amongst older adults, were provided.

**Table 1: Key search terms in Scoping Review**

Key Search Terms
Malnutrition OR Poor Nutritional Status AND quality of life OR well-being AND older adults OR elderly
Malnutrition OR Undernutrition AND quality of life OR health-related quality of life AND elderly OR aged people
Malnutrition OR Poor Nutritional Status AND prevalence OR incidence AND quality of life OR health-related quality of life AND older adults OR elderly

### Charting the data

The Mendeley program was used to record and export articles that were identified from electronic databases. After that, the articles were filtered for duplicates. The remaining full articles were evaluated for eligibility. The eligibility process requires determining the criteria for inclusion and exclusion. Studies included were the ones with (1) older adults aged 60 years and above; (2) human study; (3) studies published in English languages; and (4) full text only. Excluded criteria include studies that involved animals or biomarkers studies. After removing the full-text articles that did not meet the criteria, the remaining data were included in this scoping review. The studies were qualitatively summarised. Country, author, year of publication, types of study design and purpose of study, participant characteristics (number and age), and findings on assessment of malnutrition and quality of life, prevalence of malnutrition, quality of life, or association between malnutrition and quality of life in older adults are summarised in Table II.

### Collating, summarizing and reporting the results

The significant findings and data from this review were summarised in Table II. The table has been adjusted to meet the objectives of the study. The elements extracted from the findings were on the assessment, prevalence of malnutrition, quality of life and the relation between malnutrition and quality of life. The table was designed to assist qualitative synthesis of the included studies.

## RESULTS

A total of 766 titles were identified during the search, and 123 abstracts were identified for possible inclusion. However, 21 articles were selected and included in the final screening procedure stage of the review, as shown in Figure 1. The majority of research studies were cross-sectional studies (19 studies, 90%) with one longitudinal cohort study (5%), and one randomised controlled trial (5%). The sample size in the studies ranged from 83 to 3977 participants, aged 60 years and older. This study summarised the findings on assessment of malnutrition and quality of life, prevalence of malnutrition, quality of life and their relation, as outlined in Table II.

### Assessment and Prevalence of Malnutrition

A total of 21 studies in this review investigated the assessment of malnutrition. The assessment tools used in these studies included mini-nutritional assessment (MNA), mini-nutritional assessment-short form (MNA-SF), nutritional screening initiative (NSI), Dutch malnutrition steering group, malnutrition universal screening tool (MUST), malnutrition risk screening tool-hospital (MRST-H) scale and anthropometric parameters (4,9,15,16,18–34). The anthropometric parameters used to assess malnutrition included body weight, height when standing, body mass index (BMI), mid-upper arm circumference (MUAC) and waist circumference (WC). However, the most common validated nutritional

screening and assessment tools used in these studies (15 studies) to assess the malnutrition status amongst older adults were MNA and MNA-SF. The overall prevalence of malnutrition ranged from 1.6% to 26.5%, based on all tools used in these studies. In addition, those at risk for malnutrition ranged between 9.3% and 67.2%.

### Assessment of Quality of Life

A total of 19 studies in this review investigated assessment tools used to measure the quality of life (QoL), which were short-form 36 (SF-36), short-form health survey (SF-12), WHO's quality of life measure-brief version (WHOQOL-BREF), EuroQoL-5D (EQ-5D), 15D and control, autonomy, self-realisation and pleasure (CASP-19) scale (4,9,15,16,18–25,27,29–34). The scoring of these tools varied from one another but had a similar purpose, which was to evaluate the quality of life amongst participants. Participants with higher scores indicated better QoL, and those with lower scores showed poor QoL. The majority of studies in this review reported lower QoL amongst older adults who were malnourished.

### Association between malnutrition and quality of life

The majority of the studies (19 studies) in this review explained the relation between malnutrition and quality of life in older adults. One study stated that nutritional status had significant impacts on the HRQoL; hence, nutritional screening and sufficient nutrient intake could become an important contribution to the health and QoL amongst older adults (9). In addition, one longitudinal study showed that being persistently poor in nutrition (according to MNA-SF at-risk/malnourished or NSI moderate/high nutritional risk) was associated with elevated incidence of declined QoL and mortality (22).

Three (3) studies reported that older adults who were malnourished and those at risk of malnutrition had significantly worse mental, psychological and physical aspects of HRQoL as compared to those who were well-nourished (24,25,32). Another two studies found that older adults who were at risk of malnutrition were significantly associated with domains of QoL, such as physical, social participation, intimacy, psychological, environmental and sensory abilities (30). Three studies found that dimensions of QoL, such as problems in mobility, self-care, usual activities and pain or discomfort were most commonly associated with energy and nutrient intake, which indirectly impacted the nutritional status (18,27,34). One study found that increase in diet quality might improve the physical QoL. Therefore, improving the physical and mental QoL will decrease the risk of malnutrition amongst older adults (15).

## DISCUSSION

Malnutrition has become one of the most common

**Table II: Overview of studies in Malnutrition and Quality of life**

Country	Study design	Participants characteristics (n, age, sex)	Assessment tool Malnutrition	Assessment tool Quality of Life	Results
Brazil; De Oliveira et al., 2021(29)	Cross-sectional study	Subjects; n = 344 older adults  Aged = 60 years and above	<ul style="list-style-type: none"> <li>MNA-SF</li> <li>Weight, height, BMI</li> </ul>	SF-12	<p>41.9% of the participants were well-nourished, while 43.6% were at risk of malnutrition</p> <p>Score of HRQoL evaluation was considered good with median of 60 points</p> <p>Findings show that those who were malnourished had worse HRQoL scores.</p>
Malaysia; Ahmad et al., 2021 (4)	Community-based Nationwide Cross-sectional study	Subjects; n = 3977 older adults  Aged = 60 years and above	MNA-SF	Control, Autonomy, Self-Realization and Pleasure (CASP- 19) scale	<p>Prevalence of malnutrition and at-risk of malnutrition was 7.3% and 23.5%, respectively.</p> <p>Low quality of life is a predictor of at risk of malnutrition among elderly living in Malaysia.</p>
East Coast Peninsular Malaysia; Wong et al., 2021(27)	Cross-sectional study	Subjects; n = 196 older adults  Aged = 60 years and above	<ul style="list-style-type: none"> <li>Malnutrition Risk Screening Tool-Hospital (MRST-H) scale</li> <li>Anthropometric measurement (weight, height, BMI, mid- upper arm and calf circumference)</li> </ul>	EQ-5D-5L	<p>41% of the participants were at high risk of malnutrition</p> <p>The most commonly reported health problems among participants were mobility, usual activities, pain/discomfort, anxiety/depression and self care</p> <p>Those at risk of malnutrition was associated with multiple dimensions of HRQoL which are mobility, usual activities and self care</p>
Iran; Khatami et al., 2020 (25)	Nationwide Cross-sectional study	Subjects; n = 1350 older adults  47.6% men; 52.4% women  Aged = 60 years and above	MNA	SF-36	<p>13.6% participants were malnourished, 11.3% at risk of malnutrition and 11.5% of the participants were normal nutritional status</p> <p>Malnourished elderly people have significantly worse mental and physical aspects of HRQOL in comparison with elderly who are well-nourished and at-risk malnutrition.</p>
Cyprus; Gezer et al., 2020 (15)	Cross-sectional study	Subjects; n = 1402 older adults  Aged = 60-96 years	<ul style="list-style-type: none"> <li>MNA</li> <li>Anthropometric measurement (weight, height, BMI, waist, mid- upper arm and calf circumference)</li> </ul>	SF-36	<p>Of the participants, 5.4% had malnutrition, and 9.3% were at risk of malnutrition</p> <p>Those aged &gt; 85 years had the highest risk of malnutrition and those aged 65- 74 had the highest physical and mental quality of life</p> <p>Those without risk of malnutrition had higher mental and physical quality of life than those with risk of malnutrition.</p>
East Coast Peninsular Malaysia; Wong et al., 2020 (28)	Cross-sectional observational study	Subjects; n = 211 older adults  Aged = 60 years and above	<ul style="list-style-type: none"> <li>Malnutrition Risk Screening Tool-Hospital (MRST-H) scale</li> <li>Weight, height, BMI</li> </ul>	-	58.4% of the participants were at high risk of malnutrition and 49.4% were at low risk of malnutrition
Finland; Salminen et al., 2019 (18)	Cross-sectional study	Subjects; n = 2160 older adults  Aged = 65 years and above	<ul style="list-style-type: none"> <li>MNA</li> <li>Weight, height, BMI</li> </ul>	15D	<p>64% of participants were at risk of malnutrition and 18% of them suffered from malnutrition</p> <p>HRQoL was significantly associated with malnutrition in both female and male residents.</p> <p>HRQoL started to increase among those at risk of malnutrition and continued to increase linearly among those well-nourished.</p>
Singapore; Wei et al., 2019 (22)	Longitudinal study	Subjects; n = 2075 community living adults  Aged = 60 years and above	<ul style="list-style-type: none"> <li>MNA-SF</li> <li>NSI</li> </ul>	SF-12	<p>Nutritional deterioration was associated with poor QoL and mortality; persistent poor nutrition (MNA-SF at risk/ malnourished or NSI moderate/high nutritional risk) was associated with elevated incidence poor QoL and mortality.</p>
Spain; Julio et al., 2018 (23)	Cross-sectional study	Subjects; n = 326 non-institutionalized individual  Aged = 75 years and above	MNA-SF	<ul style="list-style-type: none"> <li>Health perception status was measured as excellent, very good, good, regular, or poor</li> <li>Overall health at the time of the interview was categorized as good or poor</li> </ul>	<p>Prevalence of malnutrition was 2.8% and 26.9% individuals were at risk of malnutrition, whereas women presented a higher rate (31.5%)</p> <p>Individuals that showed a lower risk of malnutrition are those with a positive perception than those who have a good overall health</p> <p>Individuals at risk of malnutrition is associated with higher QoL.</p>

<sup>1</sup>Abbreviations: MNA, Mini Nutritional Assessment; MNA-SF, Mini Nutritional Assessment-Short Form; MRST-H, Malnutrition Risk Screening Tool-Hospital; BMI, Body Mass Index; SF-12/SF-36, Short Form -12/-36; CASP-19, Control Autonomy Self-Realization and Pleasure Scale; EQ-5D, European Quality of Life Five Dimension; WHOQOL-BREF, World Health Organization Quality of Life; ANSI, Australian nutrition Screening initiative

**Table II: Overview of studies in Malnutrition and Quality of life (Continued.....)**

Country	Study design	Participants characteristics (n, age, sex)	Assessment tool Malnutrition	Assessment tool Quality of Life	Results
Southeastern Brazil; Damiao et al., 2018 (30)	Cross-sectional study	Subjects; n = 2868 older adults  Aged = 60 years and above	<ul style="list-style-type: none"> <li>MNA</li> <li>Anthropometric measurement (weight, height, BMI, mid- upper arm and calf circumference)</li> </ul>	WHOQOL-BREF	<p>Of the participants, 1.6% malnourished and 27.9% were at risk of malnutrition</p> <p>The lowest percentages were observed in domains of WHOQOL-BREF which were psychological health as well as the past, present and future activities domains (51.8% and 52.5%, respectively)</p> <p>Risk of malnutrition was associated with physical, environment, psychological, sensory abilities, social participation and intimacy domains of QoL.</p>
Netherlands; Bakker et al., 2018 (21)	Cross-sectional study	Subjects; n = 1325 community-living elderly  Aged = 75 years and above	Dutch Malnutrition Steering Group (self-reported weight, height)	EQ-5D	<p>4.8% of participants were malnourished</p> <p>Poor HRQoL is significantly associated with malnutrition.</p>
Nepal; Ghimire et al., 2018 (9)	Cross-sectional study	Subjects; n = 289 older adults  Aged = 60 years and above	<ul style="list-style-type: none"> <li>MNA</li> <li>Weight, height, BMI</li> </ul>	EQ-5D	<p>Prevalence of malnutrition was 10%</p> <p>Nutritional score according to MNA was positively associated with HRQoL after adjusting the age and gender.</p>
Egypt; Hamza et al., 2018 (19)	Cross-sectional study	Subjects; n = 170 community dwelling older adults	<ul style="list-style-type: none"> <li>MNA</li> <li>Weight, height, BMI</li> <li>Waist and hip circumference [Waist/hip ratio (WHR)]</li> </ul>	SF-36	<p>High prevalence of malnutrition was found among community-dwelling elderly. 26.5% of them were malnourished, 40.6% were at risk of malnutrition and 32.9% were well nourished</p> <p>Findings showed that HRQoL was significantly poorer in malnourished elderly (p&lt;0.001).</p>
West Sumatera; Kurniawati & Dewi, 2018 (20)	Cross-sectional study	Subjects; n = 125 older adults  76 male and 49 female  Aged = 60 years and above	<ul style="list-style-type: none"> <li>MNA</li> <li>Weight, height, BMI</li> </ul>	WHOQOL-BREF	<p>21.6% of the elderly participants were well-nourished, 67.2% were at high risk to malnutrition while 11.2% were malnourished.</p> <p>More than half of the elderly participants who had high risk of malnutrition also have lower QoL.</p> <p>Persons with high risk of malnutrition or malnourished has already lowered their QoL compared to normal nourishment.</p> <p>There were significant relationship between nutritional status and QoL among elderly people.</p>
Mediterranean coast; Hernandez-Galiot et al., 2017 (33)	Cross-sectional study	Subjects; n = 102 older adults  61 women and 41 men  Aged = 75 years and above	MNA	EQ-5D	<p>Almost 21% of the elderly participants were at risk of malnutrition and 2% had malnutrition</p> <p>Almost 42% of population rated their health as excellent or best imaginable state of health</p> <p>Malnourished individuals and those at risk of malnutrition had lower rate of QoL and greater loss of personal autonomy.</p>
North-West Spain; Maseda et al., 2017 (24)	Cross-sectional study	Subjects; n = 749 community dwelling elders  Aged = 65 years and above	MNA-SF	WHOQOL-BREF	<p>Of the participants, 85.7% well-nourished, 14.3% were malnourished/at risk of malnutrition</p> <p>The overall QoL, physical health and psychological domains of WHOQOL-BREF were associated with poor nutritional status</p>
South East Sweden; Naseer et al., 2015 (32)	Cross-sectional study	Subjects; n = 1402 older adults  Aged = 65 years and above	Anthropometric measurement (weight, height, BMI, mid- upper arm and calf circumference)	SF-12	<p>8.5% participants were at risk of undernutrition</p> <p>Mean score of PCS-12 and MCS-12 according to SF-12 was significantly lower among those at risk of undernutrition.</p> <p>The risk of undernutrition was significantly associated with poor HRQoL in both physical and mental dimensions.</p>
Spain; Jimenez-Rodondo et al., 2014 (34)	Cross-sectional study	Subjects; n = 83 non-institutionalized residents  30 men and 53 women  Aged = 80 years and above	MNA	EQ-5D	<p>Malnutrition in 3.3% of men and 1.9% of women, and those at risk of malnutrition in 6.7% and 37.7%, respectively</p> <p>EQ-5D pointed out differences between men and women. Problems in mobility (all participants) and pain/discomfort (women) dimensions were most frequently reported.</p> <p>Risk of malnutrition are associated with QoL in elderly people.</p>

<sup>1</sup>Abbreviations: MNA, Mini Nutritional Assessment; MNA-SF, Mini Nutritional Assessment-Short Form; MRST-H, Malnutrition Risk Screening Tool-Hospital; BMI, Body Mass Index; SF-12/SF-36, Short Form -12/-36; CASP-19, Control Autonomy Self-Realization and Pleasure Scale; EQ-5D, European Quality of Life Five Dimension; WHOQOL-BREF, World Health Organization Quality of Life; ANSI, Australian nutrition Screening initiative

**Table II: Overview of studies in Malnutrition and Quality of life (Continued.....)**

Country	Study design	Participants characteristics (n, age, sex)	Assessment tool Malnutrition	Assessment tool Quality of Life	Results
New Zealand; Wham et al., 2014 (31)	Randomised controlled trial (RCT)	Subjects; n = 3893 older adults  Aged = 65 years and above	Australian nutrition Screening initiative (ANSI)	WHOqoL- BReF	62% were identified to be at moderate or high nutrition risk  Those at low nutrition risk had better functional status and physical and social health related QoL.
Northern Peninsular Malaysia; Chen et al., 2012 (26)	Cross-sectional study	Subjects; n = 236 older adults  Aged = 60 years and above	Anthropometric parameters (body weight, standing height, BMI, mid upper arm circumference (MUAC) and waist circumference (WC))		Overall prevalence of underweight based on BMI <18.5 kg/m <sup>2</sup> was 17.4%. Prevalence of overweight based on BMI ≥25 kg/m <sup>2</sup> was 28.4%  Malnutrition and overweight coexisted among elderly people
Norway; Kvamme et al., 2011 (12)	Cross-sectional study	Subjects; n = 3286 older adults  1632 men and 1654 women  Aged = 65-87 years	<ul style="list-style-type: none"> <li>• MUST</li> <li>• Weight, height, BMI</li> </ul>	EQ-5D	9.6% women and 5.6% men were at risk of malnutrition  Findings show significant reduction in HRQoL with increasing risk of malnutrition, and was more pronounced in men than women.

<sup>1</sup>Abbreviations: MNA, Mini Nutritional Assessment; MNA-SF, Mini Nutritional Assessment-Short Form; MRST-H, Malnutrition Risk Screening Tool-Hospital; BMI, Body Mass Index; SF-12/SF-36, Short Form -12/-36; CASP-19, Control Autonomy Self-Realization and Pleasure Scale; EQ-5D, European Quality of Life Five Dimension; WHOQOL-BREF, World Health Organization Quality of Life; ANSI, Australian nutrition Screening initiative

problems amongst older adults, which eventually leads to a decline in their QoL. Malnutrition is described as a state of nutrient deficiency, excess, or imbalance that has a negative impact on body structure, function, and clinical outcome (5). Severe malnutrition results in a loss of muscle strength and mass, a decrease in functional capacity, and reduces the quality of life of an individual (20). In addition, malnourished individuals are more likely to be disabled as they experience various limitations such as inability to use public or private transportation, difficulty in purchasing food and preparing their own meals (35). Hence, nutrition is one of the potential modifiable factors of QoL (19). Nutrition screening and detection of malnutrition are crucial to help in preventing the worsening of QoL and well-being of older adults (24). This scoping review gathered studies on the assessment of malnutrition and QoL and examined the relation between malnutrition and QoL amongst older adults.

The most common assessment tools used in these studies to assess the malnutrition status were MNA and MNA-SF. Mini-nutritional assessment was one of the rapid nutritional assessment tools which was broadly used internationally amongst older adults to determine those who were at risk of malnutrition (9,15,18–20,25,30,33,34). This tool consisted of two sections which were screening and evaluation. The MNA consisted of 18 questions under four aspects, which were anthropometric measurements, general assessment, nutritional habits and subjective assessment 36. The maximum score of MNA was 30 points. The MNA was categorised into three groups, which were normal nutritional status, at risk of malnutrition and malnourished. Scores ≥ 24 points indicated a normal or good nutritional status, while scores that ranged between 16 and 23.5 were considered as at risk of malnutrition and scores < 16 indicated malnourished. The validity, sensitivity (96%) and specificity (98%) of this tool was proven to measure nutritional status (BMI,

energy and vitamin intake) and was highly correlated with the clinical assessment (37,38).

Mini-nutritional assessment-short form (MNA-SF) was a shorter version of the full MNA developed by Rubenstein and colleagues to shorten the time of completing the full MNA (39). This tool was a validated nutritional screening and assessment tool used to identify malnourished, at risk of malnutrition or well-nourished older adults. The MNA-SF consisted of six items extracted from the full MNA questionnaire, which included the decline in food intake, involuntary weight loss, mobility, psychological stress, neuropsychological problems (dementia or depression) and BMI. The total scores of this tool were ranged from 0 to 14 points. Those who scored between 12 to 14 showed good nutritional status, 8 to 11 indicated elderly at risk of malnutrition and 0 to 7 were considered malnourished (11). The reliability of the MNA-SF tool in the current study showed Cronbach's alpha value of 0.59.

In addition, this scoping review identified that Short Form Health Survey 36 and 12; and EuroQoL-5D (EQ-5D) were the most common tools used to evaluate the QoL amongst the population in these studies. Haywood and colleagues (2005) stated that these instruments had good evidence in terms of reliability, responsiveness, and validity. It is recommended that the SF-36 is required when assessing health broadly and in more detail, especially amongst community-dwelling older adults who have minimal morbidities. The EQ-5D is suggested to evaluate a more brief assessment and measure the significant changes in health.

Short-form 36 (SF-36) is an instrument commonly used to assess the health-related QoL amongst people. SF-36 involves 36 items that cover 8 domains in both physical health and mental health components. Physical component summary (PCS) includes physical function (PF), role physical (RP), bodily pain (BP) and general

health (GH), whereas mental component summary (MCS) includes role emotional (RE), vitality (VT), mental health (MH), and social functioning (SF) (41). The scores for SF-36 range from 0 to 100 for each domain, whereby the highest score indicates better QoL. This tool is appropriate to be used because of the characteristics included, which are socioeconomic and cultural aspects. Besides that, it evaluates several dimensions of health and consequence of diseases (42).

In addition, a shorter version of SF-36, which is a short-form health survey (SF-12), is also often used to measure the HRQoL. This tool was developed from the medical outcomes study SF-36. Both SF-12 and SF-36 have similar domains and components. However, SF-12 has less questions and it is more practical to be used amongst populations, especially with those who have poor ability to pay attention or have mental health issues (43). The reliability of this tool was demonstrated according to the Cronbach's alpha values which were 0.86 (PCS-12) and 0.77 (MCS-12) (32).

EuroQoL-5D (EQ-5D) is one of the instruments used to describe and measure the HRQoL. It was developed by many countries, used amongst all populations regardless of any age group and available since the year 1990 (14). This instrument consists of two parts which are the EQ-5D descriptive system and EQ-VAS (visual analogue scale). The EQ-5D describes the health status in five aspects which are self-care, mobility, pain or discomfort, usual activities and psychological status. Each aspect is assessed based on the level of severity which are no problems, some problems and extreme problems. The scores range from 0 to 1, whereby the maximum score shows good HRQoL. The EQ-VAS is used to rate the current health status of an individual with endpoints of 0 and 100. Zero indicates the worst HRQoL, and 100 indicates the best HRQoL (16).

These studies suggested that malnutrition is associated with health-related quality of life amongst older adults. However, the relation between malnutrition and QoL in older adults was found to be very complex and may be affected by various factors. Factors such as being able to walk, not being frail, not being malnourished and having good self-perceived general health status may give a better impact on the HRQoL. Older adults who were malnourished had poor HRQoL scores (29). In addition, findings from another study also showed that older adults who lived in a rural area, lack education, experience depression, increased dependency, and with a low QoL had a significant risk of malnutrition or malnourishment (4).

Malnourished older adults had significantly worse mental and physical aspects of HRQoL as compared to those who were well-nourished and at risk of malnutrition. This study found a clear relation between malnutrition and HRQoL amongst older adults living

in Iran (25). Apart from that, factors which influenced the HRQoL were age, family composition, marital status, education, occupation, receiving pension and insurance. All of these factors may also impact the nutritional status of an individual, which eventually will cause a worsening of the HRQoL. A study conducted in Cyprus showed the prevalence of malnutrition and those at risk of malnutrition were higher amongst older adults, especially those aged between 85 years and above 15. Findings from this study also found that increase in diet quality may improve the physical QoL. Improvement in terms of physical and mental quality of life will decrease the risk of malnutrition amongst older adults.

Nutrition is one of the main aspects in determining the HRQoL amongst older adults. In this study, 18% of the malnourished older adults had impairments in activities of daily living (ADL), frequently suffered dementia, had lower cognitive levels and usually with inadequate energy intake 18. Impairments in ADL such as mobility, eating, doing usual activities and excretion are parts of the dimension of health-related QoL. Similarly, a study conducted in Spain found that dimensions of QoL, which were problems in mobility and pain or discomfort, were most commonly associated with energy and nutrient intake, which indirectly impacted the nutritional status (34). Those who increase their calorie, protein, fat, magnesium, phosphorus, selenium and niacin intakes showed lower pain or discomfort problems. The increase in QoL was due to improvement in nutritional status. In addition, deterioration in terms of nutritional status was related with poor QoL and mortality.

A study conducted in Spain amongst 326 non-institutionalised older adults found that those with a positive perception of life had a lower risk of malnutrition as compared to those with a negative perception of life, good and poor overall health (23). Malnourished older adults usually have multiple problems such as difficulty in chewing, speech disability, and eventually lead to poor HRQoL (21).

Studies conducted in Egypt and West Sumatra also found that those at high risk of malnutrition or malnourished had already worsened their QoL as compared to well-nourished individuals (19,20). However, some well-nourished older adults may also experience poor quality of life because of the co-existence of multiple chronic diseases and poor health status (20). All functioning conditions will gradually decline in older adults. As a result, psychological, physiological, and societal issues arise (19). A study conducted by Hernández-galiot & Goci also found that older adults who were malnourished and at risk of malnutrition had a poor rate of QoL and a significant loss in terms of individual autonomy. In addition, overall QoL, psychological aspects, mental problems and physical health were related with poor nutritional status (24,32). Other factors that can cause malnutrition in older adults were gender,

impairment in social resources and decline in physical health according to the WHOQOL-BREF domains (24).

Almost two-thirds of the older adults living in New Zealand were found to be at high risk of malnutrition (31). Those who had a lower risk of malnutrition had better functional status and QoL in terms of physical and social health. The study which enrolled 3,286 older adults found a significant decrease in the HRQoL with those who were at higher risk of malnutrition 16. Meanwhile, those who were overweight with BMI 25-27.5 kg/m<sup>2</sup> showed better HRQoL (44).

This review is a current analysis of the commonly used assessments in measuring malnutrition and quality of life, as well as the prevalence of malnutrition, quality of life in older adults and its relation which included studies from 2011 to 2021, comprising the most recent publications on "malnutrition" and "quality of life". Lastly, the shortcoming of this scoping review was that limited studies were conducted in Asian countries on the assessment of malnutrition and QoL and their relation. In addition, scarce study was done to explore the factors and mechanisms of how malnutrition led to poor QoL. Therefore, more studies should be done to provide data for future research and assist healthcare professions to combat malnutrition and poor QoL amongst older adults.

## CONCLUSION

In conclusion, results from this scoping review provide a subjective summary of the relation between malnutrition and QoL amongst older adults. Overall findings from this review suggested that malnutrition and quality of life among older adults are strongly related. Nutrition screening is crucial in detecting and preventing malnutrition which indirectly improves the HRQoL. In addition, appropriate nutritional interventions may be one of the key strategies in managing and combating health problems in older adults.

## ACKNOWLEDGEMENT

This work was supported by the Special Research Grant Scheme International Collaboration (UNISZA/2021/SRGS-IC/02). We would like to express our gratitude to all those who helped to contribute throughout the writing of this article.

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