

Factors associated with food choices among elderly: a scoping review

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ABSTRACT

Introduction: The aging population is a matter of global concern. Age-related physiological, pathological, psychosocial, economic, cultural and environmental changes are common and may greatly influence the quality of life of the elderly. The aim of this review was to explore the determinants and motivations that drive the elderly in making food choices. **Methods:** The search strategy of this literature review used the PRISMA protocol. Potential literature that was related to food choices was identified using two different combinations of keywords and two major electronic search engines, namely Pubmed and Science Direct. The articles that were selected for this review had to be in the English language, open-accessed and published between January 2007 and December 2017. **Results:** From a search of 1398 articles, 15 articles (seven quantitative and eight qualitative) were identified that were related to food choices among the elderly. The key factor that determined food choices among the elderly population was identified to be health. Others included convenience, sensory appeal, price, early food experience and more. The limitations of these studies that were reported were the small sample size and the reliance on self-reporting. The conclusions that were drawn were for specific groups that were studied in this review should be extrapolated or generalised with caution. **Conclusion:** Strategies for intervention programmes should be undertaken in collaboration with health professionals, researchers, policymakers, and the food industry. Future research is needed in the elderly who have chronic diseases, are dependent or who have disabilities.

Keywords: Food choice, food intake, elderly, nutrition, scoping review

INTRODUCTION

The aging population is a matter of global concern. The elderly, by definition, are those aged ≥ 60 years. In 2017, 13% of the global population aged ≥ 60 years was approximately 962 million people, with the highest percentage (25%) to be

found in Europe. The world population of the elderly is forecast to be 1.4 billion in 2030, increasing to 2.1 billion in 2050 and to 3.1 billion in 2100 (UN DESA, 2017).

Age-related physiological, pathological, psychosocial, economic and cultural

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environmental changes (Rozin, 2006; Sharpe, Huston & Finke, 2003) are common and may greatly influence the quality of life of the elderly. This complex phenomenon, interlaced with several socio-demographic factors such as gender (Wardle *et al.*, 2004) and religion (Asma *et al.*, 2010) can influence food choices and preferences (Rolls, 1999). Changes in food choices may have adverse effects on the energy and macronutrient intake and which in turn may eventually impact or aggravate nutrition-related illness, body weight, body composition, disability and the quality of life (Rolls, 1999).

The determinants of food choice in the elderly, as shown by previous studies, include the decline in chemosensory system sensitivity (i.e. in taste and smell) (Rolls, 1999), loss of appetite (Shatenstein *et al.*, 2013) and life course events such as parental influence, early adult events and new health diagnoses during aging (Pucciarelli & Thomas, 2011). The other factors that contribute to food choices are, *inter alia*, taste, convenience, cost, nutritional knowledge, health status and food accessibility (Ree, Riediger & Moghadasian, 2008; Gunsam & Murden, 2007). The understanding of these factors in influencing food choices is still unclear, limited and requires investigation (Gunsam & Murden, 2007). Brownie & Coutts (2013) stated that knowledge on how available dietary guidelines of food intake recommendations can be applied to food choices and daily life for the elderly is limited. Hence, the aim of this review is to explore the determinants and motivations of the elderly in their healthy food choices.

METHODS

The search strategy was undertaken according to the Preferred Reporting Items for Systematic and Meta-Analyses

(PRISMA) Statement Protocol (Moher *et al.*, 2009), as shown in Figure 1. The electronic search engines namely Pubmed and Science Direct were used to identify potential literatures that were related to food choices. Two different combinations of keywords that were used in order to locate studies that were related to food choices were “food choice and elderly” and “food choice or elderly”. The articles that were obtained in the identification step were then subjected to screening where duplicated articles were discarded and abstracts were examined to identify articles that were relevant to the research question of this review. The eligibility criteria that were adopted to accept the articles for this review, were as follows: (1) the article was written in the English language and was open-accessed; (2) publications for the period January 2007 to December 2017; (3) the definition of the elderly population by age was according to the country of origin and (4) the articles had explored factors related to food choices among older people. The exclusion criteria were articles with other age ranges instead of elderly subjects and informal narrative or reviews on food choices.

RESULTS

The identification step retrieved 1,398 publications by using the search engines mentioned and the two different combinations of keywords. The unrelated studies and duplicates were then removed and 1,148 articles were examined thoroughly for relevant abstracts. This procedure resulted in 41 full-text articles that were reviewed for eligibility for inclusion in the final review. Finally, 15 articles that met the inclusion criteria were summarised and tabulated by using the key concepts and themes of the studies. The outcomes were categorised into two research designs:

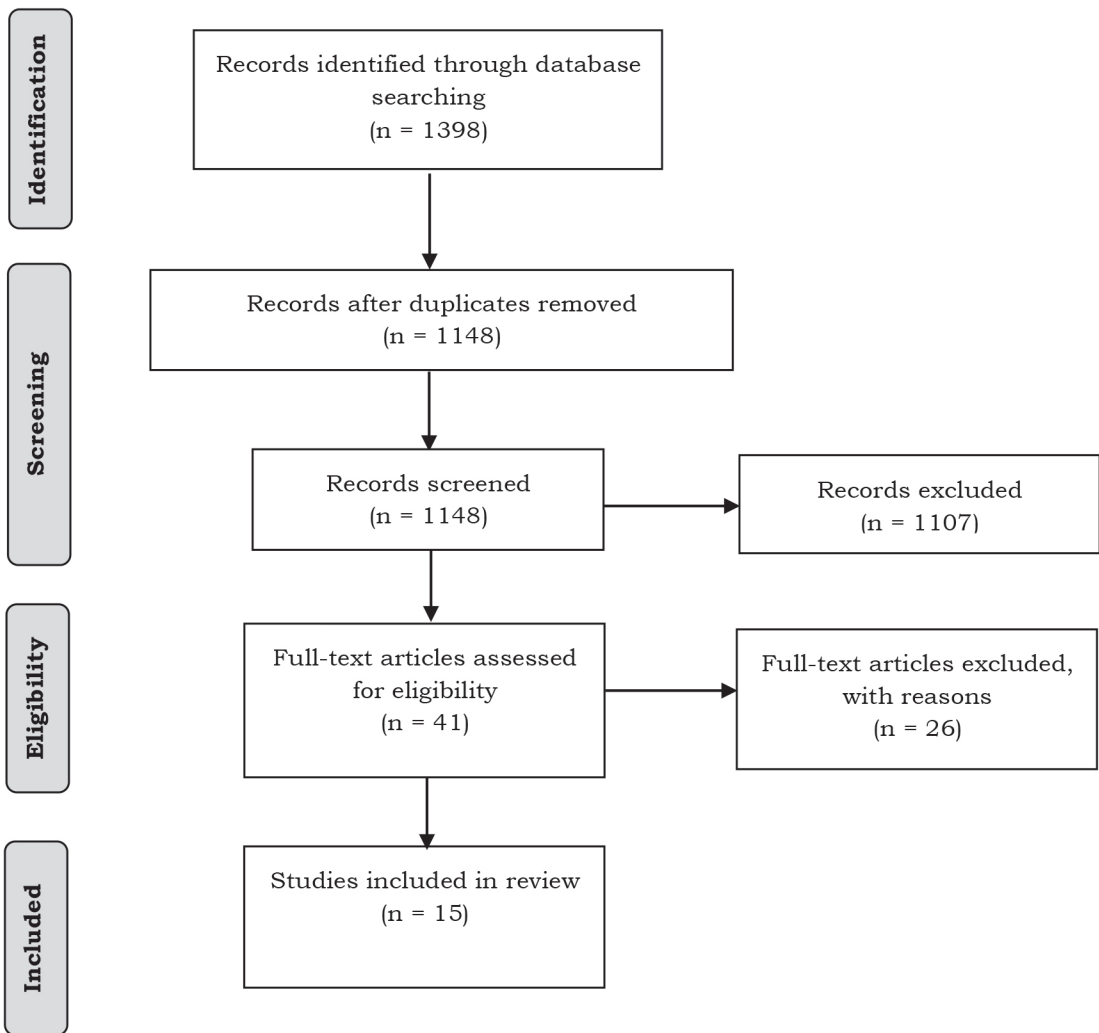


Figure 1. PRISMA flow chart illustrating the selection process of articles for this scoping review.

seven quantitative and eight qualitative types of research as presented in Table 1 and Table 2, respectively.

Table 1 indicates the summary of factors that are associated with food choices among elderly. Similar food choice factors were found repeatedly in various studies. These are health, taste, food access, body weight concern, nutritional knowledge, price, sensory appeal, and convenience. The themes that emerged from the qualitative

studies are reported in Table 2 and they are food habits, social and economic circumstances, healthiness of the food and food access.

DISCUSSION

To the best of our knowledge, this is the first scoping review that has investigated the various factors that influence the food choices of the elderly, after a supporting research article that was published about 24 years ago by Herne

Table 1. Summary of factors associated with food choices among elderly (quantitative studies)

| <i>Author, Year, Origin</i> | <i>Purpose of the study</i> | <i>Study characteristics</i> | <i>Outcome measurements</i> | <i>Main results</i> |
|--|---|--|--|---|
| Gunsam & Murden (2007) Mauritius | To investigate the several possible factors and their respective significance in influencing food choices and thus food intake of the elderly people in Mauritius | Design: Cross-sectional Setting: Rural and urban region around the island of Mauritius Subjects: 60 elderly from an average socioeconomic level Age: ≥ 58 years | Interviewer-administered food-frequency questionnaire (FFQ) | According to the order of importance: culture (93.3%) followed by taste (90.0%), routine (85.1%), nutritional knowledge (75.0%), ease of food availability (71.7%), company or peer at meal times (31.7%) and media (11.6 %) influenced food choice among elderly. Only the factor of taste influencing food choice was significantly different between the two sexes (significant value=0.02, $p<0.05$). |
| Ree, Riediger & Moghadasian (2008) Canada | To investigate education, income, gender, ethnicity and age affecting Canadian food choices for health-related reasons | Design: Cross-sectional Setting: Canadian community Subjects: 98733 Canadians (25338 older adults; 9580 elderly) Age range: Older adult (55-74 years) Elderly (> 75 years) | Questionnaire: (1) Choose or avoid foods based on health concerns (2) Choose foods for their nutrient content (3) Avoid foods for their nutrient content Demographic characteristics | 48% of older adults and 31% of the elderly had concerns with body weight. 47% of older adults and 31% of the elderly had heart disease as concern. Response of elderly was lower than older adults in choosing low fat as influencing choice on food content. 67% and 60% of older adults and elderly choose foods based on their fibre content, respectively. 70% of older adults and 59% of the elderly reported avoiding foods because of their fat content. |

| Author, Year, Origin | Purpose of the study | Study characteristics | Outcome measurements | Main results |
|---|--|---|--|---|
| Dean <i>et al.</i> (2009) 8 European countries | To investigate the effects of resources and food-related goals on the variety of food choice among elderly | Design: Cross-sectional Setting: Poland, Portugal, United Kingdom, Germany, Sweden, Denmark, Italy and Spain Subjects: 3200 participants (400 from each country) and living in their own homes. Age: 65 years of age | Questionnaire: (1) 11 goals (5-point scale) (2) 22 resources (5-point scale) Weekly Food Variety Score Demographic Characteristics | There were 8 significant perceived resources that influenced variety of diet: good appetite, food knowledge, access to convenient food products, access to a good food service provider, kitchen appliances, short distance to the shops, access to high-quality products and support from friends and neighbours. There were 3 significant goal predictors on variety of diet: controlling weight, having a variety of foods on the menu, and cooking for others. |
| Locher <i>et al.</i> (2009) Birmingham | To investigate the motivations and perceived barriers related to food choices made by homebound older adults | Design: Observational Setting: Home health, a university-affiliated geriatric medicine outpatient clinic, a university-affiliated inpatient rehabilitation facility, area churches. Subjects: 185 homebound older adults. Mean age: 78.9 years old | The Food Choice Questionnaire Vailas Food Enjoyment Questionnaire Social demographic characteristics 24-hour dietary recalls | Key motivations to food choice: (1) Convenience (58.9%) (2) Sensory appeal (55.7%) (3) Price (47.6%) Key barriers to food choice: (1) Health (25.5%) (2) A special diet (22.2%) (3) Unable to shop for self (16.8%) Majority of subjects had insufficient total calorie intake and vitamin D |

| Author, Year, Origin | Purpose of the study | Study characteristics | Outcome measurements | Main results |
|----------------------------------|---|--|---|---|
| Kim et al. (2013) South Korea | To determine the structural association between LOHAS, healthy food choices, trust, and emotional loyalty and the moderating role of age among elderly and non-elderly in restaurants | Design: Cross sectional. Setting: Restaurant chain that specializes in vegetable- and soybean-based dishes. Subjects: 413 diners. Age: Seniors (≥ 50 years of age) Non-senior (< 50 years) | All four constructs were rated on five point-Likert scale: (1) Lifestyle of health and sustainability (LOHAS) (nine items) (2) Healthy Food Choice scale (six items) (3) Trust scale (four items) (4) Emotional Loyalty (three items) | LOHAS had a significantly positive effect on the perception of healthy food choices in restaurants ($\beta=0.320$, $t=5.877$, $p<0.001$). Healthy food choices had a significant effect on trust ($\beta=0.623$, $t\text{-value}=17.421$, $p<0.001$) and emotional loyalty ($\beta=0.220$, $t=3.515$, $p<0.001$). Greater variance in healthy food choices (4.9 %) and trust (20.8 %) among the senior group than the non-senior group. |
| Kim (2016) South Korea | To investigate the relationship between social network type, food choice value, and diet quality in frail older adults with low socioeconomic status | Design: Cross-sectional. Setting: National Home Healthcare Services in Seoul, South Korea Subjects: 87 frail older adults Age: ≥ 65 years | The Practitioner Assessment of Network Type Instrument (PANT) The Food Choice Questionnaire (FCQ) Mean adequacy ratio (MAR) | According to the order of importance: price (3.22 ± 0.88), sensory appeal (3.02 ± 0.93), healthiness of food (2.90 ± 0.95), and convenience (2.89 ± 0.87). The private restricted and local self-contained network types were more likely to be affected by price (OR 4.28, 95% CI 1.36-13.42, $p=0.013$) and healthiness of food (OR 10.79, 95% CI 2.58-45.13, $p<0.001$) respectively. |

| <i>Author, Year, Origin</i> | <i>Purpose of the study</i> | <i>Study characteristics</i> | <i>Outcome measurements</i> | <i>Main results</i> |
|---|--|---|---|---|
| Appleton <i>et al.</i> (2017) France, Italy and UK | To investigate factors associated with the quantity and variety of vegetables predicted by different food choice motives consumed by older adults. | Design: Cross sectional. Setting: France, Italy and UK Subjects: 497 older adults Age: ≥ 65 years | Questionnaire: (1) Demographic characteristics. (2) Quantity of vegetable consumption (3) Regular consumption of various vegetables (4) Liking for various vegetables (5) Attitudes to food consumption. | Higher quantities of vegetables consumption was significantly associated with a higher age ($\beta=0.16, p<0.01$). Greater variety of vegetable intake was significantly associated with a higher importance in consumption given to health benefits ($\beta=0.13, p=0.02$). |

Table 2. Summary of factors associated with food choices among elderly (qualitative studies)

| <i>Author, Year, Origin</i> | <i>Purpose of the study</i> | <i>Study characteristics</i> | <i>Outcome measurements</i> | <i>Main results</i> |
|--|---|---|--|--|
| Pucciarelli & Thomas (2011) Indiana | To record Muncie, Indiana residents' change in eating habits over time To investigate factors shaping the food choices made by elderly | Design: Cross-sectional. Setting: Mid-western town, Muncie, Indiana Subjects: 25 elderly who were born and lived all but 8 years in Muncie, Indiana Age: 65-100 year old | A semi-structured, questionnaire/interview script where subjects need to recall what foods/meals they consumed while: (1) living with a parent (2) after they transitioned to be the primary food processor (3) after leaving work and/or > 65 years. | Two broad factors shaping the food choices made by elderly: (1) External loci of control (economics, market availability, technology, social norms) (2) Internal loci of control (convenience, health status, ideals, life course) |

| <i>Author, Year, Origin</i> | <i>Purpose of the study</i> | <i>Study characteristics</i> | <i>Outcome measurements</i> | <i>Main results</i> |
|--------------------------------------|---|---|--|---|
| Delaney & McCarthy (2011) Ireland | To describe the crucial contextual influences on food choice patterns in older Irish adults | Design: Qualitative Setting: Southwest of Ireland Subjects: 32 older adults who participated in health screening session. Age: 61-79 years old | Semi-structured interview includes: (1) Current eating habits, attitudes, and beliefs about food. (2) Memories and perceptions about food and dietary change at different life stages. | Three main factors that influenced present food choice pattern: (1) Early food experiences (2) Changing political, economic, social, and cultural circumstances - Economic development - Food system - Knowledge and awareness (3) Changes in individual life circumstances - School, work, family, etc. - Health - Ageing |
| Edfors & Westergren (2012) Sweden | To explore home-living elderly people's perceptions on essential circumstances regarding food and meals | Design: Qualitative Setting: Small community in southern Sweden Subjects: 12 elderly living in their own home Age: ≥ 65 years | Semi-structured interview includes: (1) Food and meals on ordinary day (2) Food preferences and intake (3) Physiological difficulties (4) Functional difficulties (5) Social dimensions of eating | Three major categories related to views on food and meals: (1) Habits founded in past life affected present life - Food and meals - Gender roles (2) Getting help from others with food and meals - The breaking point - Transition from independence to dependence (3) Food and meals in present life - Meals during the day - Quality of food - Buying and transporting food - Cooking - Eating |

| Author, Year, Origin | Purpose of the study | Study characteristics | Outcome measurements | Main results |
|---|---|--|--|---|
| Brownie & Coutts (2013) Australia | To explore views and practices about what composes a healthy diet for Australians' older people | Design: Qualitative (Focus group) Setting: Northern NSW, Australia Subjects: 29 independently- living retirees Age: 60-93 years old | Focus group questions: (1) What are you doing to achieve a healthy diet? (2) Do you think that as people get older their dietary requirements change? | Four themes, viz.: (1) Healthy foods - Fruit and vegetables important factors of healthy diet. (2) Quantity - Eating less and making different food choices were favourable to health in elderly. (3) Personal circumstances - Social situation may have constrained elderly to adopt a healthy diet and food choices. (4) Good intention - Desire of elderly to preserve wellbeing and health was a significant determinant of food choices. |
| Kamphuis, de Bekker-Grob & Van Lenthe (2015) Netherlands | To investigate the relative importance of health considerations for food choices compared with other motives To investigate differences in preference structures between low and high socioeconomic groups | Design: Cohort Setting: Southeastern region of The Netherlands Subjects: 399 older adults (a subsample from GLOBE study) Mean age: 63.3 years old | A discrete choice experiment (DCE) is used to develop 24 choice sets about a usual dinner at home and subjects need to choose the meals alternative that appealed most to them | In order of importance: healthiness followed by taste, price and travel time to the grocery store all significantly influenced older adults' meal decisions. There were significant interactions among education and healthiness (+) and education with price (-). There was positive association between income with both healthiness and very good taste. |

| <i>Author, Year, Origin</i> | <i>Purpose of the study</i> | <i>Study characteristics</i> | <i>Outcome measurements</i> | <i>Main results</i> |
|---------------------------------|---|---|---|---|
| Host et al. (2016) Australia | To identify major factors that influence the food choice and dietary behaviours amongst healthy, independent-living older Australians | Design: Qualitative (focus group) Setting: Three low-care Illawarra Retirement Trust (IRT) lifestyle residential facilities Subjects: 18 independently living residents and in good health Age: ≥ 60 years | A semi-structured focus group was required to discuss a set of 12 questions that includes Components of Bandura's Social Cognitive Theory | Three broad themes that influenced the food choice and dietary behaviours: (1) Adaptation - Variability of life circumstances - Management of physiological change (2) Psychosocial parameters - Maintenance of independence - Sense of community - Interest in and understanding of health and nutrition - Preferences, aversions and beliefs (3) Food landscape - Price - Quality - Country of origin - Store attributes (accessibility and service) |
| Shanks et al. (2016) Montana | To investigate how the rural food environment affects food choices of older adults | Design: Qualitative (focus group) Setting: Rural Montana communities with several senior centres Subjects: 33 older adults residing in rural Montana community Age: 50 years or older | Brief socio demographic survey. Semi-structured focus group questions include elements of food choices: (1) community (2) food preferences (3) budgeting (4) food availability (5) food community public programmes | Four major themes with 12 sub-themes influenced food choices among rural older adults: (1) Perception of the rural community environment (2) Community support (3) Personal food access (4) Dietary factors influencing food consumption |

| <i>Author, Year, Origin</i> | <i>Purpose of the study</i> | <i>Study characteristics</i> | <i>Outcome measurements</i> | <i>Main results</i> |
|--------------------------------------|--|---|---|--|
| Oemichen & Smith (2016) Minnesota | To investigate food choice, food access, and food insecurity among elderly | Design: Qualitative (focus group) Setting: Minnesota community centre Subjects: 62 elderly who had the ability to shop Age: ≥ 60 years old | Open-ended questions focus group: (1) food choices (2) shopping strategies (3) food access points (4) food security issues Socio-demographic characteristics Anthropometric measurements (weight, height and BMI) | Five major themes identified: (1) Eating behaviour affected by former experiences (2) Financial and food security driving use of food assistance programmes (3) Food access strategies: restaurants, retail markets and alternative sources (4) Food access and intake influenced by physical changes associated with aging (5) Social impact as an aspect in decision making |

(1995). A small number of research studies were conducted on elements affecting food choices in the elderly, and only 15 relevant studies that were published between 2007 and 2017 were retrieved. Therefore, this review is a key step in conveying to healthcare professionals, future researchers, policymakers and the food industry itself, the impact of food choices among the elderly in different settings.

This scoping review should contribute to the small but growing body of literature predominantly from Europe followed by North America, Asia, Australia and Africa, that examines food choices among the elderly. The majority of the studies (9 of 15) identified health as the most important factor that determined the food choices among the elderly. Ree *et al.* (2008) revealed that the health-conscious group was mainly middle-aged and older adults who tended to select food wisely for different reasons related to health such as disease prevention, disease management, or maintaining physical independence. It has been observed that the elderly readily modify their food habits and are willing to fight the urge of eating their favourite foods as instructed by their doctors (Shanks *et al.*, 2016). This has been categorised as internal indicators that shape the food choice of older people (Pucciarelli & Thomas, 2011). The lowering of fat and cholesterol intake with healthier food choices in order to meet health goals were among the changes specifically made by the elderly (Delaney & McCarthy, 2011; Pucciarelli & Thomas, 2011; Host *et al.*, 2016). A significant association was found between vegetable intake of different varieties and the higher importance given to health benefits (Appleton *et al.*, 2017) as the elderly assumed that fruits and vegetables were important parts of a healthy diet (Brownie & Coutts, 2013).

A study by Kim (2016) showed

that persons who did not have local kinfolk, few nearby friends, low levels of community contacts and infrequent contact with at least one relative, and the frail elderly were, surprisingly, concerned about the healthiness of food. An earlier study conducted by Kim *et al.* (2013) showed the strong impact of the lifestyle of health and sustainability (LOHAS) on healthy food choices within a group of seniors. This should trigger health-oriented marketers to treat the elderly as a separate market segment.

In contrast, homebound elderly adults chose health as the major perceived barrier to food intake as per participants' meal preference (Locher *et al.*, 2009). Gender also played a role as women were seen to be more likely to select or discard foods due to health reasons and nutrient content (Ree *et al.*, 2008). Highly educated and higher income older adults rated a healthy meal to be a more important consideration in making meal decisions (Kamphuis, de Bekker-Grob & Van Lenthe, 2015).

Convenience was the second most common consideration that determined food choices for older people. Locher *et al.* (2009) reported that convenience was the most important perceived motivation related to food selection whilst it was the fourth consideration in the report by Kim (2016) after the price, sensory appeal, and healthiness of food. Convenience meant the ease of food preparation (Pucciarelli & Thomas, 2011), and convenient transport. A short distance to go to the shops provided more varied dietary choices (Dean *et al.*, 2009).

Most of the studies that we examined reported similar limitations. The first limitation was the small sample size (Locher *et al.*, 2009; Kim, 2016; Appleton *et al.*, 2017; Delaney & McCarthy, 2011; Edfors & Westergren, 2012; Host *et al.*, 2016; Shanks *et al.*, 2016). Thus, future studies with a larger sample sizes will benefit the complexity of food choices

in the elderly population. Secondly, the dependence on self-reporting inevitably results in inaccuracies and biases (Locher *et al.*, 2009; Kim, 2016; Appleton *et al.*, 2017; Pucciarelli & Thomas, 2011; Host *et al.*, 2016). There were also unmeasured confounding factors that might have had an effect on the study results of Kim (2016) and Kamphuis *et al.* (2015). Lastly, as the studies in this review were focused only on homebound older adults (Locher *et al.*, 2009), Korean seniors in restaurants (Kim *et al.*, 2013), frail older adults (Kim, 2016), seniors from Midwestern town (Pucciarelli & Thomas, 2011), elderly in rural and urban environment (Delaney & McCarthy, 2011) and older adults from a senior centre (Host *et al.*, 2016), extrapolation of findings to other ethnic groups and geographical areas may not always be valid. Further cross-cultural studies are necessary to apply findings in groups across geographical borders.

Nevertheless, the findings and conclusions of this review have vital relevance to clinical practice and implementation in the area of nutrition. Health promotion interventions and policies with a multifactorial approach that are aimed to promote a healthy diet, food modifications and eating behaviour (Locher *et al.*, 2009) of the elderly should take into account the potential influence of health, interpersonal and social issues to them (Gunsam & Murden, 2007). Explicit strategies on awareness, health messages (Delaney & McCarthy, 2011), affordable and easy meal preparation will have a greater chance to be put into practice by the elderly (Pucciarelli & Thomas, 2011) to prevent and manage chronic diseases. Furthermore, the involvement of caregivers in medical nutrition therapy for the elderly (Locher *et al.*, 2009) and raising the awareness of age-adjusted nutrient targets through media campaigns (Brownie & Coutts, 2013) may help to change the

behaviour of the elderly to make them realise the importance of food choices. Health professionals need to be aware of existing information regarding social network of elderly with local family and/or friends and neighbours. This may help in deciding suitable interventions to develop healthy food choice values especially among the elderly with few community contacts (Kim, 2016).

CONCLUSION

This review of seven quantitative and eight qualitative studies conducted in different continents has given new insights on food choices among the elderly. The health domain was the most commonly reported factor that influenced food choices besides convenience, price, sensory appeal, among others. Small sample size, reliance on self-reporting and the inability to make generalisations, were the most important limitations of this review. New strategies for intervention programs should be undertaken by a joint force of health professionals, researchers, policymakers and the food industry. Future research in the elderly who have developed a particular chronic disease, and those who are independent or with a disability is needed.

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Authors' contributions

FIMS, designed and conceptualised the study and search strategy, undertook the analyses and drafted and edited the manuscript; NO, advised on the analysis, description and classifying the study and reviewed the manuscript; ZAMD, and co-supervisors reviewed the manuscript; NFZ and co-supervisors reviewed the manuscript.

Conflict of interest

The authors declare that they have no competing interests.

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