

ORIGINAL ARTICLE

Development, Validation and Acceptability of a Newly Developed Nutrition Resource Kit for At-Risk and Malnourished Elderly in Health Clinics Setting

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ABSTRACT

Introduction: The elderly population is highly vulnerable to malnutrition, including those in the community. The use of nutrition education as part of nutrition intervention is able to improve their nutritional status. Hence, provision of a nutrition resource kit addressing the needs of at-risk and malnourished elderly would be advantageous. This research aimed to develop, validate and evaluate the acceptance of a newly developed nutrition resource kit, which served as an educational material among at-risk and malnourished elderly in Malaysian health clinics. **Methods:** This study was conducted in three phases: Phase I comprised of qualitative needs assessment to identify the types of nutrition resource kit needed; Phase II was the development and validation of the nutrition resource kit; while Phase III was acceptance evaluation, which involved individual in-depth interview and triangulation. **Results:** An A5-sized booklet with incorporation of an educational video in a QR code was developed. Both printed material and educational video had excellent content and face validity. Suggestions by experts and elderly from validation were considered and revision was done accordingly. Acceptance evaluation revealed four themes: 1) positive acceptance, 2) elderly-friendly, 3) valuable, and 4) individual preference. Triangulation data revealed that all elderly positively evaluated both resources. Additional suggestions given by elderly were considered for improvement. **Conclusion:** This newly developed nutrition resource kit, both in the printed and electronic format, was well-accepted among the at-risk and malnourished elderly. It could be used as an important reference for the elderly, especially those attending health clinics, in treating and preventing malnutrition.

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expected to increase up to 1.5 billion by the year 2050 (2). In line with the estimation, local statistical data have also shown that the percentage of elderly population has increased to 7.0% in the year 2020 (3).

INTRODUCTION

The United Nations World Assembly on Ageing, which was held in Vienna in 1982, used 60 years and above as a cut-off value for defining the age of elderly. Similarly, Malaysian policy makers have also employed this similar age range for reference and official use in action plans for elderly (1). The number of elderly worldwide is

The increased number of elderly population happens due to growing socioeconomic and demographic changes (4). This may contribute to various health and nutritional issues by increasing the need for basic essentials of life, which can further impact the society directly with the call for healthcare service provision (5,6). Apparently, the elderly population is at high risk of malnutrition, specifically undernutrition, due to numerous factors. It

is linked to various adverse outcomes such as prolonged hospitalisation (7), increased risk of complications and mortality (8), and increased healthcare cost (9). The prevalence rate of elderly with malnutrition varies according to the care settings. Global findings from Cereda et al (10) outlined a range of 3% to 29% for the prevalence of malnutrition among elderly in different settings, in which community: 3%, outpatients: 6%, home-care services: 9%, nursing homes: 17.5%, hospital: 22%, long-term care: 29%, and rehabilitation/sub-acute care: 29%. Despite lower global prevalence of malnutrition among elderly in the community compared to other settings, a higher prevalence was recorded in Malaysia. A range from 25.7% to 64.0% of Malaysian elderly living in the community have been classified as at-risk and malnourished (11–14). This shows a call for action to tackle malnutrition issue, especially among Malaysian community living elderly, which should be done systematically, as no published intervention studies were identified in this setting.

According to Volkert et al (15), at-risk and malnourished elderly should be provided with nutritional information and education as part of nutrition intervention in order to improve their nutritional status, awareness and knowledge. The use of a nutrition resource kit is useful due to its ability to provide nutrition education for at-risk and malnourished elderly (16). Therefore, it is recommended for healthcare professionals, particularly nutrition experts, to provide a nutrition resource kit which serves as a reference for at-risk and malnourished elderly. Various global and local studies have demonstrated the use of nutrition resource to deliver nutritional guidance for the elderly (17–20). However, it is worth to note that these existing resources were mainly targeting the general elderly population. Hence, the information provided were less comprehensive for use among at-risk and malnourished elderly. To the best of our knowledge, an Australian study in the general practice setting used formulated nutrition resource kit for at-risk and malnourished older adults (16), while nutrition education booklets were used on a similar population in the Ireland health care setting (21).

To date, there is no specific and comprehensive nutrition resource kit for this high risk group available in the Malaysian health clinics setting. Thus, this study aimed to develop, validate and evaluate the acceptance of a newly developed nutrition resource kit for at-risk and malnourished elderly, which serves as a reference or guide for them to overcome and prevent malnutrition. This newly developed nutrition resource kit provides a comprehensive content in which all necessary and important information are included to improve the nutrition knowledge, dietary intake and nutritional status of at-risk and malnourished Malaysian elderly. This can facilitate the elderly in complying with their nutritional care plan which could directly help them overcome and prevent malnutrition.

METHODS

This was an action research study with the aim to make an action to solve a problem in a particular community (22).

Study approach and study setting

This study consisted of three phases, namely 1) Phase I: Qualitative needs assessment on the types of nutrition resource kit needed among community living elderly; 2) Phase II: Development and validation of the newly developed nutrition resource kit; and 3) Phase III: Acceptance evaluation of the newly developed nutrition resource kit among at-risk and malnourished elderly. The summary of each phase is shown in Table I.

Table I: Description of each phase

Phase	Action	Data Collection	Participant
I	Identification of the type of nutrition resource kit needed by community living elderly	Individual in-depth interview	21 elderly
II	Development and validation of nutrition resource kit	<ul style="list-style-type: none"> ▪ Scoping review was performed to identify the suitable content in a nutrition resource kit ▪ Validation of newly developed nutrition resource kit 	For validation purpose: <ul style="list-style-type: none"> ▪ 6 experts ▪ 12 elderly
III	Acceptance evaluation towards the newly developed nutrition resource kit among malnourished and at-risk elderly	<ul style="list-style-type: none"> ▪ Individual in-depth interview ▪ Triangulation 	22 elderly

This study was conducted in selected urban and rural government health clinics in Kuantan, Pahang, Malaysia. The health clinics in Kuantan recorded the highest number of elderly registered per year compared to other districts in Pahang. Therefore, Kuantan was chosen as the district for study location. The health clinics involved were Klinik Kesihatan Indera Mahkota and Klinik Kesihatan Permatang Badak, which were categorised as urban clinics; and Klinik Kesihatan Sungai Lembing and Klinik Kesihatan Gambang, which were categorised as rural clinics. This classification of health clinics was based on the registry of the Pahang State Health Department. In accordance with the records of total number of registered elderly, these four health clinics were able to provide sufficient number of participants for the recruitment process.

Phase I: Needs assessment

The nutrition resource kit was developed based on our findings from a needs assessment on the types of nutrition resource kit needed by community living elderly, which was previously reported by Noor Azam et al (23). The assessment was done qualitatively by obtaining the viewpoints of elderly in both urban and rural areas,

which addressed their knowledge on existing nutrition educational materials, preference and suitability to their needs towards nutrition educational materials, as well as opinions on technology-based materials. This was to ensure that the newly developed nutrition resource kit was able to suit the elderly in different regions.

Phase II: Development and validation of the newly developed nutrition resource kit

Development of nutrition resource kit

The development process of this nutrition resource kit followed an algorithm recommended by Wizowski, Harper, & Hutchings (24) in developing a patient educational material. In this process, a scoping review was performed to identify suitable topics in the nutrition resource kit, in which the details had been reported by Noor Azam et al (25). As this study was an action research study, the development of the nutrition resource kit was linked to the findings from the needs assessment in Phase I (23). Findings from the previous phase and the scoping review were integrated to elicit the nutrition resource kit.

In this study, an A5-sized booklet with incorporation of an educational video in a QR code was developed. Both nutrition resource kit in printed and digital versions used the Malay language as it is the main language used in the country. A series of meetings with the research team was conducted to finalise the content and design of the nutrition resource kit. This team comprised of three dietitians, a family medicine specialist, a community medicine specialist, and a representative from the Pahang State Health Department. This group of experts was designated in order to obtain ideas from different expertise. A professional graphic designer and a videographer were also employed to design the nutrition resource kit and educational video, respectively.

Validation of nutrition resource kit

Validation of the newly developed nutrition resource kit and educational video were conducted among experts and elderly patients attending the selected health clinics. The details of the process are described as below:

i) Content and face validation by experts

At least five and up to ten experts are required for content validation (26) and it is essential to choose suitable experts to enable content validity to be evaluated sufficiently. Thus, six experts in the geriatric dietetics field were invited to perform content and face validation towards the newly developed nutrition resource kit, both in printed and digital versions.

The nutrition resource kit in printed version was evaluated in seven aspects (18,27). Two aspects were related to content validity, particularly on the scientific accuracy and content. The other five aspects were related to face validity, particularly on understanding

information, aspects facilitating comprehension, illustrations, attractiveness, and readability of material. Meanwhile, the nutrition resource kit in digital version was assessed in three aspects. The educational video was assessed for its objective, structure and presentation, and relevance (28,29). All experts were also encouraged to provide additional comments and suggestions for the nutrition resource kit, both in printed and digital versions. In addition, modified Kappa was calculated for each item, as it is able to provide information about the degree of agreement beyond chance (30). In regard to content validity, content validity index (CVI) is the usual method used by researchers. It could be categorised into two types, which are CVI for item (I-CVI) and CVI for scale (S-CVI). Generally, an index of more than 0.83 is considered as an acceptable value for content validity carried out by at least six experts (31). Meanwhile, Kappa values of above 0.74, between 0.60 and 0.74, and between 0.40 and 0.59 are interpreted as excellent, good, and fair, respectively (30). Comments and suggestions given by all experts were taken into account by researchers to further improvise the nutrition resource kit. For face validation, all items evaluated that achieved at least 75% positive responses were considered valid (32).

ii) Face validation by elderly

After improvisations of the nutrition resource kit were made on both printed and digital versions, face validation was further performed among community living elderly in the similar health clinics mentioned previously. It is suggested to have at least seven to ten people for face validity to have sufficient control over chance agreement (33). Purposive sampling was employed to recruit potential participants in this face validation. This was to ensure that the participants were able to provide the best information in order to improvise this newly developed nutrition resource kit (34). Recruitment of potential participants was aided by healthcare staffs in each health clinic. Inclusion and exclusion criteria of the participants were adopted from a local study (18). Malaysian citizens aged 60 years old and above who were able to read, write and speak in the Malay or English language were included in this study; those who had any psychiatric and mental disorders and terminal illness were excluded.

Recruited participants were asked to answer a set of question. They were given 15 minutes to read the nutrition resource kit and watch the video prior to completing the questionnaire. The questionnaire was divided into two parts, which were evaluation on: i) nutrition resource kit in printed version, and ii) educational video. For printed version, the questions addressed the understanding of information, aspects facilitating comprehension, illustrations, attractiveness, and readability of material. Meanwhile, for educational video, the questions were related to interactivity, objective, relevance and effectiveness, and clarity. Responses from participants

were analysed descriptively. Items that achieved at least 75% positive responses were considered validated (32). Participants were also encouraged to give additional comments and suggestions for improvement. Any appropriate and suitable insights from participants were taken into account to further improvise the resources.

Phase III: Acceptance evaluation of the newly developed nutrition resource kit among at-risk and malnourished elderly

After further improvisation was made, evaluation on the acceptance towards the developed nutrition resource kit, both in printed and digital versions, was conducted. Individual in-depth interview and triangulation were conducted among at-risk and malnourished elderly in health clinics involved to identify their acceptability and perception towards the kit and video.

Purposive sampling was used to recruit the participants in this study phase. The recruitment process was aided by the healthcare staffs of each health clinic, such as medical assistant and staff nurse. Elderly was screened by healthcare staffs for their nutritional status and were categorised based on the classification of malnutrition according to the Mini Nutritional Assessment-Short Form (MNA®-SF) scores. MNA®-SF is a nutrition screening tool for elderly that aims to identify malnutrition risk (35). It contains six questions related to dietary intake, weight loss, mobility, presence of psychological stress or acute disease, neuropsychological problems, and body mass index (BMI) or calf circumference measurement if unable to obtain BMI. Elderly who scored 0 to 11 points, which was considered as at-risk and malnourished, were then referred to researchers for further screening process. Elderly was screened based on the inclusion and exclusion criteria that had been adapted by the researchers from a previous local study (18). The inclusion and exclusion criteria for this phase are shown in Table II.

Table II: Inclusion and exclusion criteria for Phase III

Inclusion Criteria	Exclusion Criteria
1. 60 years old and above of Malaysian	1. Psychiatric and mental disorder
2. Able to read, write and speak in Malay or English language	2. Terminal illness
3. At risk of malnutrition with weight loss or already malnourished according to MNA®-SF score (0-11 points)	

Eligible and consented patients were interviewed using a semi structured interview guide. The questions addressed in the interview guide are listed in Table III. Interviews were audio recorded using a voice recorder (SONY Stereo IC Recorder ICD-UX560F) and transcribed verbatim. Then, data were analysed using the NVivo software version 12.0 by applying the thematic synthesis approach suggested by Braun & Clarke (36). Consequently, a set of questions related to acceptability evaluation was given to the same participants involved in the in-depth interview as part of

Table III: Questions in the semi-structured interview guide in Phase III

Topic	Main question
Improve dietary intake	How this kit could help you to eat adequately?
	How this educational video could help you to eat adequately?
Information	How would you describe the information on this newly developed nutrition resource kit?
	How would you describe the information provided in the educational video?
Layout	Nutrition resource kit in printed version: i) What do you think on the font used in this nutrition resource kit? ii) What do you think on the colour used in this nutrition resource kit? iii) What do you think on the figures used in this nutrition resource kit?
	Educational video: i) What do you think on the figures used in the educational video? ii) What do you think on the font type and size used in the educational video? iii) What do you think on the video and audio quality in the educational video? iv) What do you think on the video presentation of the educational video?
Acceptance	Do you really satisfied with this kit?
	Do you really satisfied with the educational video?
Improve-ment	What do you think that can be done in order to improve this newly developed kit?
	What do you think that can be done in order to improve the educational video?

triangulation. Triangulation can be described as the use of multiple approaches of data collection to answer a research question and it is necessary for a researcher to check the validity of the data (37,38). The questionnaire, which was adopted from previous studies, consisted of dichotomous questions (yes/no question) and addressed participants’ opinions and acceptability on both materials - nutrition resource kit and educational video. Evaluation questions for nutrition resource kit in printed version consisted of understanding information, aspects facilitating comprehension, suitability of figures, and combination of colours (18); while the educational video was rated based on its interactivity, objective, relevance and effectiveness, and clarity (28,29). Participants were also encouraged to provide additional suggestions for further improvement of the nutrition resource kit in printed and digital versions. This process was conducted in an allocated room in each health clinic and the researcher was ready to assist any elderly who had difficulties to access the printed nutrition resource kit and educational video.

There was no sample size calculated in this stage as potential participants were screened, recruited and

interviewed until the data reached an acceptable saturation point. It progressed until the data obtained became repetitive and no new information was generated. Furthermore, multiple sources suggested five to fifty people as an adequate number of participants in qualitative research (39). The nutrition resource kit in both versions were further improvised accordingly.

RESULTS

Phase I: Needs assessment

Qualitative needs assessment in Phase I had identified the preferred types of nutrition resource kit among community living elderly and reported them in another paper (23). Participants highlighted the need to be provided with a printed and eye-friendly nutrition resource kit along with the use of diagrams. A few participants indicated their support towards technology-based materials. Therefore, incorporation of technology like the use of QR code in the printed version of the nutrition resource kit for access to nutrition education video was thought to be beneficial.

Phase II: Development and validation of the newly developed nutrition resource kit

Development of nutrition resource kit

This kit consisted of 41 pages including the front page and was titled 'Kit Pendidikan Pemakanan: Untuk Warga Emas yang Mengalami Malpemakanan'. The topics included in the kit were according to the findings from the scoping review conducted, which included information related to understanding malnutrition, managing malnutrition, and implementing malnutrition management (25). It was written in the Malay language. A nutrition education video which provides the similar information as per the printed kit was incorporated in a QR code format to be listened to, as well as watched for better clarity. Age and culturally appropriate examples were provided in this nutrition resource kit and video. Appropriate font type and size, figures and colours were used by adapting a guideline on writing a material (40). A family font type named Barlow was used in the printed kit, while the font size varied according to the suitability of each page. Even so, the font size used was still bigger than the recommended font size for elderly, which was 14 point (40). Various bright colours were used in this nutrition resource kit as we understand that the readability of a material can be enhanced with the use of colours (41). Colours are important as it can help for a better contrast and visibility of information.

The educational video lasted for 5 minutes and 41 seconds [00:05:41]. The video was finished in full HD standard and encoded in MP4 format. Cloud was selected as the choice of storage for this educational video.

Validation of nutrition resource kit

i) Content and face validation by experts

Validation was performed for the nutrition resource kit, both in printed and digital versions. From the analysis, all item-content validity index (I-CVI) values for the printed version nutrition resource kit achieved full agreement (value of 1.0), except for one item. Meanwhile, S-CVI values achieved the minimum required value of 0.83. As for the educational video, all I-CVI and S-CVI values achieved 1.0. All experts (100.0%) were able to understand the information provided and agreed that it was suitable for recommendation among at-risk and malnourished elderly. Majority of the experts indicated that the terminologies and sentences used were easy to understand, figures and colours used were suitable and attractive, and font size was readable.

Generally, the validation of the printed nutrition resource kit and educational video required only minor amendments. The experts' suggestions and comments were considered for amendments, particularly on the printed version, which was mainly on the font size and pictures used in the kit. No amendment was made for the educational video.

i) Face validation by elderly

The revised version of the nutrition resource kit further underwent a validation process by the elderly. Twelve elderly (n=12) were recruited for this face validation. Table IV displays the demographic data of the participants.

All participants (100%) understood the information provided and rated that the terms and sentences used were easy to understand, while the figures used were suitable, attractive and readable. For colours,

Table IV: Demographic data of participants involved in face validation

Characteristics	Overall (N=12)	Urban (n=6)	Rural (n=6)
Age (year) ^a	68.75±5.89	68.83±5.64	68.67±6.68
Race			
Malay	10(83.33)	4(66.67)	6(100.0)
Chinese	1(8.33)	1(16.67)	0(0)
Indian	1(8.33)	1(16.67)	0(0)
Gender ^b			
Male	6(50.0)	3(50.0)	3(50.0)
Female	6(50.0)	3(50.0)	3(50.0)
Educational level ^b			
Primary	4(33.33)	1(16.67)	3(50.0)
Secondary	6(50.0)	3(50.0)	3(50.0)
Tertiary	2(16.67)	2(33.33)	0(0)
Access to smartphone and computer ^b			
Yes	4(33.33)	4(66.67)	0(0)
No	8(66.67)	2(33.33)	6(100.0)

^a Data presented as mean±SD

^b Data presented as n(%)

one participant (8.33%) thought that they were less attractive in the kit. Meanwhile, for the educational video, it was positively rated in terms of interactivity, objective, relevance and effectiveness, as well as clarity. However, 50.0% of participants mentioned that the video had less accessibility and they were unable to use it by themselves as they required assistance to scan the QR code to watch it. Additional suggestions by the participants for the kit and video were considered; and revision was done accordingly. Similarly, only minor suggestions were given, which was mainly on font size. No amendment was made for the educational video at this stage as well.

Phase III: Acceptance evaluation of the newly developed nutrition resource kit

This nutrition resource kit, both in printed and digital versions, was assessed for its acceptance among at-risk and malnourished elderly in health clinics. A total of 22 participants with a mean age of 68.82±5.33 years participated in this final phase. From the total of 22 participants, 11 participants were recruited from urban health clinics and 11 participants were from rural health clinics. Most participants were at-risk for malnutrition with an average MNA@-SF score of 10.27±1.08. Table V displays the demographic data and characteristics of the studied population in this phase.

Key Findings

Four key themes emerged from the in-depth interviews conducted with the participants: 1) Positive acceptance, 2) Elderly-friendly, 3) Valuable, and 4) Individual preference. The explanation for each identified theme is described as follows:

Theme 1: Positive acceptance

All participants (n=22) were satisfied with the printed version of the nutrition resource kit and educational video. This can be further described in an open-ended response as below:

'According to my standard, yes I am satisfied...'
'This is because the information provided is okay... The recipe given is okay. My husband can cook at home too...' (A07, female, 68 years old, urban health clinic)
'Satisfied...'
'Yes, it provides guidance.' (A16, male, 68 years old, rural health clinic)
'It is not bad...'
'Okay... The way, appearance, delivery of information is effective.... So, I am able to understand easily.' (A14, female, 61 years old, rural health clinic)

Besides, more than half of the participants (n=12) described that this nutrition resource kit, both in printed and digital versions, was comprehensive.

'It is complete enough already...' (A13, female, 73 years old, rural health clinic)
'It shows and explains everything...'
'It shows about nutrition...' (A15, female, 71 years old,

rural health clinic)

Theme 2: Elderly-friendly

All participants (n=22) mentioned that this nutrition resource kit, both in printed and digital versions, were elderly-friendly. This demonstrated that these resources responded well to the elderly's needs. In this theme, several participants (n=11) mentioned that these resources were appealing. They described their opinion towards these resources as follows:

'Look at this.... If looking at the nutrition photo, it is attractive. The foods... It is tempting...' (A02, female, 70 years old, urban health clinic)
'This is a nice book... It's good, we are happy with it...'
'If people did not eat... This porridge seems nice... So we want to eat it...' (A18, female, 74 years old, rural health clinic)

Participants also highlighted that these resources had good visibility, particularly in terms of legibility, as well as the figures and colours used. Participants highlighted their opinion in an open-ended response as below:

'Clear...'
'We are able to read it even without the use of spectacles...' (A02, female, 70 years old, urban health clinic)
'The figures used were clear... bright...' (A22, male, 63 years old, rural health clinic)
'The colours used were attractive.'
'It is bright... Clear...' (A07, female, 68 years old, urban health clinic)

In addition, participants also highlighted on the accessibility of this nutrition resource kit and educational video.

'This is because we are able to read it on hand...' (A01, male, 79 years old, urban health clinic)
'We are able to watch it... listen to it...' (A19, female, 73 years old, rural health clinic)

Furthermore, a few participants also considered this kit as systematic and practicable. One participant perceived that the arrangement of this nutrition resource kit was organised and practicable as it offered options for her to choose from. This opinion was described as per an open-ended response below:

'It is neat when take a look at it... The things were organised in the orderly way...'
'Look at the guidance, font.... It is already okay... Easy for me to choose the option...' (A14, female, 61 years old, rural health clinic)

Theme 3: Valuable

Participants highlighted on the benefits that they could achieve upon obtaining this newly-developed nutrition resource kit. It was thought to be beneficial to themselves and to their family members as well. For example, these participants mentioned that:

'It provides explanation for health.'

'It is because it shows us the guide for nutrition...' (A15, female, 71 years old, rural health clinic)

'With this book, yes, we are able to... since this book assimilates to teaching us...' (A21, male, 67 years old, rural health clinic)

Theme 4: Individual preference

This theme particularly discussed the acceptability of at-risk and malnourished elderly towards the educational video that was incorporated in the booklet in a QR code format. Several participants (n=4) narrated on the accessibility issue of the educational video. A few participants (n=4) voiced out on the unavailability of suitable electronic devices and difficulty to access the video. These issues could restrain them from fully utilising the digital material. Participants' opinion related to this matter were described in an open-ended response as follows:

'I don't have a device to watch the video... I will take a look on the book only...' (A09, female, 65 years old, urban health clinic)

'I don't have telephone...' (A19, female, 73 years old, rural health clinic)

'This video requires me to press it in order to watch it...'
'It is another work for me...' (A01, male, 79 years old, urban health clinic)

'Yes. Like this, sometimes we want to say it, our intelligence, our capability to use it... were limited... There are people who have less ability for this...' (A12, female, 66 years old, urban health clinic)

In addition, two participants (n=2) believed that this video was more suited for those who lacked reading interest. These two participants mentioned that:

'This is good... but it depends on people.'

'For me, I love to read...' (A12, male, 66 years old, urban health clinic)

'Yes, for those who love to watch it... but not everyone loves it. In my personal opinion, it is okay... the development of the video is okay... Nowadays, people who refused to read is indeed suitable for this... But the problem is we cannot be focusing on that only, we need to read too. This is because reading and video provides different effects.' (A11, female, 66 years old, urban health clinic)

Triangulation

Descriptive analysis of triangulation was in line with the themes that emerged from the qualitative interviews, particularly on positive acceptance and elderly-friendly. All participants (100.0%) indicated that they understood the information provided and described that the figures used were suitable, colours were attractive, and font size was legible. They (100.0%) also agreed that this kit was acceptable with respect to terminologies, sentences and appropriateness for recommendation. Meanwhile, for the educational video, all evaluated items achieved full agreement (100%) from the participants. All participants were satisfied with the educational video.

This commensurate with the themes identified from individual in-depth interviews, particularly with theme 1: positive acceptance, theme 2: elderly-friendly, and theme 3: valuable. Despite more than half of the elderly participants having no access to smartphones or any electronic devices, yet they rated that access was easy and it enabled autonomy for its use. This showed that the use of educational video is an individual preference, which corresponded with theme 4 of the qualitative analysis.

With respect to further improvement, additional suggestions given by the participants were taken into account. No amendment was done for the educational video. The finalised version of the nutrition resource kit, both in printed and digital versions, are displayed in Fig. 1 and Fig. 2, respectively.



Figure 1: Final version of nutrition resource kit in printed version



Figure 2: Final version of nutrition educational video

DISCUSSION

A nutrition resource kit for at-risk and malnourished elderly was developed using an action research approach, aiming to provide nutritional guidance for them in preventing and overcoming malnutrition issues. The development of the nutrition resource kit, both in printed and digital versions, was accomplished by a thorough process including validation and acceptance evaluations by both experts and elderly. These resources, which are presented from basic to more specific topics, are proposed as suitable reference materials to be provided by dietitians for at-risk and malnourished elderly. Compared to existing nutrition resources, this newly developed nutrition resource kit delivers comprehensive content merely aiming to treat and improve the nutritional status of at-risk and malnourished Malaysian elderly.

Validating these materials was an important step for the researchers as contributions from experts and elderly would be useful, particularly in improving these two developed materials. Numerous studies have demonstrated the validation of their developed educational materials and went through multiple modifications until a validated final version was attained (27,42,43). Similarly, the validation of this nutrition resource kit and nutrition educational video resulted in a few adjustments, mainly on wording, figures and colours. In particular, this study demonstrated excellent validity towards the resources. The I-CVI value for printed nutrition resource kit achieved full agreement for all items evaluated by the experts, except on one aspect related to the understanding of malnutrition; while all items evaluated for the educational video achieved the value of 1.0. I-CVI could be influenced by total number of experts since it was computed based on the amount experts rated for the scores of 3 and 4. In addition, adequate face validity was achieved among the experts and elderly as the level of agreement was high for almost all aspects evaluated, ranging from 83.33% to 100%, which was higher than the established minimum of 75% (32,44).

In addition, multiple studies have also assessed the acceptability of their developed educational materials among their target group (18,19,42). Acceptability of an intervention among providers and receivers could make for a successful implementation of it (45–47). Hence, it is important to evaluate the acceptability of these materials among the target group. In general, the nutrition resource kit and educational video were well-accepted by at-risk and malnourished elderly, both in urban and rural health clinics. Contradictory finding was reported by Shahar et al (18) where majority of their elderly participants did not understand the content of the developed booklet, which was related to the terminologies used (60%), illustrations (20%), and nutrition recommendations (20%). The difference in

results may be explained by the fact that our nutrition resource kit was developed according to the needs and specific type of preference among the elderly, which had been identified previously (23). This nutrition resource kit was also handy in size, colourful, using appropriate font type and size, equipped with figures to enhance the understanding of information, and included an educational video that enabled the elderly to obtain information by listening and watching. In short, elderly's involvement in the development of an educational material targeted for them should become foremost by all authorities (17) in order to improve the acceptability of the material as this process enables them to provide their point of view (19,48).

Besides, this nutrition resource kit, both in printed and digital versions, were appealing, had good visibility and accessibility, was systematic and practicable. All participants appraised the printed version of the nutrition resource kit for its suitability of figures, colours and font used. A local study conducted in Kuantan, Pahang found that 86.0% of elderly recruited had an eye disorder due to ageing process (49). This data showed that it is therefore important for elderly to have an elderly-friendly material. Participants also mentioned during the interview that these two materials were valuable and beneficial to themselves and their family members. The use of printed educational material is a common type of intervention which can be used alone or with others (50,51). According to Higgins & Barkley (52), a printed educational material might be more suitable and useful to educate elderly as this type of material allows them to re-read and learn at their own pace if a personal copy is available. This corresponds with the aim of enabling them to use the material at home or bring it along wherever they go.

In this study, a few elderly participants disliked the educational video (n=6) due to less accessibility (n=5) and they thought that the video was more appropriate and suitable for those who had less interest in reading (n=2). Despite the fact that most elderly were following the technology trend, it is worth to note that there must be someone who will encounter difficulties with the adoption of technology. The difficulty of using technology could be impacted by multiple demographic factors such as earnings, level of education, setting, disabilities, and technology complexity (53). However, in contrast to qualitative findings, analysis from triangulation revealed that all participants evaluated the educational video positively in all aspects in terms of interactivity, objective, relevance and effectiveness, and clarity. A possible explanation for this might be due to the elderly perhaps still believing that the video was appropriate and suitable to be included despite the limitations.

With respect to the limitation of this study, a researcher-administered questionnaire instead of a

self-administered questionnaire was performed in the triangulation process. Initially, the plan required the elderly participants to answer the questions individually. However, all elderly participants refused to answer them by themselves although the questions consisted of a yes or no option only. Instead, the participants requested for the researcher to read and ask them the questions. Nevertheless, the matter of performing triangulation in qualitative research was useful. The use of methodological triangulation has been found to be beneficial as it could help to confirm the findings, allowed for data comprehensiveness, enhanced validity, and increased understanding towards the study objective (54). In addition, all data were reviewed and checked critically by all team members to promote its validity and reliability. Involvement of research team members in the study process served as one of the strategies to enhance trustworthiness in qualitative research (55). Besides, data collection was also conducted in both urban and rural areas. Thus, these study findings could be generalised to elderly in these two different geographical areas.

CONCLUSION

To conclude, the development and provision of a tailored educational material for at-risk and malnourished elderly would be beneficial in tackling malnutrition issue among them. This present study illustrated that the newly developed nutrition resource kit, both in printed and digital versions, was well accepted by at-risk and malnourished elderly. This material has the potential to aid in delivering nutritional guidance effectively since it was developed according to the target population's own viewpoints. Hence, it could further facilitate them to comply with their nutritional care plan, which directly helps to overcome and prevent malnutrition. Measuring the effectiveness of this developed nutrition resource kit is required in the future for continuity in implementation of nutrition intervention in health clinics setting.

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