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Factors associated with nutritional status of elderly in Ubon Ratchathani, ThailandPiyanit Churak¹, Panrawee Praditsorn¹, Jaroonsree Meenongwah², Wanphen Wimondeerapattana¹ *¹ Institute of Nutrition, Mahidol University, Salaya, Phutthamonthon, Nakhon Pathom, Thailand² Boromarajonani Collage of Nursing Sanpasithiprasong, Meung, Ubon Ratchathani, Thailand

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Abstract

The prevalence of elderly population is increasing among Asian countries including Thailand during the present. Aging can affect not only the physical and mental health by causing deteriorative changes but also can lead to the problem of malnutrition in elderly. This study aimed to investigate the nutritional status of elderly individuals from Northeastern Thailand and to determine the association between nutritional status of the elderly and socio-demographic factors, lifestyle, and health conditions. A cross-sectional study was conducted in urban and rural areas of Ubon Ratchathani province. Anthropometric measurement, health practices questionnaire, and mental health self-assessment tool were applied to 398 elderly participants aged 60 years or more. Multiple logistic regression was performed to identify factors associated with nutritional status. Several variables regarding socio-demographic characteristics, health-related lifestyle, and health status were included in the analysis. Results showed that the underweight in the elderly was associated with elderly age ≥ 70 years (OR = 5.5, 95% CI 2.3-13.0), non-married status (single, OR = 12.9, 95% CI 2.4-69.5; other non-married situation, OR = 3.5, 95% CI 1.5-8.2), teeth or gum diseases (OR = 8.0, 95% CI 2.2-28.9), and appetite disorder (OR = 3.0, 95% CI 1.4-6.5). The overweight was positively associated with the elderly having hypertension (OR = 1.7, 95% CI 1.0-2.8) and unfavorable health status (OR = 2.0, 95% CI 1.1-3.5). In conclusion, these findings highlight the importance of nutrition and physical health problem among Thai elderly. There is a need for primary health care personals to provide nutritional knowledge and self-health care to improve the nutritional status of the elderly.

Keywords: elderly, malnutrition, underweight, overweight, body mass index, aging health, Thailand

1. Introduction

The ageing population of the world is increasing and is estimated to reach 22% by 2050 [1]. Recently, Thailand has become an aged society, with an increase in the numbers of those reaching senior age and will become a super-aged society in next 20 years [2]. Currently, Thailand is the second highest elderly nation among ASEAN countries. Aging can affect not only the physical and mental health by causing deteriorative changes but also can lead to the problem of malnutrition in elderly [3]. According to the 2017 Global Nutrition Report, malnutrition refers to impaired health and can be classified into under- and over nutrition, which affects one in three people worldwide and is increasing in several countries, making it a universal public health challenge. Therefore, attention is needed to alleviate malnutrition especially in the older population [4].

Malnutrition is one of the health problems concerning elderly people, which may occur due to different causes. Mann and colleagues have studied the association between chewing and swallowing problems with dietary deficiencies. Their results showed that older adults with those difficulties had an intake of 300-400 calories lower than the recommended DRIs [5]. Kimura et al., used Food Diversity Score Kyoto to assess varieties of food consumed by elderly. Participants with low chewing ability had lower food diversity ($p < 0.001$), and less frequent intakes of beans ($p = 0.006$), vegetables ($p = 0.005$), and nuts ($p = 0.002$), than those with normal chewing ability [6]. Thus, impaired oral function might result in undernourished condition. Besides this, decreased appetite and loss of taste or smell, which are common in the elderly, and can be exacerbated by disease and drugs, were also possible factors for nutrient deficiency [7 & 8]. Almost 3 times higher risk of malnutrition were observed in

elderly with underweight taste disorders [9]. A number of studies have been undertaken to identify the social and lifestyle factors such as alcoholism, smoking, and social isolation that may predict malnutrition [10-12]. The risk of poor nutrition increased significantly with current smoking status (OR = 2.84), alcohol consumption (OR = 3.50) and, lack of physical activity (OR = 1.67) as shown by a previous study [13]. Moreover, many of the studies have focused on nutritional deficiencies while investigating the relation between cognitive disorders especially depression and nutrition [14-16]. On the other hand, overweight and obesity in elderly have studied since the prevalence of both over-nutrition increased [17-19]. A strong association between excessive body weight and age (OR = 2.162, $p < 0.001$), with the prevalence of overweight and obesity increasing as age increased in both genders was found in Hu et al [20].

In Thailand, a few studies have investigated the factors associated with nutritional status of elderly population [21 & 22]. However, those were focused on oral health and did not cover other possible conditions that is relevant to elderly health and the quality of life such as physical environments, social surrounding, lifestyle, etc. that may influence their dietary practices. It is necessary to assess the nutritional status of older adults and potential determinants of malnutrition. However, data on the nutritional status and associated risk factors for malnutrition among community-dwelling elderly adults has not been well established in Thailand.

Given the background, the present study aimed to investigate nutritional status of elderly individuals from two areas in Thailand, and its association with socio-demographic factors, lifestyle, and health conditions.

2. Materials and Methods

2.1 Study design

The cross-sectional study was conducted in two areas of Ubon Ratchathani province, Thailand. Elderly participants (60+ years) were randomly sampled from a selected district, Warinchamrab, and then sub-districts were randomly chosen including That and Huay Ka Yung Sub-District Municipalities to represent urban areas and Tha Lat and Pho Yai Sub-District Administrative Organizations as rural exemplars. Sample size was calculated based on the equation that was appropriate for prevalence study. The formula $N = Z^2 P(1-P)/d^2$ was employed to determine the sample size where P or the estimated prevalence for obesity in elderly from the report of the Public Health Office [23] equal to 12%, tolerable error equal to 0.05, and the confidence level at 95%. The required number of participants according to the formula was 163 cases and 20% drop-out were expected. The estimated sample size per urban/rural area was 196 cases. Thus, four-hundred elderly were recruited for this study. Population sampling was done by acquiring information about the distribution of gender and age-subgroup (young-elderly, 60 to 69 or; older-elderly, 70+ years) from records of particular health care centers prior to visiting days. Three hundred ninety-eight elderly participants were asked to complete health examination and take part in interview sessions.

2.2 Questionnaires

All of the participants were asked a set of questions adapted from the “national-level survey on health status of elderly in 4 regions across the country” [24]. Socio-demographic information were obtained using standardized questionnaire. For assessment of nutritional status, gender, sub groups of elderly age (young or older-elderly), marital status, level of education, occupation (working or not), living arrangements (with someone or alone), adequacy of income, socio-demographic and lifestyle variables were used.

The questionnaire study also sought information regarding perception on how they ‘feel’ about their own health status in terms of quality of health scales (good or not good). An answer was classified as ‘good’ when the participants feel like they neither have any serious illness nor impaired ability or as ‘not good’ when the contrary feeling was recognized. Other questions including smoking status (smoker or non-smoker), health problems such as hypertension (yes or no) and diabetes (yes or no) as well as the factors related to food consumption like oral health problem (yes or no), appetite disorders (yes or no), number of meals (less or more than three meals a day) and alcohol consumption (drink or not drink) were also asked. All these variables indicated participants’ health status.

Self-assessment mental health questionnaire ‘Thai Mental Health Indicator (TMHI-15)’ developed by Department of Mental Health, Ministry of Public Health were used as an instrument to measure both mental health and happiness [25 & 26]. Participants were asked TMHI-15 questions by research staffs to determine the overall mental health status. There were fifteen questions for each of questionnaire. Answers were assessed in five scales rating to reflect their situations, circumstances, opinions, and feelings. Participants’ answers were classified into poor, fair, and good as an interpretation.

2.3 Anthropometric assessment

Anthropometric measurements were performed by specially trained staffs. Body weight was measured with the subject wearing light clothing using calibrated digital weighing scale (Tanita® model BC-587) to the nearest 0.1 kg. For height measurement, wall mounted height measuring tape was set up and, each participant was measured in bare feet to the nearest 0.1 cm. Then body mass index was calculated using the following formula: body mass index (BMI) = weight (kg)/height (m²) and classified into three groups according to BMI classification for Asians [27]. Since an excess BMI whether overweight or obesity are clearly associated with nutrition related non-communicable diseases [28], the group of participants of this study were comprised of underweight (BMI <18.5), normal weight (BMI 18.5-22.9), and overweight and obesity (BMI ≥ 23).

2.4 Data Analysis and Ethical Approval

Descriptive statistics consisting of percentage, mean, and standard deviation (SD) of nutritional status were analyzed to describe the data. Multiple logistic regression was used to estimate the association between nutritional status and interested variables including socio-demographic characteristics, lifestyle factors, and health status. Multicollinearity test was performed prior the model analysis. The statistical analysis was performed using Statistical Package for Social Science (SPSS, version 18, SPSS Inc., Chicago, IL, USA).

The study was approved by the Committee for Research Ethics (Social Sciences), Mahidol University (Reference number: MU-SSIRB: 2016/539 (B1)).

3. Results

Three hundred ninety-eight respondents were included in the analysis, in which females make up a majority of subjects (258 participants, 64.8%). Among these female participants, 55.0% were classified as young-elderly (60 to 69 years) whereas 51.4% were male elderly. Table 1 shows the distribution of aged participants according to socio-demographic, lifestyle and health variables. It can be observed that the majority of the respondents had primary level education. Almost two-third of the participants were married and were in greater number than those who were non- married. The prevalence of appetite disorders, number of meals, and self-perceived health status as 'not good' were 31.9%, 11.8% and 24.9%, respectively.

Average BMI were 22.8 ± 3.6 kg/m² for males and 24.2 ± 4.4 kg/m² for females. When considering subgroups of aging, result showed that underweight 18.5% in young-elderly females, and it was 81.5% in older-elderly females. For overweight females, 64.6% were in the age group of 60-69 years, and 35.4% was in the age group of 70 years and above. The proportion of the underweight males were not different between age subgroups with 47.1% in younger group, and 52.9% in older subgroup whereas the overweight males were 55.9% in the age group of 60-69 years, and 44.1% in elderly who were aged 70 years and above as showed in Table 2

Table 1 Characteristics of the participants

Variables	% response	n	%
Marital status	100.0		
Marry		267	67.1
Widow/Divorce/Separation		117	29.4
Single		14	3.5
Education	100.0		
High school/College		36	9.0
Elementary school		362	91.0
Occupation	100.0		
Doing work		190	47.7
Not work		208	52.3
Living arrangements	100.0		
Lives with someone		368	92.5
Lives alone		30	7.5
Income	100.0		
Adequate		202	53.0
Inadequate		196	47.0
Smoking status	100.0		
Non smoker		366	92.0
Smoker		32	8.0
Alcohol consumption	100.0		
Does not drink		319	80.2
Drink		79	19.8
Hypertension	99.7		
No		273	68.8
Yes		124	31.2
Diabetes	99.7		
No		325	81.9
Yes		72	18.1
Health status	100.0		
Good		312	75.1
Not good		86	24.9
Tooth/Gum Disease	99.7		
No		375	94.5
Yes		22	5.5
Appetite Disorders	100.0		
No		271	68.1
Yes		127	31.9
Number of meals	100.0		
≥ 3 meals		351	88.2
< 3 meals		47	11.8
Mental Health	100.0		
Good		198	49.7
Fair		146	36.7
Poor		54	13.6

Table 2 Nutritional status in elderly by age group and sex

Age group (years)	n	BMI* Mean \pm SD	Underweight n (%)	Normal n (%)	Overweight n (%)
Male					
60-69	72	23.5 \pm 4.2	8 (47.1)	31 (48.4)	33 (55.9)
70+	68	22.0 \pm 2.7	9 (52.9)	33 (51.6)	26 (44.1)
All	140	22.8 \pm 3.6	17 (12.1)	64 (45.7)	59 (42.2)
Female					
60-69	142	25.2 \pm 3.9	5 (18.5)	35 (47.9)	102 (64.6)
70+	116	22.9 \pm 4.6	22 (81.5)	38 (52.1)	56 (35.4)
All	258	24.2 \pm 4.4	27 (10.5)	73 (28.3)	158 (61.2)

*Body mass index (kg/m²): Cut off point BMI for Underweight \leq 18.5 kg/m²; Normal $>$ 18.5 to 22.9 kg/m²; Overweight/obesity \geq 23.0 kg/m²

Table 3 present the crude association between variables of interest and improper nutritional status. Participants aged 70 years and above were 3 times more likely to be at risk of being underweight than the younger elderly (95% CI 1.6-6.2, $p = 0.001$). Underweight was significantly associated with all types of marriage separation (OR = 2.2, 95% CI 1.1-4.2, $p = 0.022$). The risk caused by health-related variables like smoking, tooth or gum diseases, and appetite disorders were more than twice and are predictors of underweight. Two factors were associated with overweight status including sex, in which female had higher risk (OR 2.2; 95% CI 1.4, 3.3) than males and the overweight elderly presented more hypertension (OR = 1.6, 95% CI 1.0, 2.4)

Table 4 shows multiple variables and their association with nutritional status of the participants. In relation to risk of underweight, significant difference was found for elderly who were more than 70+ years of age than the young-elderly and they were 5.5 times (95% CI 2.3-13.0, $p < 0.001$) more likely to be underweight. Single elderly had 12.9 times higher risk than married ones (95% CI 2.4-69.5, $p = 0.003$), whereas the separated ones, either widow or divorced showed 3.5 times higher risk than reference group-(married) (95% CI 1.5-8.2, $p = 0.003$). Likewise, overweight also showed significant association with older-elderly compared to younger-elderly (OR = 0.4, 95% CI 0.2-0.6, $p < 0.001$). Other factors did not show any statistical significant difference. It was also noted that participants aged more than 70 years were more likely to be risk for being the underweight than being the overweight. Other factors were not showing any statistical significant difference.

Results also demonstrated that the underweight status of the elderly was positively associated with poor health conditions and that elderly having tooth or gum diseases could predict 8 times higher risk when compared to the elderly having normal oral health (95% CI 2.2-28.9, $p = 0.001$). Appetite disorders were also found to be 3 times higher in the underweight elderly than the elderly having normal appetite (95% CI 2.2-28.9, $p = 0.004$). No associations were found between underweight and smoking status, alcohol consumption, hypertension, diabetes, subjective health status, and mental health.

Table 3 Univariate logistics regression of factors associated with nutritional status

Variables	Underweight			Overweight/Obesity		
	(n=44)	OR (95% CI ^a)	p	(n=217)	OR (95% CI ^a)	p
Gender						
Male	17	1		59	1	
Female	27	0.8 (0.4-1.6)	0.611	158	2.2 (1.4-3.3)	<0.001
Age group (years)						
60-69	13	1		135	1	
70+	31	3.1 (1.6-6.2)	0.001	82	0.5 (0.3-0.7)	<0.001
Marital status						
Marry	22	1		147	1	
Widow/Divorce/separation	19	2.2 (1.1-4.2)	0.022	63	1.0 (0.6-1.5)	0.826
Single	3	3.0 (0.8-11.7)	0.107	7	0.8 (0.3-2.4)	0.711
Education						
High school/College	2	1		23	1	
Elementary school	42	2.2 (0.5-9.6)	0.282	194	0.7 (0.3-1.3)	0.239
Occupation						
Doing work	19	1		103	1	
Not work	25	1.2 (0.7-2.3)	0.522	114	1.0 (0.7-1.5)	0.905
Living arrangements						
Lives with someone	42	1		201	1	
Lives alone	2	0.6 (0.1-2.4)	0.432	16	1.0 (0.5-2.0)	0.892
Income						
Adequate	24	1		115	1	
Inadequate	20	0.8 (0.4-1.6)	0.594	102	0.8 (0.6-1.2)	0.328
Smoking status						
Non smoker	37	1		213	1	
Smoker	7	2.5 (1.0-6.2)	0.048	4	0.1 (0.04-0.3)	<0.001
Alcohol consumption						
Does not drink	34	1		180	1	
Drink	10	1.2 (0.6-2.6)	0.612	37	0.7 (0.4-1.1)	0.127
Hypertension						
No	34	1		139	1	
Yes	10	0.6 (0.3-1.3)	0.200	77	1.6 (1.0-2.4)	0.039
Diabetes						
No	38	1		175	1	
Yes	6	0.7 (0.3-1.7)	0.414	41	1.1 (0.7-1.9)	0.633
Health status						
Good	33	1		163	1	
Not good	11	1.2 (0.6-2.6)	0.563	54	1.5 (0.9-2.5)	0.083
Tooth/Gum Disease						
No	38	1		207	1	
Yes	6	3.3 (1.2-9.0)	0.018	9	0.6 (0.2-1.3)	0.196
Appetite Disorders						
No	22	1		160	1	
Yes	22	2.4 (1.3-4.5)	0.008	57	0.6 (0.4-0.9)	0.008
Number of meals						
≥ 3 meals	42	1		192	1	
< 3 meals	2	0.3 (0.1-1.4)	0.131	25	0.9 (0.5-1.7)	0.845
Mental Health						
Good	22	1		111	1	
Fair	14	0.8 (0.4-1.7)	0.649	81	1.0 (0.6-1.5)	0.915
Poor	8	1.4 (0.6-3.3)	0.458	25	0.7 (0.4-1.2)	0.203

^a Confidence interval

Table 4 Multiple logistics model of elderly with the association between nutritional status and socio-demographic characteristics, lifestyle variables

Variables	Underweight OR ^a (95% CI ^b)	p	Overweight/Obesity OR ^a (95% CI ^b)	p
Gender				
Male	1		1	
Female	0.9 (0.3-2.3)	0.807	1.7 (1.0-2.9)	0.055
Age group (years)				
60-69	1		1	
70+	5.5 (2.3-13.0)	<0.001	0.4 (0.2-0.6)	<0.001
Status				
Marry	1		1	
Widow/Divorce/separation	3.5 (1.5-8.2)	0.003	0.8 (0.5-1.4)	0.472
Single	12.9 (2.4-69.5)	0.003	0.4 (0.1-1.3)	0.123
Education				
High school/College	1		1	
Elementary school	1.5 (0.3-7.3)	0.640	0.8 (0.3-1.7)	0.501
Occupation				
Doing work	1		1	
Not work	1.5 (0.7-3.1)	0.291	1.0 (0.6-1.5)	0.963
Living arrangements				
Lives with someone	1		1	
Lives alone	0.3 (0.06-1.6)	0.171	1.5 (0.6-3.7)	0.334
Income				
Adequate	1		1	
Inadequate	0.9 (0.4-1.8)	0.735	0.8 (0.5-1.2)	0.258

^a Odds ratios simultaneously adjusted for all variables in the table; ^b Confidence interval

The relationship between the overweight status of the elderly and nutritional and health practices were also determined. The overweight elderly presented (or suffered from) hypertension which was 1.7 times higher than the elderly who were not overweight (95% CI 1.0-2.8, $p = 0.039$). As illustrated, health status also demonstrated similar pattern of relationship with those having unfavorable health 2 times higher risk of being overweight than that of people without health problems (95% CI 1.1-3.5, $p = 0.019$). The overweight elderly were more having 2 times of risk for the unfavorable health status compared to those who had good health. Besides smoking behavior and existing appetite disorder were significantly associated with overweight as well but demonstrated small adjusted OR at 0.1 (95% CI 0.04-0.4, $p = 0.001$) and 0.6 (95% CI 0.4-1.0, $p = 0.04$), respectively as shown in Table 5.

Table 5 Multiple logistics model of elderly with the association between nutrition status and health status variable

Variables	Underweight OR ^a (95% CI ^b)	p	Overweight/Obesity OR ^a (95% CI ^b)	p
Smoking status				
Non smoker	1		1	
Smoker	2.0 (0.6-7.0)	0.254	0.1 (0.04-0.4)	0.001
Alcohol consumption				
Does not drink	1		1	
Drink	2.1 (0.8-5.7)	0.144	0.7 (0.4-1.3)	0.257
Hypertension				
No	1		1	
Yes	0.4 (0.2-1.0)	0.054	1.7 (1.0-2.8)	0.039
Diabetes				
No	1		1	
Yes	1.4 (0.5-3.9)	0.584	0.7 (0.4-1.2)	0.182
Health status				
Good	1		1	
Not good	1.4 (0.6-3.3)	0.467	2.0 (1.1-3.5)	0.019
Tooth/Gum Disease				
No	1		1	
Yes	8.0 (2.2-28.9)	0.001	0.5 (0.2-1.4)	0.179
Appetite Disorders				
No	1		1	
Yes	3.0 (1.4-6.5)	0.004	0.6 (0.4-1.0)	0.040
Number of meals				
≥ 3 meals	1		1	
< 3 meals	0.1 (0.03-0.7)	0.015	1.4 (0.7-2.8)	0.369
Mental Health				
Good	1		1	
Fair	0.8 (0.3-1.7)	0.508	1.0 (0.6-1.7)	0.889
Poor	1.1 (0.4-3.4)	0.824	0.6 (0.3-1.3)	0.184

^a Odds ratios simultaneously adjusted for all variables in the table; ^b Confidence interval

4. Discussion and Conclusion

This study investigated nutritional status of elderly individuals from two areas in Thailand, and its association with socio-demographic factors, lifestyle, and health conditions. The results showed a different scenario in relation to malnutrition, which reflected both under- and overweight and expected associated factors.

A half of our participants (54.5%) were classified as overweight and obese and other 11% were underweight. It can be assumed that almost two-third of elderly in this study were malnourished. The prevalence of the overweight was similar to that reported in Thai National Health Examination survey in 2014, which indicated the prevalence of obesity in elderly was as high as 41.4% and the prevalence was 32.1% in age group between 70-79 year old and 17.6% in age group ≥ 80 year old. While underweight was less than 10% in early elderly, it also worsened with increasing age [29]. Present results showed consistency with those studies that used the same cut-off points for BMI, as the segment of older people with high prevalence of overweight and obesity was approximately 60% in Singapore [30]; however, a difference was observed when compared to Indonesians as their senior citizens were middle-to-high 45% overweight [31]. The prevalence of overweight in elderly from our study seemed to be relatively high as that we used the BMI cut-off points for Asian population as criteria for nutritional classification. The clinical evidence summarized by World Health Organization also supported that the risk of obesity-related to chronic diseases presented when BMI was more than 23 kg/m² among Asians [28].

We compared the results with those studies conducted in elderly with an interest on nutritional status and related factors. Gender in this study was not associated with both underweight and overweight, however, it tend to show the association between females and overweight. The present results were consistent with other studies whereby the relationship between body weight and gender were not yet clarified [32-34].

Body weight change consequently putting BMI out of normal range in older age is consistent with other studies [34 & 35] and explanation to this phenomenon is aging process itself. The alteration of biological, physiological and psychological conditions altogether are defined as the aging process, which is expressed in the sense of taste and smell as well as cognitive and functional capacity that declines with age [36]. In addition to those changes,

oral cavity problems are one of the causes for improper intake of food and nutrients. Chewing ability can affect low food intake because of the dental caries and gum diseases and therefore contribute to malnutrition in the elderly [37]. Results from our study supported the evidence that elderly who have teeth or gum diseases were associated with the underweight. Moreover, appetite disorders also positively associated with underweight elders but adversely found in the overweight.

Some behavioral practices are well known to be risk factors to health like smoking that has several effects on the thyroid gland, an important human organ that functions in metabolic control [38]. Tobacco smoke contains numerous compounds emitted as gases and condensed tar particles, many of them being oxidants and pro-oxidants, capable of producing free radicals. In addition, tobacco constituents have been shown to reduce levels of several vitamins of the B-complex. Nutritional status in smokers may be further compromised by an inadequate diet [39]. Surprisingly, this study showed smoking was negatively associated with overweight for either the ex- or current smokers. Body change results from physical and psychological aging in combination with factors such as medication and its conditions may reduce the risk of overweight in elderly population. The lower prevalence of smoking elderly compared to those who were non-smokers supports the hypothesis that the smoking habit is related to reduction of body weight. Similar results were found in other studies [32 & 34].

In this study, hypertension was positively associated with overweight which was also observed in many previous studies [40-43]. Excess weight gain is associated with increased visceral adiposity increased extracellular fluid volume expansion and increased blood flow in many tissues which, in turn, increases venous return and cardiac output. It also increases hormone and enzyme activities in obese individuals leading to an increase in stiffness of blood vessels and resistance to blood flow which may explain the association between this factor and overweight [44].

Nutritional risk especially for overweight was two times higher for individual who specified their perceived health status as 'not good'. The subjective health assessment reflects a person's integrated perception of health that is inaccessible to any external observer despite it being obviously seen in this study.

Unlike earlier studies which showed life circumstance factors such as living arrangements and eating situation provided some effects to nutritional status [35, 37, 45, 46]. In this study, living or eating alone may have a negative influence on nutritional aspects in the form of under-nutrition. However, no association was not found between living conditions and poor dietary intake in this study which may be due to limited number of people that are living or eating alone. One possible reason for this phenomenon was the local cultural and social context in which aging parents normally live with or nearby their children or relatives.

The cause of significant association between marital status either single, widow, divorce, or other kind of separation and dietary intake was unclear. However, marital status may be related to bodily changes through several possible ways [47]. Ending of marriage is an important life event with psychological and economic consequences that may be conducive to people for changing their health practices that could lead to weight changes. Furthermore, entering, being in, and exiting from marriage have gender issues involved. The roles of men and women in marriage lead them to have different experiences in a coupled life. The traditional gender roles, especially, tend to be more beneficial to men than women [48 & 49]. Further study is needed when considering marriage and body weight.

Our study have some limitation in that; first, information on medical conditions and medications were collected using self-report and interviewing. Second, the study was conducted in a single province, which might not be able to represent the entire population of the country. Third, because of the cross-sectional nature of this study design, causal relationships could not be inferred.

In conclusion, the present study explored the relationship between socio-economic status, lifestyle and health behaviors and nutritional status of the elderly in Ubon Ratchathani province. Results demonstrated that factors associated with the underweight of the elderly were increasing age, single status tooth/gum diseases and appetite disorder. The overweight status among elderly was associated with the present with hypertension and the unfavorable health. To tackle dual-form of malnutrition, nutrition and health education are important strategies to promote and maintain good health and well-being of the elderly and this can be achieved by health care personnel in the community.

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