



Original Article

Health Status and Health Patterns in Urban-rural Dwelling Elderly in Nakhonratchasima Province, Thailand

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ABSTRACT

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Introduction: As rapid urbanizing spreads throughout Thailand, the combination of urban-rural lifestyle has been gradually found. These changes may effect on health pattern of the older adults. This study was aimed to explore the incidence of health problems and life styles of the elderly in urban-rural areas.

Methods: A random interview survey with qualitative approach was used. Data were randomly collected from 14 areas in central sub-districts of Nakhonratchasima province, Thailand. Twenty-five older adults in each area were interviewed. The recording forms consisted of demographic data, perceived health status and health problems, medication use, activities of daily living, instrumental activities of daily living, mental health, social and religious activities, and accommodation and environment. Non-invasive physical examinations of the elderly were performed by weighing, measuring height and testing muscle strength with one leg standing.

Results: Most of the elderly reported having at least one chronic disease and/or degenerative problems that had impact on their daily lives. Forty percent rated their health status as moderate to poor, 18% encountered falls while 18% were hospitalized in the past six months. Only one-third underwent an annual health check-up while 30% of the female had cancer cervix screening. Most of the elderly could perform daily tasks on their own with assistive instruments and were healthy in mind. However, many of them drank tap water without boiling or filtering.

Conclusion: The older adults in the urban-rural areas had access to health care services and had a good health status. However, their health promotion and prevention behaviors are questionable.

Keywords: Elderly, Health Status, Suburban Health, Well-being, Health Patterns

Introduction

Thailand is experiencing global trend of rapid increasing elderly population from 5% in 1950 to more than 10% in 2013 (1), that have made Thailand the top second elderly population country in Southeast Asia (2) The elderly population of Thailand is expected to up to 30% by 2050 that makes Thailand a super-aged society (3). Aging on human is progressing as the interactions

of physical, psychological, social, and environmental declines along with chronic illness. Although many elderly people are in good health, biological changes in ageing process still increase the risk of illness and disability (4, 5). They require more health care expenses, rate of dependence and the burdens for the working population and the government expenditures (6).

Health promotion and disease prevention are important issues to reduce the burden of disease and health care expenses (7, 8). Older people are valuable to their societies in either economic terms or other unmeasurable values (9). However, older people may have weak social support networks, lack income, or be subject to discrimination and abuse. Although the United Nation has focused on the rights and well-being of the older adults for more than thirty years, recent researches still reveal many gaps and influential factors related to them. In 2012, Rozanova et al. (10) found that gender, class, age, and health status were significant factors influent social engagement among seniors in rural communities in Canada. Whereas, Monma et al. concluded that mental health was the most important factor of activity limitations in Japanese older adults (11). Furthermore, low back pain regardless of age and sex, other musculoskeletal diseases only for women and cardiovascular diseases mainly for men could also be significant risk factors to activity limitations. Moreover, household income, which may directly reflect accessibility to healthcare and psychosocial stress, was added as an important modifying factor in the health risks attributable to overweight among older Japanese men (12) and a cause of caregiver strain (13). In addition, other factors related to older adults' well-being were widely reported globally. Behavioral risk factors such as tobacco use, unhealthy diet, insufficient physical activity and the harmful use of alcohol are known and modifiable contributors to a number of non-communicable diseases and health mediators but are commonly reported among the seniors (14).

Theoretical framework

Aging is a time when the physical, psychological, social and environmental declines lead to risks and health problems. It is also a time of suffering from chronic or non-communicable diseases with long term consequences. Burdens of long term care arise for many reasons such as from disease itself, from the consequences of the diseases, from deviation of health and from being disabled. Eighty-five percent of diseases found among the elderly were non-communicable or chronic diseases resulting from lifestyle, habits and their environment (7). It was found that 54% of the elderly reported their health as moderate healthy while only 11% reported having poor health. The most common health problems of elderly people were joint pain, insomnia, fainting, dizziness, constipation, hemorrhoids, high blood pressure, heart disease and diabetes (7). The major causes of death among the elderly were coronary heart disease, cancer, diabetes, liver diseases, kidney diseases, strokes, pneumonia and accidents. Health promotion, sickness prevention, treatment of the early stages and rehabilitation in the elderly are important issues to be addressed in order to reduce the burden of disease and health care expenses (8).

The Office for National Statistics (2004) reported that 2.4 million older adults (39.8%) had sickness or illness in the past month. The incidence of illness reports were higher among female older adults. Most of the older adults reported the frequency if illness or sickness at the average of three times a month. The most frequently reported symptoms were muscular and orthopedic diseases, respiratory diseases and cardiovascular diseases (15). Several health risk behaviors among the seniors were also revealed. One-fourth of the seniors smoke cigarettes. Among those, 43.3% of the male seniors were smoking while 4.6% of the female seniors did. Twenty-five percent of the seniors occasionally drank alcohol. The proportion was higher among male seniors (41.6: 8.6). More than half (60.6%) of the seniors were drivers or front seat passengers; however, 44.1% of them neglected seatbelt. Only 21.9% of the seniors always used seatbelts. It was interesting that more than half of female seniors refused to use seatbelts whereas only 18.9% always used seatbelts even though seatbelt law was enforced in Thailand since 2001. For male senior's drivers or front seat passengers, 38.7% reported never wear seatbelts while only 25% reported always wore seatbelts. Motorcycles are the most popular vehicles in Thailand and it is also the top cause of death in traffic accidents. Helmets law was enforced in Thailand since 1979. More than half of the seniors who used motorcycles never wore helmet whereas 9.4% always did. For female seniors, 66.9% never used helmets while only 6.2% used. The incidence was slightly better among male seniors with 12.7% always used helmets and 47.4% never wore (15). For health promotion behaviors, 21.0% reported regularly exercise by daily basis. The activities that the older adults reported to be difficult to perform were as mobility, self-care both inside and outside the house, illness, emotion, feeling and concentration, memory and social participation (15).

Purpose of the study

From reviewing of literatures, differences of perceived health status existed between the elderly livings in rural and urban areas were mostly explored. Living environment, life style, and health care accessibility are correlated with urban and rural development that led to the health status distinction among the elderly living in different areas were also studied. The setting of this study, Nakhonratchasima province, is a new trend of big cities in Thailand. As rapid urbanizing spreads throughout the country, the combination of urban-rural lifestyle has been gradually found. Traditional family relations have been changed, sometimes increasing burdens on the traditional family support network. Nakhonratchasima has the largest territory and the second largest population in Thailand

located 330 kilometers away from the capital Bangkok. As a province with huge population distributed in vast territory that might be different from urban area. Its health care system is at the top level (tertiary care) and throughout with exceptional quality.

Research question guiding the study was what was the health status and health perception of the elderly who lived in the municipal areas of central district, Nakhonratchasima province, Thailand. In light of the research objective, this study aimed to 1) explore the incidence of health problems and chronic diseases, 2) define potential health problems, trends, and health behaviors, and 3) explore health patterns and lifestyles of the elderly living in municipal areas.

The main purpose of this study was to explore the perceived health status of the elderly who lived in the municipal areas of central district, Nakhonratchasima province, Thailand. Therefore, information regarding the accessibility of health services, mental health status, social and family support, and health promotion behaviors are still needed. Findings would provide fundamental information for health and education services promoting quality of life for the elderly and their families.

Method

Research design

A random interview survey with qualitative approach was used.

Subjects selection

Data were collected with interview survey from 350 elderly that were randomly selected from 14 municipal areas of central district, Nakhonratchasima province, Thailand. In order to alleviate the bias rooted in literacy and visual problems of the elderly, questionnaires were read and written down by the research assistants trained by the principal investigator.

Instruments

The questionnaire contained 11 items: demographics, perceived health status and problems, medication use, activities of daily living (ADL) (16), ability to use the devices in their daily lives (Instrumental Activities of Daily Living; IADL) (17), mental health (18), social and religious activities, and accommodation and environment. Weight, height, muscle strength with one leg standing were collected as well.

The Barthel index ADL was used to evaluate physical performances. It contains ten variables that describe ADL and mobility. The possible scores were 0–100, 0–20 represented unable to perform ADL or being dependent while 100 referred to able to perform ADL without any assistant. The inter-observer reliability of the Barthel index ADL was .714, the intra-observer reliability was .968 (16) and

the Cronbach's alpha coefficient was 0.79 (17). The Barthel index ADL had acceptable content validity (Spearman's rho .629, $p < .001$) when compared to the de Morton Mobility Index (16). The Cronbach's alpha coefficient from this study was .82.

The IADL was used to assess independent living skills. There are eight domains of function measured with the Lawton IADL scale. Women are scored on all 8 areas of function, for men, the areas of food preparation, housekeeping, laundering may be excluded. Clients are scored according to their highest level of functioning in that category. A summary score ranges from (0 low function, dependent) to (8 high function, independent) for women, and 0 through 5 for men. The Cronbach's alpha coefficient from the prior study was 0.78 (17) while this study yielded at .84 .

The 20 items in the Center for Epidemiologic Studies Depression Scale (CESD) measure symptoms of depression in nine different groups as defined by the American Psychiatric Association Diagnostic and Statistical Manual, fifth edition. These symptoms are sadness, loss of interest, appetite, sleep, concentration, worthlessness, tired, agitation and suicidal ideation. People who have a total CESD scores less than 16 will be considered as no probable major depressive episode while the scores of 21 or more are at high risk. The Cronbach's alpha coefficient from the prior study was .88 (17) to .92 (18), the sensitivity was 86.67% whereas the specificity was 96.67% (18). The Cronbach's alpha coefficient from this study was .93.

Data analysis

Data were analyzed with descriptive statistics of means, percentages, and standard deviations. Inferential statistics of Chi-square and independent t-test were used to delineate health patterns among different groups of elderly .

Ethical consideration

This study was approved by the Ethical Committee at Suranaree University of Technology. Informed consent was read to all participants before obtaining their permission. Participants were voluntary to participate and could withdraw from the study at any time with no immediate risks involved. Collected data was anonymous and kept confidentially by the researcher for presentation and publication use only.

Results

Study results are outlined with participant demographics, perceived health status, health patterns, psychosocial activities, and environmental issues.

The majority of participants were married, elementary school educated female with the average

age of 70.86 years who lived in their own homes. One-third of the elderly still had the productivity of earning 3,030 Baht (95 USD) per month (Table 1). There were no statistical differences of average age and weight on gender. However, the proportions of Body Mass Index (BMI) categories were statistically different on gender (Chi-square = 21.0, df = 3, $p < 0.001$) along with 3/4 of males and half of females have normal BMI (18.5 – 24). (Table 2).

Most elderly had at least one chronic illness like hypertension, joint pain and headache were the mostly reported complaint. Forty-six percent of the elderly perceived their health at moderate and/or poor condition while 17.8% had been hospitalized in the past six months (Table 3).

Table 1. Demographic data, activities of daily living (ADL), instrumental activities of daily living (IADL) and depression scores

Variables	N (%)	Min-Max	Means	SD
Age		60 – 94	70.86	7.57
Income per month (THB)(USD)		0 – 55,730 (0 – 1741.56)	3,030.27 (94.70)	5,496.90 (171.78)
ADL		10 – 30	28.98	3.23
IADL		5 – 18	16.57	2.58
Depression scores		0 – 7	1.25	1.36
Gender				
Male	118 (37.6)			
Female	196 (62.4)			
BMI				
less than 18.5	30 (9.6)			
18.5–24.9	198 (63.1)			
25.0–29.9	74 (23.6)			
30.0 or more	12 (3.8)			
Age				
60–69	57 (45.6)			
70–79	47 (37.6)			
80 or more	21 (16.8)			

Table 2. Health patterns among male and female older adults

Variables	Male	Female	Parameters	p-value
Depression scores	1.25	1.24	$t = -1.045, df = 227$	0.297
IADL scores	16.36	16.69	$t = 0.005, df = 313$	0.996
ADL scores	28.60	29.21	$t = -1.633, df = 312$	0.104
Age	70.67	70.97	$t = -345, df = 312$	0.730
Weight	57.02	55.49	$t = 1.285, df = 312$	0.200
BMI	21.97	23.50	$t = -3.478, df = 312$	0.001
BMI categories				
Less than 18.5	14	16	$Chi - square = 21.002, df = 3$	0.000
18.5–24.9	89	109		
25.0–29.9	14	60		
30 or more	1	11		

Table 3. Frequencies and percentages of health perception and health accessibility

Variables	Frequencies	Percentages
Health Perception		
Excellent	42	13.4
Good	127	40.4
Moderate	104	33.1
Poor	41	13.1
Annual health check-up	112	35.67
High blood pressure	96	30.6
Eye problems	46	14.6
Oral problems	12	3.8
Diabetes	12	3.8
Health problems that affect ADL		
None	34	10.8
At least one problem	280	89.17
Two problems	143	45.54
Three problems	82	26.11
Four problems	31	9.87
High blood pressure	125	39.8
Musculoskeletal and joints	37	11.8
Headache	16	5.1
Cardiovascular disease	12	3.8
Diabetes Mellitus	7	2.2
Hospitalization in the past six months	56	17.8
Health services of choice		
Medical facilities with physician	284	90.4
Over the counter	25	8.0
Medical facilities without physician	4	1.3
Traditional medicine	1	0.3

Table 4. Frequencies and percentages of health problems

Variables	Frequencies	Percentages
Vision Problems		
None	195	62.1
Blurred vision	92	29.3
Combination of eyes problems	15	4.8
Blind	7	2.2
Double vision	5	1.6
Hearing problems	33	10.5
Number of working teeth		
< 20	120	38.2
20 or more	194	61.8
Falls (in the past six month)		
Never	257	88.8
Fell, outside the house	26	8.3
Fell, in the bedroom	11	3.5
Fell, in the restroom/bathroom	10	3.2
Fell, in the living room	6	1.9
Fell, in the kitchen	1	0.3
One leg stand (men at least 20 seconds, female at least 10 seconds)		
Able to	202	64.3
Able to but very difficult	79	25.2
Unable to	33	10.5
Urination problems		
None	237	75.5
Urination at night (Nocturia)	35	11.1
Frequent urination (Polyuria)	19	6.1
Leaking (Incontinence)	12	3.8
Burning (Dysuria)	5	1.6
Defecation problems		
None	260	82.8
Constipation	48	15.3
Changes of defecation patterns	6	1.9

Health problems caused by organs degeneration including visual, audial, urinal, and defecation problems (Table 3) and nearly 1/5 of participants had fall experiences in the past 6 months (Table 4). Most participants had access to health facilities with a physician when needed (90.4%), only 35.6% went for annual health check-up and 8% of participants bought over-counter medications. Although breast and cervical cancer are the top two causes of death of Thai women for years, only 30–40% of elderly females received annual cancer screening for both cancers (Table 5).

Health patterns: Less than 10% of participants consumed tobacco and alcohol. Most participants (83.4%) have routine exercise of walking, running, or other physical activities. Most of them ate two or three meals a day whereas only five of them had only one meal a day (Table 6).

Psychosocial activities: The elderly perceived their mental health status as good with very low depression and high abilities of performing daily activities. However, 7% of the elderly reported not having caregiver when they got sick. Participants had opportunities to meet with their relatives and almost 1/4 of them did such meeting weekly. Almost half of them were regularly involved in decision making with families. Participants participated in various activities including health promotion, religious, and social service activities that are helpful to their mental health (Table 1).

Environmental issues: nearly 1/3 of the elderly lived in single-storey houses while 84.4% had their bedrooms at the first floor. However, environmental risks such as the bathroom needs to be modified. As results showed 1/3 of the elderly used squat toilets that might increase risks for dizziness and falls when getting up. Moreover, almost 3/4 of the elderly drank rain water and/or ground water without boiling or filtering (Table 6).

Table 5. Frequencies and percentages of health screening among female elderly

Variables	Frequencies	Percentages
Pap smear examination		
Never	117	59.69
Yes	40	40.3
Self-breast examination		
Never	136	69.39
Yes	60	30.61
Clinical breast examination		
Never	130	66.33
Yes	66	33.67

Table 6. Frequencies and percentages of health promotion behaviors

Variables	Frequencies	Percentages
Medication usage		
Yes	133	42.4
Prescribed	152	48.4
Over the counter	7	2.2
Smoking		
None	263	83.8
Use to but recently stop	23	7.3
Yes	28	8.9
Drinking alcohol		
None	266	84.7
Use to but recently stop	22	7.0
Yes	26	8.3
Exercise (thirty minutes a day, three days a week)		
None	140	44.6
Walking	13	4.1
Other physical activities	10	3.2
Running		
Number of Meals per day		
1	5	1.6
2	70	22.3
3	239	76.1
Drinking water		
Tap water	102	32.5
Underground water	6	1.9
Rain water	150	47.8
Others (bottle drinking water)	56	17.8

Discussion

The contexts of the municipal areas illustrated in this study was a combination of the urban and the rural areas. Findings on most female participants were consistent with another report (15) since female has longer longevity. Living in their own homes is congruent with the context of suburban society in Thailand where people tended to own and live in their own real states rather than renting property. Many elderly still have productivity with low incomes of around 95 USD (3,030 Thai Baht) per month compared to 426 USD/month of the GDP. On top of the social welfare (19 – 31 USD/month) the elderly receive from the government, half of the elderly perceived those incomes was sufficient or satisfied. Part of this might be attributed to the Thai government supports most of their medical expenses (19) as a welfare state benefit that covers medical expenses, room and board for hospitalization, and other costs of necessary medical equipment (20). Furthermore, relatives of the elderly or community volunteers provided transportation to health care facilities without cost (3). For people in the degenerative period of health, above support helps alleviating additional living expense on health.

All of the elderly had at least one health issue that influenced their lives. Nearly half of participants rated their overall health as moderate to poor status while 17.8% of participants had hospitalization experiences

in the past six months. Most of the elderly had access to health facilities when needed but an annual health check-up was low. However, the prevalence of smoking and drinking found in this study was lower than the evidence from a nationwide consensus (8) which was reported at 25% many elderly (83.4%) regularly exercised compared to 21% in the nationwide consensus. Generally, life in the sub-urban areas is more hostile and competitive; therefore, people may neglect taking care of their health. Moreover, in developed areas, there may be limited places to exercise. The results of health behaviors from this study are better than those reported among other urban areas (21).

Although breast and cervical cancer are the top causes of death among Thai women (22, 23) cancer screening rate remains relatively low (30 – 40%) that could be attributed to the traditional Thai culture that Thai women perceived breasts and genital organs as very personal body parts that women of all ages neither disclose their private body parts for cancer screening nor discuss about signs and symptoms. Health care personals should put cultural issues into the account of innovative screening techniques to avoid exposing the organs and embarrassment are required for launching a campaign that educate the benefits of screening, providing screening services at home, training female providers, and educate self-observation.

It is believed that municipal communities are indifferent; urban people do not socialize in a big way resulting in possible loneliness for many. However, 70.1% of the elderly in this study were participating in social and other activities to develop their mental health. Rates of participating in such activities were close to reports from the National Bureau of Statistics (8) which reported participation at 64.2%. Rates of social participation were congruent with their high ADL score as reported by Senanarong and colleagues in 2003 (24). However, the findings of the activities scores in this study were different from reports of the National Bureau of Statistics (8) where it was concluded that older adults had difficulties in moving (11.5%) working outside the house or doing chores (10.3%) with major discomforts illnesses (8.1%).

As a result of living in the sub-urban communities, it was expected that the elderly would have been depressed and had low social interaction. However, The findings of better mental health were controversial compared to other studies who reported more evidence of depression, sadness and anxiety (56%) among the older adults (24, 25), more problems with moods, concentration and memory (26) and low social participation (27). Better mental health; low depression, and high social participation are strongly correlated with high family and social supports (28). As 65% of the elderly had chances to meet relatives and involved with decision making regarding their family affairs, it might be concluded

that they were fulfilled their self – esteem and life satisfaction.

Although only 7% of the elderly reported the lacking of caregivers when they got sick, cooperation between health/trained community volunteers and local authority's administration offices providing care to those elderly is recommended that can compensate the shortage of caregivers of those elderly in those areas (29).

Although most of the elderly did not have a history of falls, study results indicated that the bathroom was the most frequent place the fall occurred. This might be related with 33% of them still used squat toilet that could easily cause joint pain, dizziness and accidents. The design of daily living environment should put the reduction of fall risk into consideration that might decrease the risk of fall along with other means for fall prevention.

Education regarding drinking water safety is strongly needed as most of the elderly drink rain or tap water without boiling or filtering since the quality of drinking water in rural Thailand was poor that often contaminated with Coliform bacteria (30). Issues regarding unsealed storage containers, contaminated handling, sharing drinking cups/glasses that cause bacterial contamination in household drinking water should also be covered (30).

Conclusion

The elderly living in the municipal areas have chronic illness and degenerative problems that have led to their risk of poor health conditions deteriorated by inappropriate health behaviors in the future. Education given to the elderly and their family are essential to enhance their health literacy of health promotion and chronic illness prevention that integrate with the strength of living in the municipal areas including accessibility to health services and strong social support that provides health personnel greater platform developing feasible health care plan and delivering equivalent health services with less disparity rooted in rural area.

Study limitations

Data in this study was collected from 14 urban-rural of one municipal district only. Generalization of the findings may be limited.

Conflicts of interest

“none”

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Authors' contribution

The author was responsible for preparing the proposal, applying for funding, submitting for ethic committee approval, collecting data, analyzing data, and writing report and manuscript as a corresponding author.

References

1. HelpAge International East Asia/Pacific Regional Office. The changing well-being of the Thai elderly: An update from the 2011 survey of older persons in Thailand [Internet]. 2013. Available from: <https://www.helpage.org/silo/files/the-changing-wellbeing-of-thai-elderly-an-update-from-the-2011-survey-of-older-persons-in-thailand.pdf>.
2. Nantsupawat W. Geriatric Nursing: Challenging of the aging society. Khon Kaen: Khon Kaen Karn Pim, Ltd. Part; 2009.
3. World Health Organization. Older population and health system: A profile of Thailand [Internet]. 2015. Available from https://www.who.int/ageing/projects/intra/phase_one/alc_intra1_cp_thailand.pdf.
4. Park NS, Jang Y, Ko JE, Chiriboga DA. Factors affecting willingness to use hospice in racially/ethnically diverse older men and women. *American Journal of Hospice and Palliative Medicine*. 2015; 33(8): 770-6.
5. Cockayne NL, Duffy SL, Bonomally R, English A, Amminger PG, Mackinnon A, et al. The beyond ageing project phase 2 – a double-blind, selective prevention, randomised, placebo-controlled trial of omega-3 fatty acids and sertraline in an older age cohort at risk for depression: study protocol for a randomized controlled trial. *Trials*. 2015; 16(247): 1-16.
6. Department of Older Person. Situation of the Thai elderly 2014 [Internet]. 2014. Available from: http://www.dop.go.th/download/knowledge/knowledge_th_20161608145327_1.pdf.
7. National Institute for Health and Care Excellence Guideline. Older people with social care needs and multiple long-term conditions [Internet]. 2015. Available from: <https://www.nice.org.uk/guidance/ng22/resources/older-people-with-social-care-needs-and-multiple-longterm-conditions-pdf-1837328537797>
8. Chayovan N, Node J. Survey on health status of the elderly in Thailand. Bangkok: The Institute of Population Studies, Chulalongkorn University; 1998.
9. Tan KK, He HG, Chan SW, Vehviläinen-Julkunen K. The experience of older people living independently in Singapore. *International Nursing Review*. 2015; 62(4): 526-35.
10. Rozanova J, Keating N, Eales J. Unequal social engagement for older adults: constraints on choice. *Canadian Journal on Aging*. 2012; 31(1): 25-36.
11. Monma T, Takeda F, Noguchi H, Tamiya N. Age and sex differences of risk factors of activity limitations in Japanese older adults. *Geriatrics & Gerontology International*. 2015; 16(6): 670-8.
12. Nakade M, Takagi D, Suzuki K, Aida J, Ojima T, Kondo K, et al. Influence of socioeconomic status on the association between body mass index and cause-specific mortality among older Japanese adults: The AGES cohort study. *Preventive Medicine*. 2015; 77: 112-8.
13. Lee Y, Zurlo KA. Spousal caregiving and financial strain among middle-aged and older adults. *International Journal of Aging & Human Development*. 2015; 79(4): 302-21.
14. Wu F, Guo Y, Chatterji S, Zheng Y, Naidoo N, Jiang Y, et al. Common risk factors for chronic non-communicable diseases among older adults in China, Ghana, Mexico, India, Russia and South Africa: the study on global AGEing and adult health (SAGE) wave 1. *BMC Public Health*. 2015; 15(88): 2-13.
15. Office for National Statistic yearbook Thailand 2019 [Internet]. 2019. Available from: <http://service.nso.go.th/nso/nsopublish/pubs/e-book/SYB-2562/files/assets/basic-html/index.html#1>
16. Laohaprasitiporn P, Jarusriwanna A, Unnanuntana A. Validity and reliability of the Thai version of the Barthel index for elderly patients with femoral neck fracture. *Journal of the Medical Association of Thailand*. 2017; 100(5): 539-48.
17. Aroonsang P, Sritanyarat W, Lertrat P, Subindee S, Surit P, Theeranut A, et al. Health profile of older persons in health care institute and in community. *Journal of Nursing and Health*. 2012; 35(2): 15-24.
18. Nilmanut S, Kuptniratsaikul V, Pekuman P, Tosayanonda O. The study of the center for epidemiologic studies-depression scale (CES-D) in Thai people in Siriraj hospital. *Journal of Rehabilitation Medicine*. 1997; 6(3): 25-29.
19. Michel J, Beattie L, Martin F, Walson J, editors. *Oxford textbook of geriatric medicine (3rd eds)*. USA: Oxford University Press; 2017.
20. Halter J, Ouslander J, Studenski S, High K, Asthana S, Supiano M, et al. *Hazzard's Geriatric Medicine and Gerontology (7th eds)*. USA: McGraw-Hill Education; 2017.
21. Sriwichien T. A study of the nutritional status and the factors relating to malnutrition status of the elderly receiving health service from pompert community medical center. *Journal of Preventive Medicine Association of Thailand*. 2016;6(2):119-30.
22. Glangkarn S, Promasatayaprot V, Porock D, Edgley A. Measuring quality of life in Thai women

- with breast cancer. *Asian Pacific Journal of Cancer Prevention*. 2011; 12(3): 637-44.
23. Mukem S, Sriplung H, McNeil E, Tangcharoensathien V. Breast cancer screening among women in Thailand: analyses of population-based household surveys. *Journal of Medical Association of Thailand*. 2014; 97(11): 1106-18.
24. Senanarong V, Harnphadungkit K, Prayoonwiwat N, Pongvarin N, Sivasariyanonds N, Printarakul T, et al. A new measurement of activities of daily living for Thai elderly with dementia. *International Psychogeriatrics*. 2003; 15(2): 135-48.
25. Shim YS, Yang DW, Kim HJ, Park Y, Kim SY. Characteristic differences in the mini-mental state examination used in Asian countries. *BMC Neurology*. 2017; 17: 1-9
26. Birrer RB, Vemuri SP. Depression in later life: A diagnostic and therapeutic challenge. *American Family Physician*. 2004; 69(10): 2375-82.
27. Burke WJ, Wengel SP. Late-life mood disorders. *Clinics in Geriatric Medicine*. 2003; 19(4), 777-97.
28. Thanakwang K. Family support, anticipated support, negative interaction, and psychological well-being of older parents in Thailand. *Psychogeriatrics*. 2015; 15(3): 171-8.
29. Eamsamai S, Mhuansit R, Thongmag C. An elderly care model among caregiving volunteers at Phukrang Municipality, Amphur Praputthabat, Saraburi Province. *Nursing Journal of the Ministry of Public Health*. 2013; 22(3): 77-87.
30. Sangsithisawat W, Pitaksanurat S. Contamination of Coliform bacteria in rural households' drinking water. *Khon Kaen University Research Journal of Humanities and Social Sciences*. 2011; 16(8): 1025-35.