

Hypertension in Elder Person VS Nutritional Literacy

Rungnapa Pongkiatchai* & Sresuda Wongwisetkul

Faculty of Nursing, Suan Dusit University, Thailand 10300

Abstract

Hypertension is a highly prevalent condition with numerous health risks, and the incidence of hypertension is greatest among elderly. There are a number of collateral effects, including risks for dementia, physical disability, cardiovascular, and diabetes. The multi-dimensional risks of hypertension among elderly have been found to be associated with smoking, obesity, sedentary lifestyle and lack of physical activity. However, the one of determined factors of hypertension is food consumption. Consumption knowledge could help the elderly in the community. This process exposed to the various information. It also influenced to the information of decision making to increasing the behavior changing and lifestyles appropriately. Only the nutrition knowledge cannot influence the development skill of the right consuming decision. Nutrition literacy intervention is composed of the providing health information in order to achieve the knowledge and how to make the decision making correctly. Furthermore it leads to the organizing activities to develop the critical thinking skills and brings to appropriate consumption decision in elderly group. The aims of this article were to propose the nutrition literacy and the adaptation from Nutbeam and Sorensen model which related to the integrated management into practice in elderly people, which are adaptable to diverse elderly with difference level of knowledge, ability, cognitive skills, memory and culture, with high hypertension. It is very necessary for nurses and health professionals to consider the activities for elderly people.

Keywords: Nutrition Literacy, Elderly, Hypertension, Community

Introduction

In 2030 or the next ten years, Thailand will be heading toward the full-fledged aging society. It can be stated that the portion of the population which the age is over 60 years old will be 26.3 percent (Ministry of Social Development and Human Security, 2014) and tend to be full-fledged aging society by 2040 (Foundation for Older Persons' Development, 2018). The increasing number of elderly has been impacting on the change of health system due to the amount of elderly. As a result, it will cause the prevalence of chronic diseases which the body deterioration is a major causal factor. Consequently, there are several movements of social and health services in all dimensions and the elderly are focused as an important target group.

When the people enter to elderly age, there are various changes in both their physical and mental conditions. The physical changes as mentioned can reduce self-care ability and need more assistance from family in term of economics, society, and daily life activities. Elderly care divided

* Corresponding Author
e-mail: rung_10@yahoo.com

in three levels. The first level is for the elderly who are healthy, self-care and be able to participate in the social activities. They have probably chronic disease but be able to self-control the severity of disease. The second level is to take care of the elderly who are risky to have severe disease from chronic diseases or complications. The third level is to take care of the complex illness elderly who need special care from multidisciplinary team. Some of these elderly people ridden the bed. They need help in their daily activities and follow the health up continuously (Jitramontree, 2011). It shows that the needs for taking care of elderly are different subject to health conditions. Healthy elderly and risk group could participate in outdoor activities and also in the community because there is no physical limitation. In addition, these groups can be assisted and cared by community more than the complex illness elderly. With regard to caring activities related to health conditions, the health promotion, surveillance of risks to violence or complications of diseases, and self-management are emphasized in order to have a good quality of life in accordance with their health conditions.

The results from the 5th health survey of Thai people by physical examination (NHES V) found that the elderly had significant health problems as follows: hypertension (53.2%), diabetes (18.1%), depression (34%), and osteoarthritis (22.5%). These diseases are determined by the consumption behavior (Aekplakorn, 2014). In addition, the consumption behavior also affects health conditions even in those who are not sick. It will cause a change in the biological indicator (biomarker) showing that a person is possibly risky of the mentioned diseases by indicating values such as blood sugar level, blood lipid level, blood pressure, and so on.

Consumption has affected to health condition of elderly in daily life and also chronic diseases. In the same way, if there is an action to adjust the consumption behavior, it is a good way to manage the self-care of the elderly. According to the 4th survey of food consumption among Thai people by Health systems research Institute (Health Systems Research Institute, 2011). It found that the food that the elderly regularly consumed white rice, sticky rice, brown rice, coarse rice, bread, sweet fruits, various types of fish, fermented fish, Budu sauce, and chili paste. The consumption of certain foods of the elderly is higher than recommended for daily consumption such as sodium. On the other hand, the consumption of potassium, vegetables and fruits is lower than the recommended amount of consumption according to the nutrition flag and recommendations of the World Health Organization. The nutrients, which were mentioned above, affected the health condition of healthy, risk and also complicated chronic diseases groups. In the report also found that the prevalence of physical activity of the elderly is insufficient. The adequacy, regularity, and consistency of physical activity affect health condition. It can reduce the incidence of morbidity and chronic diseases such as cardiovascular disease, diabetes, obesity, and cancer (World Health Organization, 2002). The survey also found that the prevalence of smoking related to age especially in females. The consumption and physical activities were the important factors of chronic diseases in elderly (Leethongin, 2007).

At present, both public and private sectors involved in the elderly issue have become more aware of the situation in which chronic diseases have a higher prevalence from elderly society. It can be seen from the practices of those sectors that organize activities for the elderly. Meanwhile,

some elderly are interested in taking care of their own health in order to be safe from chronic diseases or complications that may be caused by chronic diseases. This group of elderly people pay attention to the health care information both regular or at risk. The health care information is a factor which relates to behavioral decision making of elderly and how to reach the source of information.

With the advances in telecommunications technology, there are more opportunities for elderly to access information in several of channels and real time. In addition, in the era of Thailand 4.0, are the online shopping via telephone, fast shipping and also the health information. Among many sources of health information, the elderly will not be able to decide on the use of overflow information and health care services if they do not have sufficient health knowledge. Such inappropriate decisions may lead to behaviors that do not promote good health. Especially in the elderly who have the chronic disease. They will have risk and also complications. Particularly, elderly who have high blood pressure which will be discussed later in this article. It can be stated that if the elderly with their chronic diseases have proper self-management with nutrition literacy under the floods of various sources of information and communication channels, it will inevitably bring good quality of life according to their health condition. Moreover, the development of health literacy and self-management behaviors are caused to each other consistently (Norris et al., 2002; Kim et al., 2004; Chodosh et al., 2005; Chao et al., 2013; Wongwisukul & Chinnapan, 2014).

Nutbeam (2010) stated that the results of providing knowledge and information should help the people have ability to make decisions for self-practice or behavioral adjustment. In other words, it is called 'health literacy'. When adopting the concept of Nutbeam (2010) combined with the situation of hypertension of the elderly, it reflects that only recognizing nutrition information may not be enough to change or adjust the behavior and way of life of individuals or the elderly in concrete ways. The development of individuals, families and society with health literacy and wisdom will engender sustainability in a better health care management. Besides, it can create changes on the society. It can be said that establishing nutrition literacy is a way to delay or cut of the first chain of the above chronic diseases. According to Wongwisukul & Chinnapan (2014), it was found that elderly will have knowledge about food consumption that is related to the high blood pressure. However, when the elderly make decision on selecting food, some elderly will get excessive salt. They understand that there is no sodium in sweet foods. It shows that acquiring knowledge and information is not yet detailed and deep enough which can lead to appropriate decision for health conditions.

Nutrition Literacy

In the past ten years, scholars have been paying more attention in health literacy. There were many academic conferences and researches that mentioned about health literacy. Meanwhile, based on analyzing in detail, it was found that nutrition literacy is only a narrow scope. If viewed in terms of health and nutrition literacy, they are similar. Only one different point is the use of nutrition-specific information for decision making.

The definition of Nutrition Literacy

Nutrition literacy means the degree to which individuals have the capacities to receive, process, understand nutrition information and necessary skills to make decisions on nutrition properly. (Silk et al., 2008; Carbone & Gibbs, (2013

Zoellner et al (2009) stated that the level of ability to receive, to process, and to understand the basic nutrition information together with the nutrition literacy is important for those in the fields of education, health systems and those being completely different in terms of nutrition, consuming behaviors and meal patterns.

Vidgen & Gallegos (2011) stated that to receive, to interpret and to understand the nutritional information and services depends on individual competence. And, this also refers to the ability to apply the information and services as the mean of health promotion.

Guttersrud et al (2013) mentioned that the nutrition literacy is the ability to analyze critically the nutrition information along with to raise the awareness on practices towards healthy dieting behavior.

Velardo (2015) propose that the basic level of nutrition literacy should include the ability to receive the facts about food and to understand the factors that promote or hinder the ways of healthier body

Krause et al. (2016) summarized the definition of nutrition literacy as the ability of information receiving, the emphasis of basic literacy and numeracy skills, logical thinking ability and the ability to apply various concepts in the form of mathematics which is necessary for understanding and the application of nutrition information.

Monique (2018) defined the nutrition literacy as the essential ability to understand the importance of healthy nutrition on people's health-caring behaviors.

In summary, nutrition literacy means skills and the level of the individual's ability for receiving, managing, understanding, accessing, and exchanging the basic nutrition information such as nutrition flags, food based dietary guideline for Thai, nutrition fact labels, etc. as well as necessary services including nutrition counseling, nutrition news, etc. It is for decision making in order to promote health properly and the ability of a person to analyze information critically. Furthermore, it can be applied to adjust the consumption behavior. Additionally, it is an important part for empowerment in the level of individuals, families and communities. Consequently, it makes change for better health condition. Aihara & Minai (2011) claimed that nutrition literacy is an integration between food consumption knowledge and healthy consumption behavior.

The Development of Nutrition Literacy

The nutrition literacy can be categorized as one of the health literacy according to the above-stated definitions. According to Nutbeam (2015) on the development of nutrition literacy, he stated that the enhancement of nutrition literacy can be evaluated from the evolution of knowledge and skills supporting the decision-making of people on their healthier behavior adjustment. Moreover, the aforesaid knowledge and skills were improved through receiving the formal health information being consistent to the health status, needs, and individual contexts

and media forms—consisting of different degrees of information. And, among these differences, it can lead to the different results of health literacy development. In fact, the vital part that should be evaluated is the knowledge and skills (both before and after obtaining the health information) and the content on health issues should be one of the major influences on the self-managing on the overall body health as well as to raise the awareness of people's health behaviors. Eventually, the individuals should act as the health models and transfer the knowledge and skills to others. Thus, another important factor for the health literacy development is the effective communication since the deficiency of this skill can cause the wrong or mistaken messages between senders and receivers. It can be said that the implementation of policy should be achieved in tandem with the development of populations' education. Furthermore, the value added of the multidimensional development will be affecting the disease prevention and the proper self-care management of patients (Nutbeam, 2015).

Santo et al (2005) conducted the meta-study on the development of the health literacy and they come up with the following conclusions: 1) the first priority to be promoted is the health education followed by the practical sessions for both group and individual sessions so as to enhance the decision-making skills on healthy behaviors and the proper self-management. Additionally, the activities advocating the development of health literacy included: the periodic stimulation, the good relations between constructing and receiving messages, the promotion of self-learning (Lee et al., 2012). Moreover, it can be said that the development of health literacy is closely run with a wide range of factors. Bodur et al. (2017), Aihara & Minai (2011) investigated these aforesaid factors and they come up with the conclusions as follows:

1. Individual factor such as the ability to understand health messages, health knowledge, culture and the belief on health and the individual experiences.
2. The public health service system including the communication on health issues in several sectors, knowledge and skills of the officers on conveying the health information and the information access services.
3. Communication factor refers to the senders' communication skills conveying the code and the recode, the communication methods such as reading, writing, cognitive skill, speaking and meaning transfer.
4. The access of nutrition information which is achieved through the main media such as television programs, books and publication. As for era of Thailand 4.0, it seems that the online social media has a huge influence on the health information access among elderly (Sap-in & Khaoroptham, 2017).

Those mentioned factors should be scrutinized so as to design the activities or to develop the successful programs of health literacy promotion.

The Hypertension in elderly and Nutritional literacy

It can be said that hypertension is globally seen as the important and challenging health problems since its high prevalence rate resulting in chronic diseases such as heart disease and kidney disease (Lawes et al., 2008). According to the report by the World Health Organization

(WHO), it has revealed that the worldwide prevalence rate of hypertension of people aged from 25 years old is 47 percent and it is the cause of death and disability (world health organization, 2018). In Thailand, the 5th health survey of Thai people by physical examination (NHES V) resulted that the prevalence rate of hypertension in the elderly was 53.2 percent (Aekplakorn, 2014). Therefore, the lifestyle adjustment seems to be the effective way for elderly to treat and to control the level of hypertension. Acelajado (2010) stated that lifestyle adjustment by reducing sodium consumption, losing weight, doing more exercising and avoiding drinking is one of the effective ways for tackle the serious problems from hypertension.

As stated by the World Health Organization regarding the relations between nutrition and hypertension, it can be said that reducing sodium, avoiding the food with high energy and reducing saturated fat as well as exercising can help prevent the risks of disease development and the level of high blood pressure. By doing this, it can decrease the levels of disease complication and death (World Health Organization, 2013).

The pathways for preventing hypertension in the elderly can be achieve through the effective nutrition consumption included the DASH* (Dietary Approaches to Stop Hypertension) diet, the decrease of sodium level in food (e.g. less than 2300 mg per day) and the alcohol reduction (Thai Hypertension Society, 2018). In addition, the Thai Hypertension Society (2018), Acelajado (2010) and Mayo Clinic (2018) similarly pointed out that the DASH diet promoted the absorb of potassium, magnesium and calcium in the proper level helping the human body reduce or stabilize the normal high blood pressure levels. Moreover, this could be more effective than directly eating such minerals or supplementary food and this will be very important to the elderly, especially the ones with kidney disease.

According to the situation of the Thai people's literacy, it showed that most of them are well-educated and possess the abilities to read, to write and computational skills. However, to the health literacy, it has revealed that only half of Thais still lack understanding health information about exercise, food, emotion, smoking or drinking (Health Education Division, 2016). The health literacy is related to the self-management on health status and non-chronic communicable diseases of the elderly. Also, since the nutrition is a fundamental factor in preventing and controlling various diseases, having low nutrition literacy may contribute to the prevalence of chronic diseases (Geboer et al., 2016). The empirical evidence about knowledge on Thais' consumption behaviors and the use of nutrition labels has revealed that the majority of people hardly access the information such as reading nutrition labels. Moreover, the purchase decision is not made from the awareness of nutrition values but other reasons including: affordable prices, convenient buying, taste, individual preference and limitation of time. Based on the aforementioned data, it can be concluded that Thais still have insufficient nutrition and health

* DASH diet focuses on 5 portions of vegetable foods consuming per day * (1 portion of vegetables equals 2 ladles of raw vegetables or 1 ladle [1/2 cup] of cooked vegetable) 4 portions of fruits per day (1 portion has the same amount of fruit slices, about 6-8 pieces or 1 medium size fruit or 2-4 small size fruits or the amount of fruit fitly placed on one coffee plate) low-fat milk and low fat dairy products 2-3 portions per day (1 box / 1 portion or 1 cup yoghurt / 1 portion) 7 portions of cereal per day (consuming brown rice instead of 1 portion of white rice or 1 Ladle). For the meat, only fish is recommend (Working group on food-based dietary guidelines for Thai people,2001)

literacy and this literacy is one factor causing different dietary habits among people (Silk et al., 2008).

Nutbeam (2000) divided the level of health literacy into three main levels and the concept of Sorensen et al (2012) concerning the steps of public health and health literacy started from 1) Access, 2) Understand, 3) Appraise and 4) Apply. Moreover, the nutrition literacy and hypertension management of elderly can be the integrated concepts and practices which can bring about the following results:

Level 1: Functional Nutrition Literacy included basic skills (e.g. reading, listening, speaking and writing) which are essential to access and to understand the health information in order to adjust such behaviors as 1) reading nutrition labels, 2) understanding the knowledge of salt consumption in relation to hypertension, 3) understanding the amount of salt that should be consumed and 4) the DASH diet.

Level 2: Interactive Nutrition Literacy consisted of basic and cognitive skills as well as social skills. This level promotes the evaluative skills and the knowledge implementation of people on behavior adjustment such as the use of nutrition labels in purchase decision making, the use of nutrition flags as an exchange food, Thai food requirements for the proper amount of salt consumption or the information from the Hypertension Association of Thailand as well as the ability to select DASH diet.

Level 3: Critical Nutrition Literacy included developing intellectual and social skills which can promote the ability to apply, to interpret data and to implement the proper information regarding high blood pressure control as well as to prevent the disease complications. These can be considered as the practical models, knowledge transfer and guidelines for people and the community. Furthermore, the examples of the above-stated knowledge and practices can be presented as follows: 1) the interpretation of nutrition label and the proper amount of nutrients. 2) the ability to analyze and to compare the information for purchase decision making, 3) the ability to assess the nutritional values and benefits of DASH food as being applied to Thai food and 4) the ability to interpret the meaning of nutrition flags as the exchanged food in disease control and etc.

For the development of health literacy through the community base, the researcher would like to propose some examples from the study by Wongwisukul & Chinnapun (2014) on the program of health literacy development by integrating educational and informational group activities and arousing the motivation through concept matching with the attempt to reduce the excessive salt consumption of elderly with hypertension in the community.

There are 30 elderly participating eight activities in the program and the activities included the knowledge and information promotion through group processes and enhancement of motivation through peer activities. Furthermore, the program takes totally 12 weeks and the additional activities to establish group relationships are held with the implementation of pre and post assessments. The results of the program were evaluated through the test of self-caring knowledge in case of suffering from hypertension and the food management by reducing salt. The questionnaires were employed in this study regarding the benefits perception and obstacles from reducing salt consumption, the ability of self-control and food consumption behaviors. At

the end of the program, it has revealed that the average scores of the elderly—regarding the literacy, benefits perception and obstacles from reducing salt consumption in food, the ability of self-control and food consumption behaviors—were significantly different comparing to their scores before joining the program. The results of the research reflected that in order to develop the health literacy, there should be the integration of activities enhancing decision making skills leading to the appropriate decision-making skills (Nutbeam 2000; Sorensen et al., 2012)

Conclusion

The managing of hypertension in elderly seems to be the vital part of society, especially in the community since the living space has a huge influence on elderly's life styles. It can go without saying that the elderly with good nutrition literacy come up with the proper decision making on their nutrition consumption as well as the behavior adjustment—being consistent to their health status leading to the better and healthier body and community. Besides, factors affecting the nutrition literacy of elderly are: educational levels, cognitive skills, memorization and these are the important things to be focused, especially for nurses and public health officers as the pathway for health literacy activity development. And, this development should be further broadened to disease prevention and health promotions among networking elderly care sectors and health care services in community.

References

- Acelajado, M.C. (2010). Optimal management of hypertension in elderly patients. *Integrated Blood Pressure Control*, 3, 145–153.
- Aekplakorn, V. (Ed.). (2014). *Thai national health examination survey, NHES V 2014*. Retrieved November, 20, 2018, from <http://thaitgri.org/?p=37869>
- Aihara, Y., & Minai, J. (2011). Barriers and catalysts of nutrition literacy among elderly Japanese People. *Health Promotion International*, 26(4), 421-431.
- Bodur, A.S., Filiz, E., & Kalkan, I. (2017). Factors affecting health literacy in adults: A community based study in Konya, Turkey. *International Journal of Caring Sciences*, 10(1), 100-109.
- Carbone, E.T., & Gibbs, H.D. (2013). Measuring Nutrition Literacy: Problems and Potential Solutions. *Journal Nutrition Disorders Therapy*, 3:e105, doi:10.4172/2161-0509.1000e105.
- Chao, J., Xie, W., Yang, Y., Liu, H., Jiang, L., & Liu, P. (2013). The effect of integrated health management model on the satisfaction among Chinese elderly. *Archives of Gerontology and Geriatrics*, 5, 27-31.
- Chodosh, J., Morton, S.C., Mojica, W., Maglione, M., Suttrop, M.J., Hilton, L., . . . Shekelle, P. (2005). Meta-analysis: Chronic disease self-management programme for older adults. *Annual of Internal Medicine*, 143 (6), 427-439.
- Foundation for Older Persons' Development. (2018). Aged society. Retrieved November, 10, 2018, from <https://fopdev.or.th/สังคมผู้สูงอายุโดยสมบูรณ์>
- Geboers, B., De Winter, A.F., Spoorenberg, S.L.W., Klaske Wynia, K., & Reijneveld, S.A. (2016). The association between health literacy and self-management abilities in adults aged 75 and older, and its moderators *Quality of Life Research*, 25(11), 2869-2877.

- <https://doi.org/10.1007/s11136-016-1298-2>.
- Guttersrud, Ø., Dalane, J. Ø., & Pettersen, S. (2013). Improving measurement in nutrition literacy research using Rasch modelling: examining construct validity of stage-specific 'critical nutrition literacy' scales. *Public Health Nutrition*, 17 (4), 887-883.
<https://doi.org/10.1017/S1368980013000530>.
- Health Education Division. (2017). *Report of the health literacy assessment and health behavior among working aged (15-59 years)*. Retrieved November, 10, 2018 from <http://www.hed.go.th/linkHed/321>
- Health Systems Research Institute. (2011). *Report of the food consumption survey of Thai people :Thai National Health Examination Survey, NHES IV 2008-2009*. Nonthaburee: Thai Health Survey Office.
- Jitramontree, N. (2011). Aging population: Trend and elderly care issues. In Thongcharoen, V. (Ed), *Science and arts in Gerontological nursing* (pp 1-15). Bangkok.
- Kim, S., Love, F., Quistberg, D.A., & Shea, J.A. (2004). Association of health literacy with self-management behavior in patients with diabetes. *Diabetes Care*, 27(12), 2980-2983.
- Krause, C., Sommerhalder, K., Beer-Borst, S., & Abel, T. (2016). Just a subtle difference? Findings from a systematic review on definitions of nutrition literacy and food literacy. *Health Promotion International*, 33, 378-389.
- Lawes, C.M., Vander Hoorn, S., & Rodgers, A. (2008). Global burden of blood-pressure-related disease, 2001. *Lancet*, 371, 1513-1518. doi:10.1016/S0140-6736(08)60655-8.
- Lee, T.W., Heui, S., Kim, H.H., & Kang, S.J. (2012). Effective intervention strategies to improve health outcomes for cardiovascular disease patients with low health literacy skills: A systematic review. *Asian Nursing research*, 6(4), 128-136. <https://doi.org/10.1016/j.anr.2012.09.001>
- Leethongin, S. (Ed.). (2007). *Global strategies on food, exercise and health*. Bangkok: The War Veterans Organization of Thailand.
- Mayo Clinic. (2018). *DASH diet: Healthy eating to lower your blood pressure*. Retrieved November, 20, 2018, from <https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/dash-diet/art-20048456>.
- Ministry of Social Development and Human Security. (2014). *Thai elder population: present and future*. Retrieved November, 12, 2018, from http://www.dop.go.th/download/knowledge/knowledge_th_20160106135752_1.pdf.
- Monique, L. (2018). *Nutrition Literacy*. Retrieved November, 9, 2018, from <https://www.diet.com/g/nutrition-literacy?get=nutrition-literacy>.
- Norris, S.L., Lau, J., Smith, S.J., Schmid, C.H., & Engelgau, M.M. (2002). Self management education for adults with type 2 diabetes: a meta analysis of the effect on glycemic control. *Diabetes Care*, 25(7), 1159-1171.
- Nutbeam, D. (2000). Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*, 15(3), 259-267.
- Nutbeam, D. (2010). *The evolving concept of health literacy*. Retrieved November, 30, 2018, from <https://pdfs.semanticscholar.org/8b0c/09f5076e7193ee538de5bc2b49386b9679cb.pdf>.
- Nutbeam, D. (2015). Defining, measuring and improving health literacy. *HEP*, 42(4), 450-455.

- Santo, A., Laizner, A.M., & Shohet, L. (2005). Exploring the value of audiotapes for health literacy: a systematic review. *Patient Education and Counseling*, 58(3), 235-243.
- Sap-in, R., & Khaoroptham, Y. (2017). The elderly and Media in Thailand. *Dhurakij Pundit Communication Arts Journal*, 11(2), 367-387.
- Silk, K.J., Sherry, J., Winn, B., Keesecker, N., Horodynski, M.A., & Sayir, A. (2008). Increasing nutrition literacy: testing the effectiveness of print, web site, and game modalities. *Journal of Nutrition Education Behavior*, 40, 3-10.
- Sorensen, K., Van den Broucke, S., Fullam, J., Doyle, G., Pelikan, J., Slonska, Z., & Brand, H. (2012). Health literacy and public health: A systematic review and integration of definitions and models. *BMC Public Health*, 12(80), 1-13. <https://doi.org/10.1186/1471-2458-12-80>.
- Thai Hypertension Society. (2018). *Thai guideline on the treatment of hypertension*. Retrieved November, 20, 2018, from <http://www.thaihypertension.org>
- Velardo, S. (2015). The Nuances of health literacy, nutrition literacy, and food literacy. *Journal of Nutrition Education Behavior*, 47, 385-389.
- Vidgen, H., & Gallegos, D. (2011). *What is food literacy and does it influence what we eat: A study of Australian food experts*. Brisbane, Australia: Queensland University of Technology.
- Wongwisetku, S., & Chinnapan, W. (2014). Program of health education through group learning and 'buddy' support on reducing excessive salt consumption among the aging with hypertension. Proceedings of the 1st International Nursing Conference (INC 2014) Nursing Innovation: A Key To Promote The Humanized Health In ASEAN Economic Community (AEC) Era. Ho Chi Minh City, Vietnam.
- Working group on food-based dietary guidelines for Thai people. (2001). *Nutrition flag healthy eating for Thai*. Nutrition Division, Department of Health, Ministry of Public Health.
- World Health Organization. (2013). *Diet, nutrition and hypertension*. Retrieved November, 13, 2018, from <http://www.emro.who.int/world-health-days/2013/nutrition-hypertension-factsheet-whd-2013.html>
- World Health Organization. (2018). *Global health observation*. Retrieved November, 13, 2018, from http://www.who.int/gho/ncd/risk_factors/blood_pressure_prevalence_text/en.
- World Health Organization. (2018). *The world health report 2002 - Reducing Risks, Promoting Healthy Life*. Retrieved November, 13, 2018, from <https://www.who.int/whr/2002/en/>.
- Zoellner, J., Connell, C., Bounds, W., Crook, L., & Yadrick, K. (2009). Nutrition literacy status and preferred nutrition communication channels among adults in the Lower Mississippi Delta. *Preventing Chronic Disease*, 6(4), 1-11.

Received 30 November 2018

Revised 19 December 2018

Accepted 21 December 2018

Pongkiatchai & Wongwisetkul