



**THE DEVELOPMENT OF A FAMILY AND COMMUNITY
BASED CARE MODEL FOR SARCOPENIC OBESITY
IN OLDER ADULTS**

**BY
NUCHTHIDA SAMAISONG**

**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF THE
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FACULTY OF NURSING
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ABSTRACT

Sarcopenic obesity is considered one of the health challenges, arising from the aging process and health behaviors that are commonly found in the elderly. It has implications for overall health, including physical, mental, emotional, and social aspects, as well as the quality of life for the elderly and caregivers. Health literacy promoting about sarcopenic obesity and encouraging behavior modification is crucial for the recovery of their health and the prevention of complications. Developing suitable models for this purpose is highly recommended.

This study applied participatory action research to develop a family and community-based care model for sarcopenic obesity in older adults. The study was conducted in Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province, Thailand, from March to August 2023. The study was divided into 2 phases, phase 1 explored the perception of sarcopenic obesity, synthesized the factors related to sarcopenic obesity, effects of sarcopenic obesity on the health status, and care needed for sarcopenic obesity, and clarified the necessary and environmental resources for managing sarcopenic obesity in older adults. In this phase, 25 older adults with sarcopenic obesity were included for in-depth interviews and focus group interviews with a total of 15 participants with all stakeholders. The data obtained was used as a basis for creating the preliminary of a care-model in the subsequent phase. Phase 2

consisted of participatory action research aimed to developing a family and community-based care model for sarcopenic obesity in older adults with 4 cycles during a period of 16 weeks. In this phase, there were 15 older adults with sarcopenic obesity.

In Phase 1, the findings consisted of 5 main categories consisted of: 1) Lack of sarcopenic obesity awareness; 2) Wellness literacy deficiency; 3) Behavior leading to poor health outcome; 4) Family and community encouraging unhealthy behavior; and 5) Achieving goals in life. The finding from Phase 1 were applied to developed preliminary care model for the PAR process in Phase 2. The action research spiral in each cycle included planning, acting, observing, and reflecting that participant participated in all steps. The cycle of change was created to explain the mechanism of sarcopenic obesity literacy facilitate and behavior transformation process of continuous dynamic change among older adults until set goals were reached. The cycle of change created healthy sarcopenic obesity begins with facilitated sarcopenic obesity literacy, enrichment in healthy behavior, cultivated behavior transformation, and dynamic behavior change process. Finally, the output was healthy sarcopenic obesity, with four main components: 1) Health awareness and sarcopenic obesity literacy; 2) Sarcopenic obesity modified lifestyle; 3) Beyond activities of daily living; and 4) Blissful life.

A family and community-based care model for sarcopenic obesity in older adults from this study describes the approach used in implementing a participatory action research method for behavior transformation in older adults. Health awareness and sarcopenic obesity literacy were the important issues for behavior change. In this study's behavior change process, transformative learning is employed, facilitating individual internal changes. This approach helps individuals understand interconnected factors through personal experiences, leading to a profound understanding and readiness to listen, deeply transform, and sustain continuous and meaningful behavioral changes.

Keywords: Care model, Sarcopenic obesity, Older adults, Participatory action research, Transformative behavior

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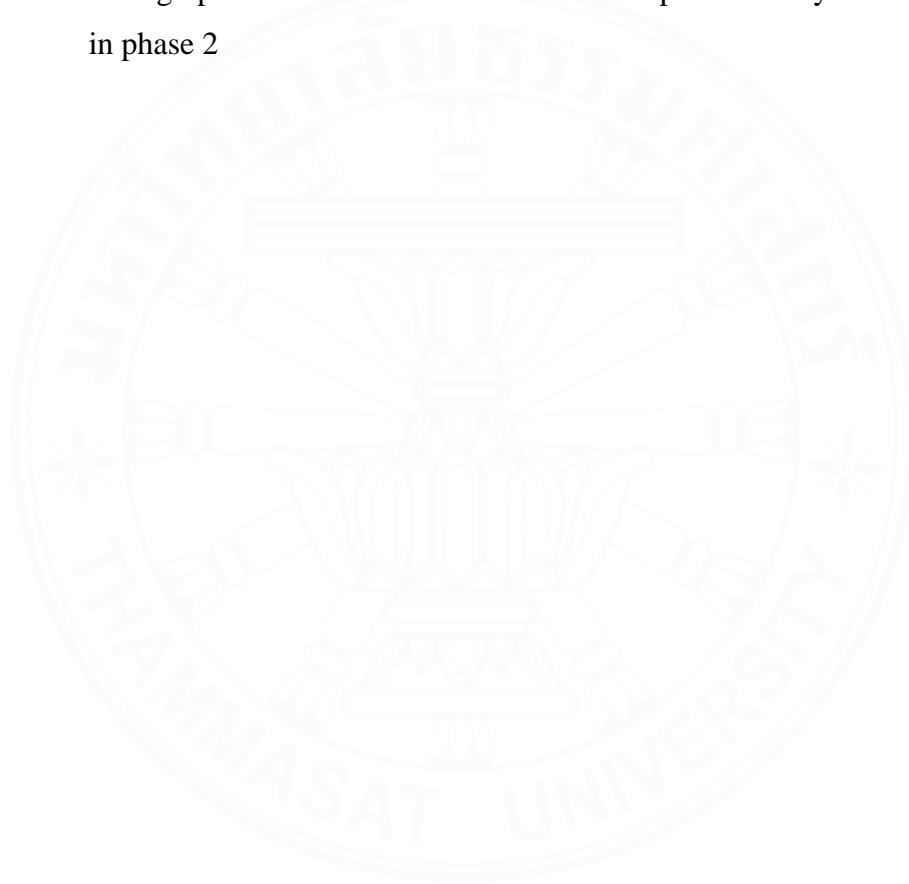
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LIST OF ABBREVIATIONS

Symbols/Abbreviations	Terms
ADL	Activities of Daily Living
AR	Action Research
ASM	Appendicular Skeletal Muscle Mass
ASMI	Appendicular Skeletal Muscle Mass Index
AT	Aerobic Training
AWGS	Asian Working Group for Sarcopenia
%BF	Percentage of Body Fat
BFM	Body Fat Mass
BIA	Bioelectrical Impedance Analysis
BMI	Body Mass Index
CT	Combination Training
CVD	Cardiovascular Disease
DXA	Dual Energy X-ray Absorptiometry
EWGSOP	The European Working Group on Sarcopenia in Older Adults
FNIHSP	The Foundation for the National Institutes of Health Sarcopenia Project
IWGS	International Working Group on Sarcopenia
MOC	Model of Care
MRI	Magnetic Resonance Imaging
PAR	Participatory Action Research
QoL	Quality of Life
RT	Resistance Training
SDGs	Sustainable Development Goals
SMI	Skeletal Muscle Index
SMM	Skeletal Muscle Mass
SMMp	Skeletal Muscle Mass Percentage
SO	Sarcopenic Obesity

SPPB	Short Physical Performance Battery
TMSE	Thai Mental State Examination
VHV	Village Health Volunteer
WC	Waist Circumference
WHO	World Health Organization



CHAPTER 1

INTRODUCTION

1.1 Background and significant

The remarkable improvements in disease prevention and control in conjunction with advancements in health technology, improved economic and social development, the means to control diseases and injuries, and the decline in early deaths have caused the world population's average lifespan to increase rapidly (World Health Organization [WHO], 2020). The world's populations aged 60 years and over continue growth in both size and proportion. According to a 1986 world population report, the number of older persons aged 60 years and older was estimated to be 435 million with a rise to 929 million in 2016. However, a more recent report in 2017, predicts that by 2050, it is the elderly population will number around 1.5 billion (United Nations [UN], 2017). Asia has the highest proportion of the world's elderly population. There are 586 million Asians aged 60 years and older, or 58% of the global population (WHO, 2021a).

In Thailand the proportion of the older population will increase at an alarming rate. In 1960, Thailand had 1 million older people aged 60 years or over, or 4%. By 2005, Thailand had become an aged society where the population aged 60 years or older was over 6 million, or 10% of the total population. In 2016, 11 million or 16.5% of the total population were ages 60 years or older (Foundation of Thai Gerontology Research and Development Institute [TGRI], 2019). In 2021, Thailand became a complete aged society, defined as when 20% of the population is aged 60 years or over. By 2031, Thailand is expected to become a super aging society with more than 28% of the population being elderly (National Statistical Office, 2017). Changes in age structure result in changes in dependency ratios of age groups. Older persons are generally characterized by deteriorating and increasing physical problems and many are impacted by multiple and chronic diseases (Amarya et al., 2018).

The aging process is an inevitable change in the deterioration of the cellular system that is complicated by multifactorial processes. The physiological and biological changes which occur in all body systems include slow progressive degeneration that affects bodily functions, including the musculoskeletal system (Cole

et al., 2019). The reduction of muscle and bone mass with higher body fat mass (BFM) are concomitant of normal aging (Valdez, 2019). Muscle changes, including reduced muscle mass in combination with muscle strength or physical performance, is a geriatric syndrome characterized by sarcopenia (Wiedmer et al., 2021).

Functional sarcopenia is a process of changes in the musculoskeletal systems of older adults. The rate of deterioration or decrease in muscle mass increases with age. Under normal conditions, muscle strength decreases by 1.5% each year, and the acceleration in muscle strength increases sharply to 3% annually after age 60 years of age (Alajlouni et al., 2020). Females lose muscle mass at a rate of 0.64–0.70% per year and males at a rate of 0.8–0.98% per year. Males lose muscle strength at a rate of 3–4% per year and females at a rate of 2.5–3% per year (Mitchell et al., 2012). In addition, increased body weight and/or body fat mass are common issues that occur in aging.

Elderly obesity is a pathophysiological complex that is attributable to many factors and conditions. Cumulative long-term excessive energy intake and inadequate energy expenditure result in accumulated body fat and increasing body weight that may be influenced by a sedentary lifestyle, low physical activity, inappropriate eating behavior, and genetic factors (Kim, 2018). An increase in body fat and a decrease in muscle mass or strength may coexist in the same person due to age-related changes in body composition. The co-existence of aging changes including increased obesity and sarcopenia is called *sarcopenic obesity*.

Sarcopenic obesity (SO) is a simultaneous occurrence of sarcopenia and obesity. These two diseases often emerge together. The reason for their co-existence is that both share common causes. Sarcopenic obesity (SO) exhibits a complex etiopathogenesis linked to factors such as aging, sedentary lifestyle, unhealthy dietary patterns, and various variables including insulin resistance, systemic inflammation, and oxidative stress. All of this leads to a decline in muscle mass and strength on quantity and quality levels, as well as an increase in fat mass (Polyzos & Margioris, 2018). Sarcopenia and obesity are typically affected by a gradual decline in physical activity and protein intake as people age. This would result in decreased energy expenditure and increased insulin resistance resulting in a series of adipose tissue modifications. More specifically, the size and number of adipocytes would enlarge, and immune cells

would penetrate the adipose tissue, resulting in an inflammatory reaction. Adipocytes and immune cells would release adipokines and cytokines, resulting in low-grade inflammation. While most adipokines and cytokines transit the systemic circulation, the inflammation would not be limited to adipose tissue. This undesirable adipokine/cytokine profile would raise insulin resistance even further, causing increased inflammation and oxidative stress, as well as ectopic fat storage (Gusmao-Sena et al., 2016).

The consequence of SO is higher risks for the negative health effects than the risks of either sarcopenia or obesity alone (Roh & Choi, 2020). The major consequences of sarcopenia include a higher incidence of falls and bone fractures, a decline in daily activity, an increased need for assistance with self-care or loss of independence, a reduction in quality of life, an increased need for medical treatment, prolonged hospitalization associated with infection, readmission, and premature mortality (Gandham et al., 2021). Muscle quality is correlated with the capacity to do the activities of daily living. Physical handicaps and dysfunctionality result from low muscle strength and consequently result in low quality of life (Ciudin et al., 2020). In addition, older adults who have sarcopenia are at risk for developing cardiometabolic diseases such as cardiovascular disease (CVD), atherosclerosis, insulin resistance, and metabolic syndrome (Cruz-Jentoft & Sayer, 2019).

Obesity also is a major risk factor of premature disability and death, including elevating the risk of adverse health outcomes as type 2 diabetes mellitus, hypertension, dyslipidemia, ischemic heart disease, cerebrovascular disease, osteoarthritis, and cancers associated with obesity (Gutin, 2020). According to the recent findings, people with inadequate muscle strength in relation to obesity are more likely to have physical disabilities in the future, which can affect functionality and quality of life (Godziuk et al., 2018). It has been reported that persons with SO possess an 23% increased risk of cardiovascular disease and a 42% increased risk of congestive heart failure compared to people with normal health status and standard body composition. Older adults with SO are associated with a 38% increased risk for type2 diabetes mellitus compared with obese people (Seo et al., 2021). Obesity also has a negative impact on infectious diseases.

The coronavirus (COVID-19) condition became more severe as body mass index (BMI) increased. In a study by UK Biobank, obese people were a significant risk factor for severe COVID-19 infection and mortality. Individuals with feasible sarcopenia were at greater risk for severe symptoms of COVID-19 compared to a group of people with non-probable sarcopenia. People with SO had a significant rise in severe COVID-19 compared with people who had obesity alone (Wilkinson et al., 2021). The findings of a review of the literature on the relationship between morbid obesity and the detrimental effects of COVID-19 infections in the United States demonstrate a statistically significant relationship between morbid obesity and negative outcomes from COVID-19. A higher risk of COVID-19 death was found in the group with an estimated BMI of 40 or above (Curtin et al., 2020). Sarcopenic obesity (SO) not affects only physiological, but psychological health problems.

Several studies have investigated the psychiatric problems people with obesity or extreme obesity encounter, with estimates ranging from 20% to 60% of those affected (Blasco et al., 2020). Low muscle performance measured by handgrip strength, one indicator of sarcopenia, in conjunction with obese persons demonstrates an association with depressive symptoms, but not found in those who are not obese (Hamer et al., 2015). The report of a longitudinal study in 3,862 community-dwelling participants indicated that SO was positively associated with early depression symptoms in older persons. The report of a cross-sectional study in 1,732 Japanese community-dwelling older adults in both genders indicated the significant risk of depressive symptoms as being particularly marked in SO participants (Ishii et al., 2016). The reports of systematic review and meta-analysis have suggested a positive association between sarcopenia and depression (Chang et al., 2017).

The prevalence of SO can differ among studies, depending on many factors including definitions, criteria, methods and instruments of body composition analysis, the cut-off points for sarcopenia and obesity, study designs, and participant characteristics. Participants in some research reports were adults in all age groups, while other studies were only elderly adults. A systematic review and meta-analysis of 50 studies report the worldwide prevalence of SO in older people in 2020 was 11% (Gao et al., 2021). In addition, the incidence also differed in gender, racial, and ethnic populations. “The National Health and Nutrition Examination Survey (NHANES)”

reports the prevalence of SO in United States populations 60 years of age and over at 18.1% in females and 42.9% in males (Batsis et al., 2015). The reported SO prevalence in Chinese community-dwelling older persons was 6.0% (7.3% and 4.8% in males and females) (Wang et al., 2019). In a recent reported on Chinese community-dwelling older adults, the SO prevalence was 0.1–7.9% with different indicators used to define obesity (Mo et al., 2022).

In Thailand, there are no studies on the incidence or prevalence of SO and few reports of sarcopenia, especially in older adults. One study to determine the prevalence of sarcopenia in Thai older adults aged 60-69 years at 45.54% and 50.91% in females and males, respectively. In adults aged 70 years and over, the prevalence of sarcopenia was 35.59% and 44.64% in females and males, respectively (Pongchaiyakul et al., 2013). The prevalence of sarcopenia was 9.6% in a study among 83 Thai elderly males and females living in congested communities in Bangkok (Promklang et al., 2018). In an outpatient setting, 330 people over the age of 60 were studied in a cross-sectional study using the 2019 AWGS criteria, sarcopenia was shown to be present in 10% of both males and females. (Therakomen et al, 2020). In the report of a cross-sectional study performed in 243 subjects aged over 60 years, the prevalence of sarcopenia was 30.5% which being higher in males compared to females (33.9% and 29.3%, respectively). There is an increasing trend for sarcopenia when participants get older (12.9% in age 60-69 years, 46.5% in 70-79 years, and 68.0% in the aged over 80 years). The prevalence of sarcopenia and related factors, 59.7% of the participants were overweight (Khongsri et al., 2016).

The older adults are prone to developing obesity at a higher rate. Based on the 5th Thai people's health survey by a physical examination in the year 2014, 35.4% of the elderly were obese, 49.4% had abdominal obesity, and 46.8% had metabolic syndrome (Aekplakorn, 2016). According to a survey, the Health of Thai people by physical examination 6th (2019-2020), 38.4% of the elderly were obese (45.1% in females and 29.9% in males), 46.4% had abdominal obesity (60.6% in females and 28.7% in males), and 39.8% had metabolic syndrome (47.6% in females and 29.9% in males) (Aekplakorn, 2021).

Currently, there is no consensus on the criteria for diagnosis of SO. Generally, the criteria for diagnosis follows the diagnosis of sarcopenia and obesity as

co-existence. Various studies have reported on the variety of measurement tools and cut-off points to diagnose both sarcopenia and obesity. Sarcopenia uses muscle quantity in conjunction with quality for diagnostic criteria. Individuals with low muscle mass and either low muscle strength and/or muscle performance are indicated to have sarcopenia (Chen et al., 2020).

Ethnic-specific factors are one of the key factors affecting muscle mass and muscle strength due to genetics, eating habits, and lifestyle. “The Asian Working Group for Sarcopenia (AWGS)” has established sarcopenia criteria for diagnosis in Asia. These guidelines are followed by “The European Working Group on Sarcopenia in Older People (EWGSOP)”, which suggests applying handgrip strength and gait speed for screening muscle performance at different cut-off points. Concerning the diagnostic criteria and cut-off point for sarcopenia, AWGS recommends low muscle mass, low muscle strength and/or low physical performance (Chen et al., 2020).

The AWGS 2019 proposes an algorithm for identifying and diagnosing older adults with or at risk for sarcopenia, including case findings, assessment, and diagnostic protocols for use in either hospital and research settings, or in community-based health care and screening settings. In primary health care or community preventive service settings, sarcopenia case findings start with calf circumference, or measured by the SARC-F or SARC-Calf questionnaire (strength, assistance in walking, rising from a chair, climbing stairs, and falling). Calf circumference in individuals with non-low muscle mass as 37.8 ± 2.5 in males and 34.7 ± 2.0 in females (Kawakami et al., 2020). If calf circumference is < 34 cm in males or < 33 cm in females or SARC-F > 4 or SARC-Calf > 11 the assessment criteria is used by measuring muscle strength by handgrip strength or measuring physical performance by a 5-time chair standing test. If handgrip strength is < 28 kg in males or < 18 kg in females or a 5-time chair standing test score of > 12 seconds possible sarcopenia is indicated and a referred is required to confirm the diagnosis and apply lifestyle modifications in diet and exercise.

In acute to chronic health care or clinical research settings, case findings will be applied to older adults who present with any clinical conditions, including functional decline or limitations; unintentional weight loss; depressive mood; cognitive impairment; repeated falls; malnutrition; chronic conditions (heart failure, chronic obstructive pulmonary disease, diabetes mellitus, chronic kidney disease, etc.) If no

clinical conditions are present, case findings use the criteria of primary health care or community preventive service settings. Diagnosis criteria start with muscle strength measured by handgrip strength. The normal handgrip strength in males is 45 to 47 kg and in females is 28 to 30 kg (Massy-Westropp et al., 2011). When handgrip strength in males is < 28 kg or in females < 18 kg, physical performance testing is performed. Physical performance is measured by 6-meter walks or 5-time chair standing tests, or a Short Physical Performance Battery (SPPB). The cut-off points of each indicator are as follows: 6-meter walk < 1.0 meter/second, or 5-time chair standing test > 12 seconds, or SPPB < 9. In cases involving positive physical performance indicators, appendicular skeletal muscle mass (ASM) by dual-energy X-ray absorptiometry (DXA) or bioelectrical impedance analysis (BIA) is performed. Low ASM is defined by a DXA result of < 7.0 kg/m² in males or < 5.4 kg/m² in females or BIA results of < 7.0 kg/m² in males or < 5.7 kg/m² in females. Sarcopenia is diagnosed by the presence of low ASM and low muscle strength. Severe sarcopenia is diagnosed by sarcopenia with low physical performance (Chen et al., 2020).

The WHO recommends body mass index (BMI) as the criteria for identifying obesity at ≥ 30 kg/m² (WHO, 2021b). At the same BMI, the East Asian population most often has a higher percentage of BFM (Jee et al., 2006). Thus, the WHO recommends BMI cut-off points for obesity in East Asians at ≥ 25 kg/m² for early prevention of negative health effects related to obesity (WHO, 2004).

Treatment of SO is accompanied by promoting activity in daily living, improving social engagement and productivity, preventing negative health consequences, and sustaining well-being (Petroni et al., 2019). Sarcopenic obesity (SO) treatment strategies are aimed at decreasing BFM, while enhancing muscle mass, muscle strength, and physical performance (El Masri et al., 2021).

In reviewing the literature related to the treatment of SO in non-pharmacological intervention, literature was searched from databases published in PubMed, CINALH, Cochrane Library, Scopus, and Google Scholar. The keywords for the search included “sarcopenic obesity” or “obese sarcopenia” and “management” or “intervention” or “nutrition” or “exercise” or “physical activity”. The search was first conducted in June 2021, and duplicate articles were removed.

This review included all original human studies of SO from randomized control trials and quasi-experimental designs since 2014 with no limitations concerning country or language of publication. The inclusion criteria were based on the PICO approach: P (Population): people aged 60 years or over with sarcopenic obesity not limited by gender or setting of the study; I (Intervention): exercise, nutrition, or combination intervention of exercise and nutrition, and behavioral modification for SO; C (Comparison): all kinds of SO interventions or control groups and O (Outcome): body composition parameters, muscle strength, or physical performance. Studies in which participants had a disease potentially affecting muscle mass or limiting physical activity, e.g., cancer, renal disease, heart disease, diabetes mellitus, and independent activity, were excluded.

The literature review search yielded 8 articles on exercise, nutrition, or a combination of exercise and nutrition intervention for SO published since 2014 (Balachandran et al., 2014), (Chen et al., 2017), (Chiu et al., 2018), (de Oliveira Silva et al., 2018), (Kim et al., 2016), (Liao et al., 2018), (Muscarello et al., 2016), (Vasconcelos et al., 2016). The study participants were from both genders. The duration of the intervention was between 10 and 16 weeks. There were many types of exercise interventions, including aerobic training, flexible training, resistance training, and combination types of exercise. Nutrition intervention consisted of low-calorie intake with a normal or high protein diet. The findings in the studies differed, depending on the type of intervention, duration of studies, and outcomes.

Exercise is one of the strategies available in healthy aging to prevent physical and metabolic health problems, while maintaining physical health. In addition, exercise can improve functional capability or physical weakness in frail elderly. Various types of exercise benefit the body and health differently. Aerobic exercise is a continuous repetition of action that involves large muscle movement as a result of cardiopulmonary fitness and increases energy expenditure (Esmailiyan et al., 2021). Flexibility training is a type of exercise for moving joints to enhance the range of motion of the joints and prevent falls by improving mobility and gait training. Flexibility training is often an exercise combined with resistance training. Resistance training or strength training involves using free weights or elastic stretching to resist muscles and contract the muscle bundle. Various clinical studies have reported the

results of resistance training in SO in older persons as improving muscle strength and physical performance (de Oliveira Silva, 2018); Chiu et al., 2018; Liao et al., 2018). The study compared the effects of different types of exercise in older adults who had SO. Resistance training (RT), aerobic training (AT), or combination training (CT) interventions were applied over 12 weeks, and the findings showed a reduction of body fat mass with progressive muscle mass and muscle strength in all intervention group (Chen et al., 2017).

Effective exercise in older adults with SO should be continuous with moderate-intensity for at least 50 minutes daily, more than 2 times per week, and continued for more than 12 weeks (Lee & Lee, 2018). The 10-week intervention of resistance training had no effect on muscle strength or performance in SO women (Vasconcelos et al., 2016). Another strategy to reduce body fat and increase muscle mass and strength in SO is an appropriate diet.

Protein is an important macronutrient that serves to maintain or build muscles and reduce body fat. In a weight reduction program, high protein consumption is associated with prolonged satiety and preserved muscle mass with maintained basal metabolic rate (Beavers et al., 2019). One clinical study reported the results of a high protein intake intervention which replace carbohydrate portions from 12% to 45% of total daily energy intake. The findings showed increased satiety time and reduced total daily intake compared with standard protein intake (Al-Nimr, 2019).

The recommendation of protein consumption to optimize muscle synthesis and preserve muscle mass in healthy elderly is daily protein intake of 1.0 to 1.2 grams per kilogram of body weight (Coelho-Júnior et al., 2018). For weight loss, the recommendation of daily protein intake should be higher than 1.2 grams per kilogram of body weight (Weijjs & Wolfe, 2016). In comparison, the amount of protein consumption in older adult women with SO during calorie restriction, a protein intake of 0.8 grams per kilogram of body weight is not sufficient to preserve muscle mass. Meanwhile, consuming 1.2 grams of protein per kilogram of body weight per day has been demonstrated to maintain muscle mass (Muscarello et al., 2016). The type of amino acid results in muscle protein anabolism, while essential amino acid consumption improves muscle building in older persons (Bo et al., 2019). Food sources of essential amino acids are animal and soy protein.

Although a high-protein diet is acknowledged to benefit in maintaining or increasing muscle mass in older persons, consuming a diet high in protein can result in declined kidney function. Health professionals recommend 1.0 to 1.5 grams of daily protein per kilogram of body weight for severe malnutrition risk or sarcopenia in older adults with normal kidney function or mild kidney dysfunction (Rhee et al., 2018). Many factors affect protein intake in the elderly, including quantity and quality of protein diet, appetite, amount of food intake, chewing and swallowing, digestion and absorption, source of quality protein, and infection or inflammation the cause of higher protein requirement (Hengeveld et al., 2019). Such factors in the elderly are found to result in insufficient protein nutrients to meet body requirements.

Interventions offering exercise alone with normal protein intake can result in decreased body weight and body fat mass, while enhancing muscle strength and physical performance without muscle mass increase. Meanwhile, calorie restriction involves decreasing body weight and body fat simultaneously and may result in loss of muscle mass and reduced basal metabolic rate. High protein consumption can prevent loss of muscle mass, but is incapable of enhancing muscle strength and physical performance. Interventions combining exercise and good nutrition with a low-calorie diet and high protein intake have produced significant improvement in all SO indicators, including loss of body weight and body fat with increased appendicular skeletal muscle, muscle strength, and physical performance (Kim et al., 2016; Yin et al., 2020). The results of concurrent exercise combined with calorie control and 1.2 grams of protein per kilogram of body weight a day by higher animal protein have indicated improved body composition and all indicators of SO (Trouwborst et al., 2018).

Changing health behaviors and lifestyles in the elderly is particularly challenging. There are various factors related to health status and other factors that differ from younger adults that make it difficult to change lifestyles, including multimorbidity, cognitive function, depression, impaired vision and hearing, dependence in daily activity, and financial problems (Kobayashi & Steptoe, 2018). Behavioral change should be concerned with participation, attitude, and motivation to improve health status (McGilton et al., 2018). Older adults' intention and willingness are important attitudes in convincing older adults to participate in the program and

accomplish behavior modification (Lachman et al., 2018). Health management in older adults requires cooperation between patients, families, the community, and health care provider teams.

Family support is a key factor in the health care of older adults that involves material, instrumental, physical, and emotional support (Bull et al., 2020). The family functioning advantage is affective bonding, strong relationships, and intimacy (Rosas & Neri, 2019). Family understanding of beliefs and cultural background also affect health in the elderly. Families generally share problem-solving methods with older adults to improve self-management. Activities of care that older persons receive from families include preparing meals, supporting daily activity, and offering mental support in stressful situations (Suksatan & Ounprasertsuk, 2020). Cooperative goal setting between older adults and family members can result in improved health outcomes. The study report of Shahriari et al. indicated the effects of behavioral change leading to success and stability in self-care programs with family support (Shahriari et al., 2013). Family members can conduct health behavior of older persons to prevent long-term depression and enhance quality of life (Yodmai et al., 2021).

Community includes living space and involvement in the lives of people. A community is made up of people who live together. Each individual has roles and duties that affect the health of people in the community, including lay residents, community leaders, and healthcare provider teams. As a result, the community is an extremely important component of the health of individuals, especially older adults. The community may contribute to a good environment and facility to support or enhance the health status of people (Casaló & Escario, 2018). A study of the association between community environment and older adult health reported on the health status of older adults who live in a greener environment with better breathing space, convenience of exercise, and good relaxation facilities, which was shown to increase physical activity and exercise in addition to improving health status. The health behavior of neighbors may be affected by the health status of older adults who contact them (Kim & Kawachi, 2017). The study reported an association between self-health care in older adults, health behavior, ability to perform activities, and community environment. All these factors have significant positive effects and appeared to be a result of a good community environment and good neighbor health behavior. This environment was

associated with an increase in the physical activity and self-rated health of older adults (Zheng & Chen, 2021). Healthcare provider teams, village health volunteers, and community leader are groups of persons who contribute to creating a communal atmosphere that is advantageous to people's health.

In Thailand, the government has established elderly clubs to enhance the physical and mental health of older adults in each local community. There are various activities organized in elderly clubs that promote group activities such as handicrafts or basketry, exercise, healthy cooking classes, or health dialogue. Elderly clubs help the elderly increase their physical activity, encourage potential in self-care, maintain health, promote interactions with people in the community, and reduce anxiety. A good elderly club should have a good operating system to organize activities that meet the affective needs of club members by using the community resources to benefit and encourage all members to participate in activities with members for the sustainability of the program (Whangmahaporn & Review, 2019; Supromin & Choonhakhlai, 2019).

Plans of action or strategies should be consistent with the country's development plan and appropriate to the community context. A master plan under the National Strategy 2018-2037 No. 13, is aimed at achieving the goal to enhance good health for Thai people. The objective is to enhance health management in all forms, leading to the potential for self-management. Along with supporting all sectors to participate in health promotion includes having appropriate health skills, knowledge of health, and promotion and development a modern health service system. These plans also involve the distribution of health care services evenly and with quality (National Strategy Secretariat Office, 2018). The 4th goal of National Economic and Social Development Plan No. 13 is to develop a medical center in Thailand. Sub-Strategy 2.3 of this goal is concerned with developing new health promotion services leading to the creation of a healthy aging society by focusing on appropriately changing lifestyle behaviors and long-term health promotion (Office of the National Economic and Social Development Council, 2021).

Primary health care is the first line of public health services accessible to the public providing health services including health promotion, health prevention, and treatment throughout the lifespan. Patient centers and health promotion resource centers are part of a healthcare system that transforms and replaces the focus on prevention

rather than on illness. Currently, healthcare organizations are facing many challenges, including demands from an aging population, communicable diseases, non-communicable diseases, and chronic conditions. Model of care (MOC) is a generated framework to create a comprehensive health care system (Booker et al., 2016). MOC is a patient-centered care concept that delivers healthcare service systems for individuals, population groups, or patient cohorts. In addition, the MOC's role is a working system that connects patients, family, community and healthcare services. The MOC process is a standard of care that is generated based on evidence-based practice. The concept to generate or redesign the MOC concerns patient-centered services to improve the quality of care, including patient and stakeholder satisfaction (Rovira et al., 2022).

In the proposed study, the development of a family and community-based care model for sarcopenic obesity in older adults involved patient-centered care and the participation of all stakeholders for sustainability. Due to the non-specific symptoms and gradual physiological decline of SO, there is no standard for screening in clinical practice. The problems of SO remain largely unsuspected and undiagnosed with no prevention concern and non-specific treatment. Awareness and health concerns of SO in community-based older adults are limited. The information on the etiology and health effects of SO is scarce, which results in defective detection, prevention, and management of SO problems (Cusack et al., 2018).

However, gaps remain in applying the recommendations to practice, possibly due to differences in the characteristics, experience, culture, context, and other important elements of older persons in each location. Furthermore, it is difficult to change health behaviors among the elderly because this is a pattern of conduct that has developed over time. Behavioral modification in older persons that leads to sustainability requires a process of transformation as well as family and community support. As a result, the researcher must be aware of this gap and continue to generate a care model that is suitable for the area. The researcher must be concerned with the dimensions of access and the incorporation of co-creation principles into the service design process for each service, which must be considered in conducting studies to develop work to meet the needs of older adults with SO, family, community, healthcare providers, and relevant stakeholders in the area. Participatory action research (PAR) is

the process of applying the standard of care to the older adults with SO and community resources to be effective and sustainable in practice.

PAR is a research approach which emphasizing the participation of stakeholders in all sectors of research. PAR combines the strengths and characteristics of action research with systematic data collection and analysis to produce practical knowledge through action and change. The research methodology of PAR is transition from a traditional cause and effects linear perspective to an emancipatory approach and concerns real-life situations. (Günbayi & Sorm, 2018). In the PAR process, participants and all relevant stakeholders must be actively collaborating and participating with researchers from an early stage of determining the research problems to the end of the process of presenting the results (Struminska-Kutra & Scholl, 2022). The researcher can perform this operation several times until the performance achieves the objectives or successfully solves the problem of work leading to sustainable solutions (Keahey, 2021). The role of researchers in PAR is the collaborative partnership and facilitators for participants to improve practice through the direct application of the evidence-based practice and research results in the context of clinical practice. PAR is empowering, as it promotes capacity development and capacity building in all who participate (Harrington et al., 2019).

The objective of the proposed study was to develop a family and community-based care model for sarcopenic obesity among older adults in a rural community, specifically, Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province, using PAR methods to bridge the preliminary model into practice. The care will reflect the needs and concerns of SO in older adults and relevant stakeholders which appropriate for the context and resources of the area. Using a PAR framework for this research, partnership action and analysis was highlighting key PAR attributes, identify the benefits of the research design technique, and the weaknesses of its use in a rural community setting. PAR is an appropriate research design process for the proposed study, because it aimed to elicit change by involving participants who were benefit from the research.

1.2 Research questions

1.2.1 What is the perception of sarcopenic obesity among older adults?

1.2.2 What are the factors related to sarcopenic obesity among older adults?

1.2.3 What are the effects of sarcopenic obesity on the health status and care needs of sarcopenic obesity among older adults?

1.2.4 What are the environmental resources needed for family and community management of sarcopenic obesity among older adults?

1.2.5 How can a family and community-based care model for older adults with sarcopenic obesity be constructed?

1.3 Research objectives

1.3.1 General objectives

To develop a family and community-based care model for sarcopenic obesity in older adults that constructed through the participatory action process.

1.3.2 Specific objectives

1.3.2.1 To explore the perception of sarcopenic obesity among older adults.

1.3.2.2 To synthesize the factors related to sarcopenic obesity among older adults.

1.3.2.3 To synthesize the effects of sarcopenic obesity on the health status and care needs of sarcopenic obesity among older adults.

1.3.2.4 To clarify the necessary and environmental resources for managing sarcopenic obesity in older adults and to empathize with family and community support.

1.3.2.5 To construct the family and community-based care model for older adults with sarcopenic obesity to connect sarcopenic obesity among older adults, family, and community.

1.4 Underpinning philosophy /Preconceived notions

The philosophical paradigm underlying approaches relied on in the proposed study is Critical Theory. This philosophical perspective is related to empowering humans to overcome constraints related to age and obstacles to behavioral modification. Researchers should apply theory to clarify social actions, recognize the power of those actions, and engage in mutual dialogue. Critical researchers should explore scientific study and transformations by interpreting the meanings of social life. According to the aim of critical theory, the inquiry is to encourage self-reflection and empower people in society to find the structure of social power and find the reality related to social power (Creswell & Poth, 2016).

The philosophical assumption of critical theory in the purpose of the study can be explained as follows:

Ontology: The reality is what was created, depending on the researcher and participants, as well as the social and cultural contexts. There is no universal truth, and one truth might have several variations.

Epistemology: Reality is known through learning about social structures. Research has the potential to create and modify reality. Researchers drive research by learning social structures and believing that the knowledge gained can change the structure of existing restriction through empowerment and supporting processes.

Methodology: The research study uses dialogic/dialectical approaches to reality. In the proposed study, the researchers used emancipation and transformative learning technique for management of SO in older adults by family and community to conduct the research and product sustainable solutions for healthy sarcopenic obesity behaviors.

In critical theory, the inquiry is to encourage self-reflection and empower people to find the structure and reality related to social power (Holloway & Galvin, 2016). Additionally, PAR knowledge is gained from a collection of participant's experiences. The scope with which information is gathered from lived experiences and actions is validated collectively and constitutes a measure of reality (Leask et al., 2019). All knowledge is relative since it is co-constructed by those in relationships with others. Interactions with one another co-create a reality based on their worldview. Hence, human relationships are fundamental to the co-construction of reality, and research

methodology should reflect this inextricable relationship. In PAR, ownership of research data and knowledge generated is based on the belief that people are also less likely to change their behavior if they have not been part of the research experience. Hence, they are more likely to reject the findings of research if they have not participated in the production of knowledge directly relevant to their concerns (Harrington et al., 2019). On the other hand, subject participation is more likely to generate a sense of accomplishment that makes for long-lasting outcomes in the community. For this reason, the PAR process can solve real-world problems in a sustainable way.

1.5 Definition of term

1.5.1 Sarcopenic obesity (SO): Sarcopenic obesity refers to the simultaneous occurrence of sarcopenia and obesity. For sarcopenia definition and criteria for diagnosis according to the “The Asian Working Group for Sarcopenia (AWGS)” 2014 and 2019. Sarcopenia defines as “an age-related decline in skeletal muscle mass as well as muscle function (defined by muscle strength or physical performance)” (Chen et al., 2014). The diagnostic criteria and cut-off point for sarcopenia followed the AWGS in 2019 and included ASM from BIA results of < 7.0 kg/m² in males or < 5.7 kg/m² in females, and handgrip strength of < 28 kg in males or < 18 kg in females, or a Short Physical Performance Battery (SPPB) score of < 9 (Chen et al., 2020). Obesity is a chronic medical concern involving excessive or abnormal fat accumulation (WHO, 2021b). The criteria for diagnosis of obesity follow WHO criteria for obesity in East Asians is BMI ≥ 25 kg/m² (WHO, 2004).

1.5.2 Older adults: Older adults are defined as people aged 60 years and over, either male or female and living in the rural community, Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province.

1.5.3 Family member: Family member refers to the person who live together in the same household of SO older person or nearby. The family member should provide care, support some activities, provide medical attention and health concern, support mental health, and protect the collective and individual rights of older

adults. The persons who are family members should be blood relatives or have legal relationships with the older adults (Zhang, 2018).

1.5.4 Community: A community is defined as a group of people that share public space, environmental resources, and connections with one another in geographical locations (Coy et al., 2021). A community is defined by geographic boundaries and health service area. The community members might share identity, beliefs, communication, and supporting behaviors. People living in the community are Muslim and Buddhism, which the majority are Muslim that beliefs and adherence to religious principles at a high level by applying religious principles and teachings to practice in daily life. The group of people in the community related to this research study consist of healthcare provider teams, village health volunteers, and community leader.

1.5.5 Family and community-based care model: The family and community-based care model constructed based on participatory action research within the collaboration of older adults with SO, family members of older adults who had SO, and the community where the individuals with SO older adults are living. Healthy sarcopenic obesity can develop as a result of the care model after the completion of the study.

1.5.6 Healthy sarcopenic obesity: Healthy sarcopenic obesity is the end goal of this proposed research, which the researchers expect to be occur in the SO older adults who participate in the study. This end goal will arise from the participation of older adults with sarcopenic obesity and all stakeholders in the spiral process of PAR; therefore, it cannot be predetermined. The researchers expected that healthy SO is the competency of older persons who have SO capacity to understand basic health information and health status, awareness of health related to SO, appropriate health decisions to managing problem and prevent the worse consequence of SO, and well-being will arise of them.

1.6 Expected benefits

1.6.1 Identify the perception of sarcopenic obesity among older adults.

1.6.2 Identify the factors related to sarcopenic obesity, the effects of sarcopenic obesity on health status, and the care needed for sarcopenic obesity in older adults.

1.6.3 Promote healthy sarcopenic obesity in the older adults with sarcopenic obesity in the community studied.

1.6.4 Awareness of the managing problems and prevention of worse consequences from sarcopenic obesity in the community studied.

1.6.5 The family and community in the community studied learn how to collaborate about creating healthy sarcopenic obesity among the older adults.

1.6.6 Obtain an operational care model based on the cooperation of older adults with sarcopenic obesity, family, community, and healthcare professional teams.

1.6.7 Can be apply the family and community-based care model for sarcopenic obesity in older adults in another community.

CHAPTER 2

REVIEW OF THE LITERATURE

The literature review was based on the core concepts and methodology to be applied in this study. The first topic reviewed includes relevant dimensions of older adults such as health status, demographics, role of the family and community and health policy. The second topic reviewed multiple aspects of SO. The last two areas included contextual information as well as literature related to a PAR methodology. The following detailed themes were covered in the literature review:

2.1 Older adults' concept

2.1.1 Definition of older adults

2.1.2 Characteristics and health status of older persons

2.1.3 Ageing society and healthy aging

2.1.4 Role of family and community in aging health

2.1.5 Health policy of older adults

2.2 Sarcopenic obesity

2.2.1 Statement of sarcopenic obesity

2.2.2 Criteria and method for diagnosis

2.2.3 Pathophysiology of sarcopenic obesity

2.2.4 Management strategies for sarcopenic obesity

2.3 Research area context information

2.3.1 Area geography

2.3.2 Population structure

2.3.3 Health-related information

2.3.4 Family and community resource information

2.4 Methodology of participatory action research

2.4.1 Basic idea and principles of participatory action research

2.4.2 Characteristics of participatory action research

2.4.3 Steps for generating guidelines to develop and implement participatory action research projects

2.4.4 Participatory action research with older adults

In order to provide more information about the proposed research, the researcher will present a detailed description of the literature review content as follows:

2.1 Older adults' concept

2.1.1 Definition of older adults

The cutoff age for older adults varies on the country and various operations related to the elderly such as welfare. In the majority of developed nations, older adults are defined as those who are aged 65 years or older. The United Nations uses the age of 60 years and over for statistical analysis and indicators to define elderly (Paroli et al., 2020). For Thailand, the definition of the older adult in the Elderly Act B.E. 2546 (2003), Section 3, defines older people as those who are over the age of 60 years (Ministry of Social Development and Human Security, 2011). This study applied the definition of older adults from Thailand.

2.1.2 Characteristics and health status of older persons

Older individuals undergo significant physical, mental, and social changes that often lead to deterioration with age. Limitations in physical and psychological capabilities impact various aspects of health, daily activities, mental well-being, and socioeconomic status. The aging process involves the accumulation of cellular and molecular damage, which is not strictly tied to chronological age. Instead, aging is intertwined with life transitions such as retirement, relocation, and the loss of loved ones, alongside biological changes (Gale & Cooper, 2018). As a result, there is a gradual degeneration in physical and mental capacity with progressive risk of illness, disability, and ultimate death (Dziechciaz & Filip, 2014).

The characteristics of older population in Thailand are presented in the 6th Thai people's health survey by physical examination in 2019-2020. Surveyed from all regions across the country, 5,882 families with a total population of 23,884 people were included. The proportion of persons aged 60 years and over living alone was 9.5%, and 22.3% lived with their spouses, while 39.4% of the elderly said they had insufficient incomes. The prevalence of falls within the past 6 months in the elderly was 15.3% (11.3% of men and 18.5% of women). Of the elderly, 85.9% said they were able

to take care of themselves in their daily activities; 8.6% said they were dependent on certain activities, and 5.5% said they were completely dependent. The elderly had chronic diseases or risk factors, including hypertension 60.7%, diabetes 20.4%, hyperlipidemia (Total cholesterol > 240 mg/dL) 23.8%, obesity (BMI \geq 25 kg/m²) 38.4%, abdominal obesity 46.5%, and metabolic syndrome 39.8% (Aekplakorn, 2021). In the health behavior of the Thai elderly, elderly people eat fresh vegetables and fresh fruits every day at 59.6%, a minimum of 8 glasses of water each day 52.0%, and exercise regularly representing 38.9% (Boukeaw & Teungfung, 2020).

Some health inequalities among older people are impacted by heredity, personal traits such as gender, and ethnicity. But behaviors, as well as socioeconomic position, neighborhoods, and communities, are the important factors affecting health conditions (John R Beard et al., 2016). Adopting a healthy lifestyle can lower the risk of non-communicable diseases, improve physical and mental abilities, and postpone the need for medical intervention. Healthy eating, regular exercise, and smoking cessation are key contributors to these benefits (Cosco et al., 2017).

2.1.3 Aging society and healthy aging

A significant societal trend that is currently taking place all across the world is population aging. The global population has been changing from a younger to an older civilization from the beginning of the twenty-first century. An aging society emerges from a demographic transition as larger proportions of the population reach 60 years and older (Zimmer, 2016). Population aging has been caused by declining birth rates and rising longevity. The livelihoods and well-being of individuals are greatly impacted by an aging society in all facets of society, including the economy, culture, and environment. The potential this demographic change creates is limitless as long as the elderly population is socially and economically active, secure, and in good health (Lakin & Burke, 2019).

Population aging, a notable public health achievement, necessitates strategic planning to ensure extended life expectancy translates into prolonged, healthy, and disability-free lives for the elderly. Governments and healthcare systems must proactively address the challenges posed by this demographic shift, developing targeted measures to accommodate the diverse health needs and disease patterns of the aging population. Ignoring these challenges risks diminishing the potential benefits of

increased longevity. Key considerations include the development of preventive strategies, supportive facilities for physical well-being, and adjustments in societal and economic structures to accommodate the changing dynamics associated with an aging population (Khan, 2019).

Healthy aging is the process of preserving and gaining the functional capacity to enhance well-being as people age (Michel & Sadana, 2017). Additionally, the external factors of health and social care that may make a substantial impact on health and well-being are highlighted, as are the contributions that must be made by all sectors with an impact on the determinants of health. Healthy aging also adopts a life course perspective on health, which acknowledges the influence of early experiences on population aging. Inherent potential, relevant environmental conditions, and their interactions make up functional ability in a person. Functional capacity is divided into five primary categories, and each individual's factors may be improved or restricted by environmental variables. These abilities include being able to perform daily routines and meet the basic needs of life, grow intellectually and emotionally, make decisions, have the ability to perform activities independently, retain the ability to establish and maintain relationships, and make contributions to society (J. R. Beard et al., 2016).

Healthy aging depends on maintaining intrinsic capacity and functional ability, all the while residing in supportive environments. The existence of illnesses, accidents, and age-related changes are only a few factors that can affect intrinsic capability. An environment is made up of a variety of elements, such as appropriate environmental arrangement, proper social interactions, values and attitudes, social and health policies, and relevant services. Home, neighborhood, and broader society are all examples of environments. According to the WHO, interactions between inherent capability and external variables lead to the development of this functional ability (Beard et al., 2017).

Healthy aging has emerged as the main priority for policymakers in the world to preserve health and improve quality of life for aging populations. The WHO, member states, and partners in the Sustainable Development Goals (SDGs) produced a global strategy and action plan for aging and health for 2016-2020. (WHO, 2016).

The five strategic objectives' vision was determined to be a society in which all populations have the prospect to reach healthy lives and longevity. The first goal of the five strategies called for taking concrete steps toward healthy aging across the board. Promoting cooperation between governmental and non-governmental sections was the main objective in order to provide the political and operational frameworks necessary for multisectoral initiatives to be effective. The second goal was to design and establish places that could be accommodating to senior citizens to give elderly individuals the chance to remain independent. These age-friendly areas assure that older people's personal growth and community involvement are supported with health promotion and removal of obstacles. The third objective was to align all healthcare systems to meet the demands of older people that accessible medical service. The needs and rights of elderly patients should be prioritized in the healthcare system. The Global Strategy's fourth goal was to establish trustworthy and suitable long-term care delivery networks (home, community, and institutional). Every nation ought to establish a comprehensive system for long-term care geared toward the elderly. In order to provide the elderly with the best and most efficient care while simultaneously preserving their dignity. The fifth component of the global strategy aims to accurately and satisfactorily comprehend the health issues of older individuals in order to analyze the health issues faced by the elderly and make improvements in the current situation in which modern and efficient measurements are required. Additionally, information about healthy aging needs to be collected and disseminated. Members of the United Nations, non-governmental organizations, all specialists, WHO departments, and members of the general public have participated in a thorough regional and international consultation process for the global plan. At the World Health Assembly on May 26, 2016, the 194 Member States of WHO accepted the Global Strategy (Rudnicka et al., 2020).

2.1.4 Roles of family and community in healthy aging

In various societies, notably in Asia, the family has frequently been considered the primary provider of informal care for older adults. The capacity of the family affects the health of specific family members, and an individual's health affects the family as a whole. Family members provide their parents with essential social and financial support as informal caregivers. Families used to have large houses, but

modernization and urbanization have had impact on family size and composition. In search of employment possibilities, young folks frequently relocate to larger cities with commercial hubs (Rittirong et al., 2014).

As a consequence of longer life expectancy, there has been a change in the structure of the family including economic conditions, family members' interactions, and support for the elderly. The microenvironment in which intergenerational, spousal, and sibling relationship's function has changed as a result of decreased fertility and a rising divorce rate making ties in senior households more fluid and unpredictable (Silverstein & Giarrusso, 2010). Joint and extended families are becoming less common; many times, younger generations do not want to be responsible for caring for their parents. In order to create alternative care and support networks outside the home, many countries are enlisting the assistance of local communities. The task of caring for and enhancing services for senior residents can be shared by communities (Manasatchakun et al., 2018).

One of the most striking features of Muslim society is the importance attached to the family. In Muslim culture, respect and esteem increase with age. The family unit is regarded as the cornerstone of a healthy and balanced society. According to Islamic principles, looking after parents is the important responsibility of descendants. Failure to adhere to religious principles is considered an offense. Muslims have the view that treating others well will please Allah and result in significant rewards both in this life and the next (Aljayyousi et al., 2019). Thai Muslims' way of life has evolved into a tradition of mutual assistance. Muslims frequently reside close to a community. Religious and other social events frequently coexist with one another. Muslims are there for one another as their relatives. Religious leaders are seen as trustworthy members of society (Phondee S, 2018).

Physical, social, and economic circumstances have a significant role in determining healthy aging and strong impact on the mental and emotional status of older adults. Age-friendly environments are better places for people to grow, live, work, play, and age. Policies have been established in addition to many inventions and technologies that play a part in providing care and assistance to the elderly in order to promote health and keep the finest physical and mental capacities throughout life (WHO, 2020). Providing a safe and convenient environment for living including

helping rehabilitate the elderly results in independent living. It is a collaboration between government and community participation that may differ, depending on the circumstances (WHO, 2019).

Primary healthcare is the main point of entry for elderly people into the healthcare system and the cornerstone of universal health coverage. Additionally, primary healthcare plays an important role in enhancing the well-being of the elderly. To improve primary health care and offer older people accessible, equitable, safe, community-based care, it is vital to have a qualified workforce, suitable legislation and regulation, and sufficient, sustainable funding (WHO, 2017).

2.1.5 Health policy of older adults

The World Health Organization was tasked with overseeing its health policy on aging implementation after the United Nations General Assembly declared 2021–2030 the Decade of Healthy Aging. Governments, civil society, international organizations, professionals, academia, the media, and the commercial sector plan to collaborate over the ten years on a targeted, catalytic project to help people live longer and healthier lives. This cooperation is dubbed the Decade of Healthy Aging (J. R. Beard et al., 2016). The Decade of Healthy Aging (2021-2030) aims to enhance the lives of older people, their families, and communities by taking collective action in four areas: changing the attitudes toward aging and ageism; building communities that value older people's abilities; offering person-centered integrated care and age-responsive primary health services; and providing older people who require it access to quaternary care (Amuthavalli Thiyagarajan et al., 2022).

All policies and strategies for older persons aim to maintain autonomy and activity as they grow older. The WHO asserts that countries adopt active aging policies and programs that enhance elderly persons' security, participation, and health, so they can afford to age. The rights, requirements, preferences, and capacities of older persons should serve as the foundation for these policies and services (Kalache & Gatti, 2003).

Thailand's government recognizes the significance of an aging population. It has encouraged all pertinent organizations to provide public services in accordance with the First National Plan on the Elderly (1982-2001) and the Second National Plan on the Elderly, and it has adopted the Act on Older Persons B.E. 2546

(2003 and revised in 2009), which stresses the value of treating the elderly with respect and preserving their valuable contributions for as long as possible (Jitapunkul & Wivatvanit, 2008).

2.2 Sarcopenic obesity

2.2.1 Statement of sarcopenic obesity

Sarcopenic obesity (SO) is a condition where both sarcopenia and obesity are present at the same time (Donini et al., 2020). There is currently no agreement on the diagnosis and classification of SO, and this discrepancy explains the contradictory results regarding the relationship with clinical outcomes. There is no agreement that using additional functional indices is the optimum method for diagnosing this condition, as SO has usually been described as excessive fat, low physical function, or performance measures. The definition of SO is a combination of the definitions of sarcopenia and obesity. However, due to the vast range of these criteria, it is difficult to provide a precise diagnosis, carry out epidemiological research, and develop efficient treatment strategies (Jane A Cauley, 2015).

Irwin Rosenberg invented the term "sarcopenia" in 1989 to explain the syndrome of age-related loss of muscle mass. "Sarx", which means flesh in Greek, and "penia", which means loss are the foundation of this term (Rosenburg, 1989). When the idea first emerged, researchers thought that, since a parallel loss in muscle mass was mostly responsible for the age-related degeneration in muscle strength, studying muscle mass was similar to studying muscle function. Sarcopenia was described by Baumgartner et al. (1998) as "low appendicular skeletal muscle mass divided by body height squared in meters (muscle mass index)" that was two standard deviations or more below the data from young, healthy adults when measured by Dual-energy X-ray absorptiometry (DXA) (Baumgartner et al., 1998). Janssen et al. (2002) used bioelectrical impedance analysis (BIA) to measure sarcopenia, which was defined as falling more than one standard deviation below the reference values from young, healthy adults. A conversion from absolute skeletal muscle mass (kg) to weight as a percentage (muscle mass/body mass x 100) was also suggested. Recent sarcopenia criteria use residuals from linear regression models to calculate the ratio of appendicular

lean mass to appendicular fat, as well as the amount of lean matter that is less than anticipated for a given amount of fat mass (Newman et al., 2003). According to the 2014 agreement of the Asian Working Group on Sarcopenia (AWGS), sarcopenia is "age-related decrease of muscular mass, plus reduced muscle strength, and/or low physical performance" (Chen et al., 2020).

Obesity is a chronic medical concern marked by excessive or abnormal fat accumulation (WHO, 2000). The WHO is a significant organization that works to combat obesity. The WHO defines obesity as an excess of adipose tissue in the body and views it as a chronic disease that is connected, either directly or indirectly, to other pathological conditions that increase morbidity and mortality (Lyn et al., 2019).

Sarcopenic obesity (SO) is considered an age-related syndrome that has become an increasing health concern (J. A. Cauley, 2015). SO is predominantly found in the elderly. However, this condition can be found in people of other ages, such as people with extreme obesity, disabilities or immobility, persons with severe infections for a long time, including those who have certain chronic diseases such as chronic kidney disease, chronic obstructive pulmonary disease, congestive heart failure, and cancer (Prado et al., 2014).

2.2.2 Criteria and method for diagnosis

As previously stated, there is disagreement over the clinical definition and standards for the diagnosis of SO. The definitions of sarcopenia and obesity used to diagnose SO are based on these terms individually. Regarding sarcopenia, there are various diagnostic criteria. The recommendations offered by professional organizations and working groups on sarcopenia provide various cutoffs for measuring and diagnosing sarcopenia in terms of muscle mass, muscle strength, and physical performance.

The 2010 European Working Group on Sarcopenia in Older People (EWGSOP) recommended that guidelines for sarcopenia diagnosis must be accompanied by either impaired physical function or decreased muscle mass. In screening for sarcopenia, gait speed with a cutoff of > 0.8 meters/second is first measured, followed by handgrip strength or walking speed to measure muscle strength, and then muscle mass to make the final diagnosis (Cruz-Jentoft et al., 2010). Male and female criteria include low handgrip strengths of less than 30 kg and 20 kg,

respectively. Different measurement procedures are used to determine the muscle mass cutoff criteria. When determined by DEXA, EWGSOP recommends appendicular lean mass index (ALMI) values of 7.23 kg/m² for males and 5.67 kg/m² for females. The cutoff points in the skeletal muscle mass (SMM) assessed by BIA were 10.76 kg/m² and 6.76 kg/m² for males and females, respectively (Lee et al., 2016).

Asian anthropometric, cultural, and lifestyle factors vary from their Western contemporaries, such as their relatively smaller body size, lesser adiposity, and less automation with more physically active lifestyles, which necessitate some unique considerations for diagnosing sarcopenia in this group (Chen et al., 2014). A diagnostic algorithm based on Asian data was proposed by the AWGS in 2014; it was similar to the EWGSOP 2010 but included unambiguous cutoffs for each diagnostic component in addition to measurement techniques. In 2019, the AWGS amended the agreement on the diagnosis and treatment of sarcopenia (Chen et al., 2020).

The diagnostic techniques used to determine sarcopenia and obesity in research for body composition evaluation and functional status are variable. The gold standards for assessing body composition can detect all segments of body fat and muscle, including area and quantity with computed tomography (CT) and magnetic resonance imaging (MRI) (Cesari et al., 2012). Meanwhile, DXA results have precise imaging systems and advantages for assessing body composition in all regions of the body (Ilich et al., 2016). The limitations of CT, MRI, and DXA in routine clinical practice are the concern of radiation exposure, inability to move to another location, and high costs. Bioelectrical impedance analysis (BIA) is a technique of indirect body composition analysis in the principle of resistance fluid retention in the body. BIA represents whole body and segmental body composition and is reproducible in a clinical study with an inexpensive method (Morley et al., 2011).

In addition, there are various diagnostic criteria for obesity, including body mass index (BMI), waist circumference (WC), body fat mass (BFM), and percentage of body fat (%BF). BMI is the most widely used indicator of overweight and obesity. The WHO recommended body mass index (BMI) as the criteria for defining overweight as ≥ 25 kg/m² and ≥ 30 kg/m² for obesity (Decaria et al., 2012). At the same time, BMI in the East Asian population most often has a higher percentage of BFM (Jee et al., 2006). Thus, the WHO recommends BMI cutoff points BMI of

obesity for East Asians at $\geq 25 \text{ kg/m}^2$ (WHO, 2000). A large meta-analysis with nearly 200,000 participants aged 65 or older also found a U-shaped relationship between BMI and mortality, with the lowest risk recorded in those with a BMI between 24.0 and 30.0 kg/m^2 , and risk only beginning to rise once BMI exceeded 33 kg/m^2 (Decaria et al., 2012).

BMI is a simple and useful indicator in clinical practice but BMI is unable to distinguish people with high BMI from those having a lot of muscle mass, such as bodybuilders. The American Association of Clinical Endocrinology recommends applying BFM as an obesity indicator (Garvey et al., 2016). Body fat distribution serves as a predictor of the onset of metabolic syndrome and the likelihood of developing cardiovascular disease (Després, 2012). The WHO recommends body fat for obesity diagnosis of $> 25\%$, and $> 35\%$ in males and females, respectively (WHO, 2000). The measurement of intra-abdominal fat, which is strongly linked to metabolic disorders, is done by measuring waist circumference (WC). Males and females WC cutoff points are 102 cm and 88 cm, respectively, whereas males and females' Asian ancestry cutoff criteria are 90 cm and 80 cm (Alberti et al., 2005). The method for evaluating body fat concentration frequently utilizes DXA and BIA (Donini et al., 2020).

2.2.3 Pathophysiology of sarcopenic obesity

Even when weight remains constant as people age, there are significant reductions in fat-free mass and muscle mass as well as an increase in visceral fat. Sarcopenia is a term used to describe the gradual loss of skeletal muscle mass. It is often referred to as the steady loss of muscle strength and physical performance. Low levels of physical activity and inappropriate dietary intake cause partial development of sarcopenia. Sarcopenia can also develop with age due to a number of age-related changes, including mitochondrial malfunction, endocrine disorders, and neurodegenerative illnesses. Skeletal muscle mass begins to deteriorate as early as age 30, with larger reductions occurring between ages 65 and 80 (Rom et al., 2012). The quantitative analysis found that the average loss of skeletal muscle mass throughout a person's lifetime is 0.37% for females and 0.47% for males, with noticeably greater rates among those who are 75 years or older (Mitchell et al., 2012). According to multiple studies, coupled with this loss in skeletal muscle mass, a considerable fall in

muscle fiber size, has been seen in older people. Several factors, such as alterations in motor coordination, excitation-contraction coupling, energetics, skeletal integrity, fat infiltration, and decreased skeletal muscle aerobic capacity, have an impact on physical performance in older persons (Straight et al., 2020).

Obesity results from an imbalance between energy intake and energy expenditure by excessive energy intake and insufficient physical activity. The accumulation of fat both outside and inside the skeletal muscle may also be caused by the decline in oxidative capacity brought on by the loss of skeletal muscle or impaired mitochondrial function. Additionally, as people age, hormonal changes such as diminished thyroid hormone responsiveness, leptin resistance, and decreased growth hormone and testosterone output are frequently observed. These changes may, through various processes, contribute to the emergence of obesity (Villareal et al., 2005).

Additionally, sarcopenia risk factors include the physiological effects of obesity. The phenomenon is known as anabolic resistance, which describes how obesity may result in resistance to anabolic stimuli such as growth factors hormones, amino acids, and exercise. By altering the signaling pathways involved in muscle protein synthesis and raising the risk for sarcopenia, the increase in intramuscular fat is a significant component contributing to anabolic resistance. Other metabolic factors for the anabolic resistance in older people's muscles include free fatty acids and insulin resistance (Cleasby et al., 2016; Tardif et al., 2014). In particular, visceral fat, which secretes a variety of proinflammatory cytokines such as interleukin-6 (IL-6) and TNF, is affected by systemic low-grade inflammation. Low-grade inflammation may also contribute to anabolic resistance, which may result in insulin resistance and other cardiovascular and metabolic issues. Finally, whereas insulin resistance and inflammation have differing effects on muscle metabolism, both decrease protein synthesis. However, inflammation is primarily responsible for activating proteolysis. In addition to accelerating the anabolic resistance in obese older individuals, obesity-induced muscular fat infiltration also has an impact on muscle quality. Adipose tissue storage causes the muscle to become more rigid, which reduces the muscle fiber's ability to contract and expand. As a result, skeletal muscle mass decreases, which lowers the quality of the muscles (Gadde et al., 2018).

Significant risk factors for both sarcopenia and obesity include a fat-free mass-related lower basal metabolic rate that is typically seen with older age as well as a decreased rate of energy expenditure with age that occurs from decreased physical activity. Sarcopenia and obesity may both be influenced by the physiological changes brought on by aging, including changed hormone levels, vascular abnormalities, low-grade inflammation, and immunological factors. It follows that the frequent coexistence of the two illnesses is not surprising (Cooper et al., 2013; Molino et al., 2016). Older adults with low skeletal muscle mass and strength are 1.95 to 2.62 times more likely to be obese than those with normal skeletal muscle mass (Stenholm et al., 2008). Aging is a factor that affects the quantity, size, and strength of muscle mass as well as muscle function. It also leads to the loss of skeletal muscle fibers. Fat penetration into muscle fiber also increases when oxidative capacity declines (Choi, 2016).

2.2.4 Management strategies for sarcopenic obesity

There are currently no approved medications to treat SO. The treatments that are most frequently advocated focus on lifestyle modification, dietary behavior changes and increased physical activity and exercise. Nutritional and exercise interventions have been combined to treat SO problems (Poggiogalle et al., 2014).

Exercise has received a great deal of attention in human intervention studies and is regularly recommended as a method for treating or preventing obesity. Additionally, many sarcopenic elderly apply exercise to increase their physical performance, muscle strength, and muscle mass (Montero-Fernández & Serra-Rexach, 2013; Vissers et al., 2013). Exercise may improve sarcopenia and obesity-related characteristics through a variety of possible pathways. Firstly, physical activity is crucial for controlling energy balance. When combined with a hypocaloric diet, the energy expenditures associated with exercise may result in a poorer energy balance. Exercise can also improve physical function indicators including handgrip strength, gait speed, balance, and aerobic capacity in both sarcopenic and obese groups. Exercise promotes both muscle protein synthesis and breakdown, but in the fed state, the total balance of these activities is boosted after exercise, leading to a gain in muscle protein and, consequently, muscular hypertrophy. Exercise is commonly discussed in the literature as a means of preventing SO since it is an efficient way to improve body composition characteristics in both sarcopenia and obesity (Jung & Park, 2018).

Exercise therapy is beneficial for the elderly with a range of health problems. Numerous earlier studies have shown the advantages of consistent aerobic exercise in lowering obesity and parameters related to metabolism, as well as the advantages of resistance exercise in boosting muscular strength, mass, mobility, and daily physical activity. It is emphasized that resistance exercise training is the most efficient way for assisting SO in senior citizens to improve their muscular performance. (Trouwborst et al., 2018). While regular resistance exercise is good at increasing muscle mass and physical function, regular aerobic exercise is often utilized to manage obesity. For elderly obese people to improve muscle function and lower their risk of falling, resistance training is essential (Jung & Park, 2018).

Obesity and sarcopenia are two conditions that are significantly influenced by nutrition. However, sarcopenia and obesity are affected by nutrition in distinct ways. While an imbalance between energy intake and energy expenditure leads to obesity, excessive energy consumption also contributes to the condition, sarcopenia is linked to an insufficient dietary intake, especially protein. When creating dietary recommendations for SO, it's vital to consider both the ideal nutrient intake to increase skeletal muscle mass or prevent muscle mass loss as well as appropriate food and energy intake to reduce excess fat mass. The primary challenge is how to maintain muscular anabolism in an energy deficit to avoid a significant percentage of weight loss as a fat-free mass in this population that is susceptible to muscle loss (Ganapathy & Nieves, 2020).

Due to the slowed anabolic reactions, adequate protein consumption is crucial in SO older adults. The ingestion of more equally distributed dietary protein throughout the day and relatively high intake of animal-source protein, which contains the amino acid leucine, at each meal may enhance the anabolic response to dietary intake. Therefore, it is important to consider these variables when developing strategies to improve skeletal muscle mass and function in SO by maximizing muscle protein synthesis (MuscarIELlo et al., 2016).

Exercise and a hypocaloric, high-protein diet are the main approaches used to treat SO. Calorie restriction decreases body weight by usually reducing body fat and muscle mass. A high-protein diet can support muscle mass or slow down the loss of rapidly growing muscles. The effect of protein consumption in older adult

women with SO in the calorie restriction period at 0.8 g/kg/day of protein intake it the inability to preserve muscle mass. Meanwhile, 1.2 g/kg/day of dietary protein has been shown effective in preserving muscle mass (Deutz et al., 2014). Although a high-protein diet is an acknowledged benefit in maintaining or increasing muscle mass in older adults, consuming a diet high in protein can result in a decline in kidney function. For elderly persons with normal renal function or mild kidney impairment who are at serious risk of malnutrition or sarcopenia, health practitioners advise protein intake of 1.0-1.5 g/kg/day. A doctor should evaluate the protein needs of a patient with sarcopenia who has moderate kidney dysfunction, and a low-protein diet of 0.6–0.8 g/kg/d is advised for patients with severe kidney disease (Martínez-Amat et al., 2018).

Treatment for SO mostly involves exercise, but combining the treatment with nutritional therapies may improve grip strength and gait speed (Yin et al., 2020). Low caloric intake with high protein together with aerobic and resistance or circuit exercise are the strategies for lessening fat mass and enhancing muscle mass and strength, in addition to preserving resting metabolic rate (RMR) among older people (Hsu et al., 2019). The study intervention of caloric reduction with increased physical activity over an 18-month period showed significantly improved walking speed and tolerance in elderly who had cardiovascular disease or cardiometabolic dysfunction (Rejeski et al., 2011). Dietary control with a physical activity intervention study has been shown to improve physical performance and activity in daily living. The results of a cross-sectional study on older adults with SO revealed perceptions regarding physical fitness and health-related quality of life (HRQL) (Pedrero-Chamizo et al., 2015). Effective exercise for improved health conditions in older adults with SO should include continuous moderate-intensity exercise for at least 50 minutes daily, more than 2 times per week, and for more than 12 weeks (Jung & Park, 2018). A study by Chang and Chiu (2020) examined the effects of resistance training (RT) on the quality of life (QoL) of older adults in long-term care residents with SO. Six nursing homes had a total of 123 elderly residents received three months intervention. The findings showed significant between-group differences in the QoL variable from the perspective of body composition (Chang & Chiu, 2020).

2.3 Research area context information

2.3.1 Area geography

2.3.1.1 Geography

Northward: Close to Ban Beung San Community, Beung San Sub-district, Ongkharak District, Nakhon Nayok Province.

Southward: Close to Ban Klong Sib See Community, Beung Nam Rak Sub-district, Bang Nam Prio District, Chachoengsao Province.

Eastward: Close to Ban Klong Kao Community, Bueng Kho Hai Sub-district, Lam Luk Ka District, Pathum Thani Province.

Westward: Close to Ban Ching Ta Kean Community, Si Sa Krabeu Sub-district, Ongkharak District, Nakhon Nayok Province.

2.3.1.2 Topography

Chumphon Sub-district is a rural community. The characteristics of houses in the community are detached houses. Most of the areas are farming.

2.3.2 Population structure

Chumphon Sub-district is a population of 1,127 households. The total population is 4,417, with 2,165 males and 2,252 females. There are a number of older adults 738 (16.71%) (Chumphon Subdistrict Administrative Organization, 2023).

2.3.3 Health-related Information

The Subdistrict Health Promoting Hospital of Ban Tam Nob provides the health care services of the people in Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province. According to the overall health status report of the community population, 31.23% of the population had non-communication diseases. The top five underlying diseases of populations in the community were diabetes, hypertension, hyperlipidemia, heart disease, and allergies, respectively. The health care rights of the population in the community found that the 30-Baht Scheme rights (universal health-care) 93.46%, Social security rights 2.27%, civil servant rights 4.26% (Ban Tam Nob Subdistrict Health Promoting Hospital, 2023).

2.3.4 Family and community resource information

2.3.4.1 Health service center of the community

Ban Tam Nob Sub-district Health Promoting Hospital has the following health personnel in the organization: 2 resisted nurses, 1 public health officer, 2 data recording officer, and 9 village health volunteers (VHV). Her Royal Highness Princess Maha Chakri Sirindhorn Medical Center Srinakharinwirot University is the host hospital supporting services and academic work. There is a team of family medicine doctors, nurses, and pharmacists to provide treatment for patients with non-communicable diseases at the Subdistrict Health Promoting Hospital twice a month, including supporting the procurement of vaccines. and dental services.

2.3.4.2 Information on the environment

Every household in the community has enough clean water for drinking and consumption. The households also have and use hygienic toilets. Most of the residences are durable for more than 5 years at 98.48%, and 66.67 % found disease vectors animals in the house (cockroaches, rats, flies).

2.4 Methodology of participatory action research

2.4.1 Basic idea and principles of participatory action research

The term "participatory action research" (PAR) refers to a research methodology in which the participants of the study collaborate with the researcher from the beginning of the project through the end, and where final results include a presentation and discussion of the practical application of the findings (Lake & Wendland, 2018). The roots of PAR come from action research (AR). Kurt Lewin (1890-1947), a German social psychologist, was the first person who coined the term "action research" related to community action programs based on his ideas about change. Lewin believed in the participant's participation in the research process and studied the relationships among human beings based on two important concepts: group decision-making and intention for improvement. As a result, AR enables the researcher to build a social experiment to accomplish an objective. In the 1940s, Lewin used the word "action research" for the first time in his own study "Action Research and Minority Problems". Lewin described spiral steps as flexible, cyclical, and dynamic

processes that entail planning, action, and fact-finding through reflecting on the outcome of the action (Huarng & Mas-Tur, 2016).

AR can be made more participatory by using PAR. Paulo Freire conducted a study in 1970 that was primarily concerned with the findings of a research study that showed the influence of the relationship between the researcher and participant to be subjective rather than objective and the participant's ability to learn on their own. Furthermore, the processes of PAR can be applied for improvement in academic, health professional, social care, and community settings. Despite the potential for positive outcomes, AR and PAR need time, social skills, and the capacity to impart individual knowledge to groups of participants in the management of change (Wallerstein et al., 2017). Various research designs have been used in PAR. Qualitative methods have the potential to address health disparities, encourage community involvement, and create personal empowerment.

A key component of qualitative research is the integration of methodologies and procedures for observing, recording, analyzing, and deciphering the traits, trends, qualities, and meanings of the human phenomena being investigated. Instead of aiming to forecast and exert control, the qualitative technique seeks to describe and comprehend. The entire human experience and the meanings assigned by live people are the main subjects of qualitative approaches. As a result of the encounter, more comprehension and deeper insight into intricate human behaviors come forth. Qualitative approaches, according to Lincoln (1992), are naturalistic, participatory modes of inquiry that reveal people's actual experiences. Therefore, various realities are dependent on personal experiences and situations rather than a single, objective reality (Cordeiro & Soares, 2018).

2.4.2 Characteristics of participatory action research

The ultimate goal of PAR is to enable people to work together to solve problems, which promotes capacity growth and strengthening among all participants. PAR conducts research with people, not on them. The problems of the community are identified, defined, analyzed, and solved by researchers and people working together (Bradbury, 2015). PAR is widely the transformation of social reality and an individual's life improvement; co-researchers collaborate to provide knowledge that will guide practice and address relevant issues. As a result, PAR seeks to ensure

that the research process results in better-informed, if not altered, actions from those engaged. Full participation in the steps of the entire research process is presented. The process of active and reflective learning, or PAR, involves the creation of knowledge. It is a creative method for putting information to the test in the real world and via critical analysis of what has been done (Chevalier & Buckles, 2019).

2.4.3 Steps for generating guidelines to develop and implement participatory action research

Different techniques have been employed to acquire data in PAR. The researcher and participants work together to decide on the best techniques of data gathering for each unique problem or circumstance. In order to overcome the limitations of any particular approach and achieve more effective problem-solving, however, it is advised that at least three well-chosen methods be utilized. Useful data generation approaches utilized in PAR include focus groups, participant observation, field notes, in-depth interviews, personal diaries and logs, questionnaires, and surveys (Keahey, 2021).

Focus groups: Focus groups, which are used frequently to investigate and create knowledge about a certain issue in small groups among the study participants in order to gather data, are regarded as a socially-oriented procedure (Cyr, 2016). Between 6 and 15 individuals are often seen as adequate for a focus group (Kinalski et al., 2017). There should be a heterogeneous or shared set of features among the participants. When having a focus group, it takes a team to lead the focus group interviews, including a knowledgeable facilitator and an assistant. As facilitators or moderators, researchers take part in discussions. In addition to maintaining existing relationships, the facilitators are crucial to the discussion since they establish a pleasant and welcoming atmosphere for new participants. In order to enrich the data, the assistant's responsibility involves watching nonverbal interactions, noting the effects of group dynamics, and recording the basic topics of the discussion (O. Nyumba et al., 2018). As all participants have the chance to communicate, it is ideal for PAR to acknowledge and emphasize all participants' opinions. In PAR, every participant in the research process is an active participant for the duration of the entire research process. Depending on the intricacy of the subject being discussed, the number of questions, and the number of participants, each meeting lasts between 1-2 hours (Guest et al., 2017).

Participant observation: The approach to gathering qualitative data that is most natural, and difficult in some ways, is participant observation. Through immersion and engagement, the researcher learns the how and why of human behavior in a specific setting, connecting them to the most fundamental human experiences. PAR typically uses participant observation, a cutting-edge qualitative research method of inquiry, and a rich source of data collection (Seim, 2021). Capturing both subjective and objective human behavior, it gives the researcher exclusive access to research participants while they are engaged in social interactions. The researcher participates in the experience of being watched, engaged in the environment, and hearing, seeing, and feeling the reality of the social situation alongside the participants (Robey & Taylor, 2018). As a result, the researcher, acting in the role of a participant-observer, engages in activities that are relevant to the social setting in addition to observing the activities, participants, and physical characteristics of the scenario. Participant observation involves taking thorough and in-depth field notes that are used to systematically notice and document socially relevant events, behaviors, and objects (Roulet et al., 2017).

In-depth interviews: A technique utilized in PAR is interviewing, which provides participants the chance to explain their circumstances. Interviewing is an engaging mode of inquiry, a theoretical approach to data collection, and an appropriate way to gather information about human experiences. In order to better understand the participant's perspective, the researcher pays close attention to how the participant frames and organizes their responses. (Simoni et al., 2019). In PAR, the data collection process often uses formal interviews by semi-structured interviews that provide a more adaptable method of conducting interviews. The semi-structured interview's flexibility enables the interviewer to ask a succession of less structured questions and explore any unplanned issues the interviewee brings up. Flexible question wording allows the interviewer to use a variety of linguistic nuances and provide clarifications (Gill & Baillie, 2018). As previously stated, the participant actively contributes to the creation of an interview guide and data analysis throughout the PAR process. In order to provide interviewees with the best chance to explain events and phenomena on their own terms and to conform to agendas of their choice, it is vital that interview questions be correctly constructed (Taylor et al., 2015).

The original form of the AR process and spiral organized by Kurt Lewin consisted of the pre-step and four main steps in the processes of diagnosis, planning action, taking action, and evaluation. After finishing all stages of re-diagnosis, the new spiral is repeated. Pre-step is originated by stakeholders or ownership in the community recognizing the questions or problems in their work or life. The participants collaborate as a team and build relationships to work on research projects. After the pre-step, the main steps are started (Lewin, 1946).

Stephen Kemmiss and Robin McTaggart proposed a new AR/PAR process that is widely accepted by researchers. The stage comprises the following three steps: (Kemmis et al., 2014):

- 1. Planning of change:** The action researchers and participants join to define/organize the community problems and design probable solutions to solve those problems. All stakeholders choose the methods and design process in the research study.
- 2. Acting and Observing:** The action researchers and participants implement of the research process of planning and observing the consequences of action.
- 3. Reflecting:** Content, process, and premise are reflected in this process to generate the new cycle.

After the main process is finished, the researchers and participants diagnose the remaining problems from the outcome of the last cycle process and repeat the spiral process of the new cycle. This cycling process continues indefinitely until the research objectives are achieved or the research period ends.

2.4.4 Participatory action research with older adults

Involving older persons in PAR may be a promising way to better understand and solve some of the complex health and social issues that older people confront, in addition to strengthening the capacity of individuals and communities with focus on empowerment. Involvement in every area of a PAR project is frequently not desired by older community partners who ought to be given the chance to participate in numerous tasks as core researchers. Furthermore, the conversational techniques at the heart of PAR are crucial in ensuring that seniors decide the degree of their personal participation at various stages of the research process (MacDonald, 2012). Given that many context-related factors are involved in older adults' social behaviors and inclusion, PAR is a good fit for these projects, since the methods for modifying context-

related features necessitate an understanding of individual and group lived experiences. There are not many examples or analyses of PAR with older persons, especially during the critical but difficult initiation stage that forms the basis of the subsequent cyclical participatory activity. Typically, older persons do not significantly participate in data collection or analysis, nor do they have any effect on the study questions that are posed (Janes, 2016).

In order to support both individual and societal change, PAR encourages the participation of older adults as co-researchers in all phases of the research process, including problem identification that is important to them and their community, prioritizing the research, conducting data collection and analysis, and disseminating findings. Rethinking the line between scientific and day-to-day knowledge is something that PAR urges older people and academic researchers to do in order to better the PAR process. This is due to the fact that both groups are able to contribute their specialized knowledge and personal experiences. These co-learning options are opposed to exploitative research techniques that are used on senior citizens to achieve objectives that are not centered on their needs, but the organizational or professional aims of researchers and other stakeholders. Older people are frequently positioned as participants rather than co-researchers or collaborators in PAR studies, which is another issue. This is because PAR aims to overcome power disparities through researcher reflexivity and the capacity to see, analyze, and speak about others. Most typically, older persons have minimal opportunity to direct the data gathering process through co-construction or discourse because researchers design and administer the interviews.

López-Mateus et al. (2017) identified the resources of the municipality of Sopó-Cundinamarca, Colombia, with the aim of increasing chances to encourage the development of an educational approach that promotes healthy behaviors as part of the holistic care of hypertension in the elderly through healthy diet and exercise. The examination of the PAR project from the Sopó Community Day Center's second semester of 2015 was developed in three stages. First, a community diagnosis revealed the need to take into account the municipality's culture, traditions, and resources as inputs that help the elderly adhere to healthy lifestyles for the control of hypertension. Second, a work plan was established based on community actions. And

third, the results were considered by the team. A sustainable intervention for the elderly could then be made through promoting dancing as a form of exercise, utilizing agricultural resources, using motivating approaches, enlisting support groups that seek to enhance the welfare of the elderly, and empowering facilitators. (López-Mateus et al., 2017).

In order to decrease older individuals' inactive behavior, Leask CF., et al. (2017) examined the co-creation of a public health intervention. Ten interactive co-creation workshops were attended by academic researchers and 11 community-dwelling senior citizens with a mean age of 74 years. The co-creators worked on fieldwork activities outside of the workshops while sessions were taking place on the university campus. The participatory and appreciative action and reflection techniques guided the workshops. The co-creators created a customized intervention that was given in a way that fit the daily routines of older adults. Co-creation is a workable method for creating public health interventions, but it is constrained by the absence of a formal framework to direct the procedure. To ensure that co-creation can be carried out in a more methodical, scientific, and repeatable manner, future work should concentrate on developing guidelines and suggestions. It is important to evaluate the intervention's efficacy and scalability. (Leask et al., 2017).

Salma J. (2020) examined the physical activity of older Muslim immigrants in Canada where a community-based participatory research project on healthy aging was conducted with 68 older people and community members from South Asian, Arab, and African Muslim ethnocultural communities in a Canadian metropolitan center. Participating community organizations underlined the value of exercise in later life and the urgency of the need for exercise programs. The four topics emphasized the opinions of elder Muslim immigrants in Canada on physical activity; beliefs and methods for staying active; health considerations, such as discomfort and physical restrictions; social considerations, and belonging; and environmental considerations, safety and accessibility (Salma et al., 2020).

CHAPTER 3

RESEARCH METHODOLOGY

This chapter introduces the research methodology, encompassing the selection of participants, study design, procedures, data collection, and data analysis techniques. The section provides an overview of the methods used to gather and analyze data, ensuring the reliability and validity of the study's findings.

3.1 Research design

In this research, participatory action research (PAR) was used as the research methodology. The researcher, along with healthcare professionals, applied evidence-based practice and knowledge to support clinical practice through an emancipatory process aimed at improving the issue of SO among older adults in the community. The outcomes of the PAR approach satisfied the needs of the target population and all stakeholders, improved clinical outcomes, and provided answers to the research questions.

Phase 1, the proposed study commenced with in-depth interviews conducted among older adults with SO to explore their perceived problems, related factors, care needs, and other issues pertinent to create healthy SO in the community. Focus group interviews were conducted involving older adults with SO, their family members, and all community stakeholders to triangulate the data. Content analysis was parallel with data collection until data saturation was achieved. All information obtained from the in-depth interviews and focus group interviews was used to develop the preliminary family and community-based care model for SO in older adults.

Phase 2, the action research spiral was followed, consists of four steps: planning, acting, observing, and reflecting (Kemmis & McTaggart, 1988). As shown in Figure 3.1, re-planning began after the reflecting stage, initiating a new cycle of the spiral process that will continue until the research project is completed.

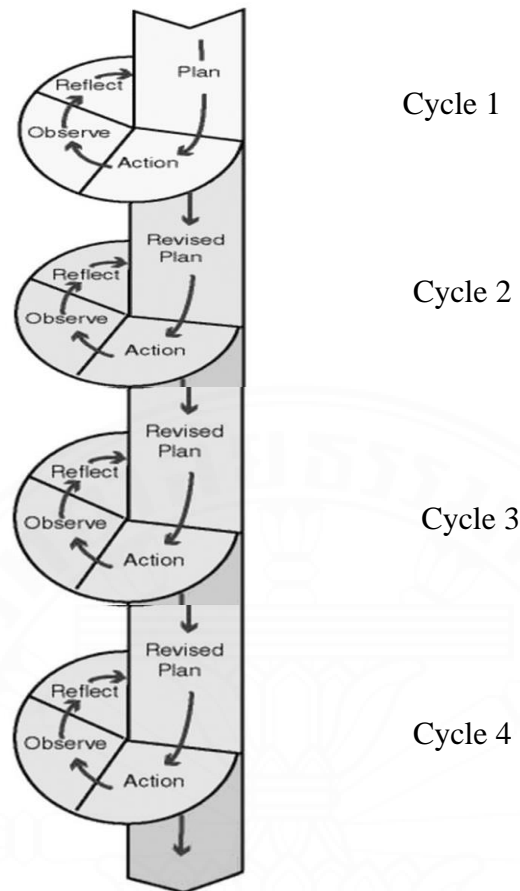


Figure 3.1 Process of action research spirals

Note. From *The action research planner* (p.11), by Kemmis and McTaggart, 1988, Victoria: Deakin University.

3.2 Setting

The researcher selected a study area that aligns with the problem and research objectives. The selection criteria included: a community experiencing issues related to obesity among the elderly and healthcare professionals as well as community stakeholders willing to participate in the research.

The researcher has specifically selected a study area, a rural community in Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province. This community is under the supervision of Ban Tam Nob Sub-District Health Promoting Hospital, which provides family physicians, nurses, and pharmacists from HRH Princess Maha Chakri Sirindhorn Medical Center, an affiliated hospital where the

researcher works. Ban Tam Nob Sub-District Health Promoting Hospital is a place where the researcher used to provide academic support and as a field training center for the Faculty of Nursing, Srinakharinwirot University. The researcher has worked in a project of village health volunteers training for stroke prevention, early stroke detection, and monitoring and support family to caring of stroke patients. This community consists of approximately 20% belonging to an elderly population in which 50% of the elderly are overweight or obese. The prevalence of sarcopenia has never been assessed in this community, but the researchers anticipated a large number of elderlies with SO in this community because there are frequent occurrences of falling problems.

There were no strategies or guidelines to manage the SO problem in this community and the researcher have not performed specific activities related to obesity or sarcopenia in this community. The topography of the community is agricultural and mainly farming. The villagers still live a simple rural lifestyle. People live together like a family, helping, sharing, and participating in social and religious activities. Cultivation is the most common profession in the community. The majority of the people in this neighborhood is Muslims. From all of these elements in the community, the researcher has determined it is suitable to construct family and community-based care model for sarcopenic obesity in older adults.

3.3 Participants, accessibility, and sample size

3.3.1 Participants

This study was conducted among older adults with SO and all of community stakeholders. The participants were separated into primary and secondary target groups using a purposive and snowball sampling method to selected the participants as follows:

3.3.1.1 The primary target population consisted of older individuals with sarcopenic obesity (SO) who residing in the Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province, who met the following inclusion criteria:

- (1) Individuals aged 60 years or older.

(2) Diagnosed with SO based on the AWGS 2019 sarcopenia diagnostic criteria and the WHO obesity criteria for BMI for the East Asian population.

(3) Independent with no restrictions on physical activity and exercise, as measured by "Barthel Activities of Daily Living (ADL) > 12 points".

(4) No cognitive impairment, as determined by the "Thai Mental State Examination (TMSE). The TMSE cut-off score ≥ 23 indicated normal (Institute of Geriatric Medicine, 2008).

(5) Have family members to support health status.

The exclusion criteria were applied by medical history to reject patients as follows:

(1) Living alone or having no family or relatives to look after health.

(2) Diagnosed with moderate to severe kidney dysfunction

(3) Undergoing cancer treatment

(4) Person with life-threatening comorbidities such as severe coronary heart disease.

(5) Have muscle problems or diseases such as myasthenia gravis, or unintentional weight loss.

(6) Hearing or vision problems that impede communication and participation in activities

(7) Psychomotor impairment, and/or known psychiatric problems.

3.3.1.2 The secondary target groups were all stakeholders involved in the development of the care model as follows:

(1) Family members of SO older adults (family member characteristics included those aged 18 years and over who lived together in the same household or lived nearby. A family member is a person who can provide care, support some activities, provide medical attention, and protect the collective and individual rights of older adults).

(2) Health care professionals included a registered nurse of the Subdistrict Health Promoting Hospital.

(3) Community stakeholders included village health volunteers, and community leaders.

3.3.2 Accessibility

The researcher coordinated with the director of the Subdistrict Health Promoting Hospital to discuss the request for support and permission to conduct a research study in the area and subsequently, met with nurses and health workers responsible in the community to explain the proposed study.

3.3.2.1. Purposive sampling

In phase 1, at the beginning, the researcher studied population data of elderly individuals in the community from the medical records of the Subdistrict Health Promoting Hospital to identify elderly people in the community who were target populations. Afterward, the researcher met with the target population, who had appointments with doctors at the chronic disease clinic of the Subdistrict Health Promoting Hospital, and evaluated them to determine if they met the preliminary project inclusion/exclusion criteria. Subsequently, contact information was obtained for future in-depth interviews. Additionally, the researcher visited elderly individuals in the community along with the village health volunteers to act as gatekeepers in searching for research collaborators who met the specified criteria for the project.

3.3.2.2 Snowball sampling

While collecting data in the field, the researcher used snowball sampling techniques to identify potential participants, by asking the interviewed elderly individuals to recommend other elderly community members who met the criteria, i.e., being over the age of 60 and having an obesity profile, to screen for research participants who met the research inclusion criteria.

Before conducting in-depth interviews, the researcher would coordinate appointments for the date, time, and location to collect data with the participants by phone. Personal in-depth interviews followed during which the researcher introduced herself, engaged in conversation to establish rapport, explained the objectives and details of the research project, and screened the research participants for eligibility according to the research inclusion criteria. This included assessing body weight, body fat percentage, muscle mass using an analyzer,

measuring handgrip strength, assessing the ability to perform activities of daily living using the Barthel Activities of Daily Living (ADL) scale, and conducting a cognitive function test using the Thai Mini-Mental State Examination (TMSE).

After verifying eligibility for research, participants who met the research inclusion criteria were asked to sign informed consent forms to participate in the project if they voluntarily wished to join. Subsequently, personal data questionnaire surveys and physical ability tests were conducted following the Short Physical Performance Battery (SPPB) criteria before proceeding with the next interview. During the interview, the researcher requested permission for the research participants to record the interview with audio recording devices in addition to written notes, aiming to confirm the research and facilitate subsequent data analysis. The interview with research participants took approximately 60 minutes that followed a semi-structured question format.

In step of focus group interviews, the SO older adults were selected in the same as inclusion/exclusion criteria. Family members were selected based on older adults with SO, who was the primary target population. Healthcare professional teams and community stakeholders were selected based on their qualifications and responsibility for caring or involvement with healthcare facilities for the older adults with SO and their families. All of the participants voluntarily participated in the study.

In phase 2, purposive sampling of SO older adults who participated in phase 1 and other which eligible participants.

3.3.3 Sample size

In qualitative research, the number of participants or sample size is not determined by the exact number before the study. Researchers applied the concept of saturation to determine whether the number of participants in a study is sufficient and appropriate (Malterud et al., 2016). Saturation refers to the point at which researchers are collecting and analyzing the data in parallel, but have no additional codes or new concepts emerging from the data analysis (Hennink & Kaiser, 2022). Qualitative research aims to understand and create knowledge from the participants, as well as collect in-depth information. Therefore, a small sample group is used but must collect information in-depth and in great detail (Vasileiou et al., 2018).

The researcher kept conducting interviews until data saturation was achieved. Therefore, the number of primary target participants in in-depth interviews was 25, the number of primary target participants in focus group interviews was 5, the secondary target population was 7, and the number of primary target participants in PAR process was 15.

3.4 Research tools

3.4.1 Researcher: In qualitative research study, the researcher is the most significant research instrument. Both research techniques and data collection skills have been achieved by the researcher. In addition, the researcher must apply her expertise obtained through:

3.4.1.1 Enrolled in a research methodology course in the Faculty of Nursing, Thammasat University.

3.4.1.2 Practiced interviewing and focus group interviews skills with senior researchers and research project advisors.

3.4.1.3 Practiced the ATLAS.ti program (The software for qualitative data analysis).

3.4.1.4 Building positive community ties and trust was a necessary precondition for undertaking PAR. Therefore, the researcher's skills in collecting data in the community demanded a positive attitude and rapport-building techniques.

3.4.2 Research assistant: The research assistants participated in data collection during focus group interviews and the action research spiral of PAR. The research assistant was also a doctoral student who have completed a qualitative research course and has completed trainings in focus group interview skills. The research assistant's role included observe non-verbal interactions and the impact of group dynamics, document the general content of the discussions, record the audio and supplement the data. The researcher conducted orientation and trained the research assistant before the data collection process to ensure the smooth operation process and quality data. Therefore, one research assistant in this study.

3.4.3 Data collection equipment: The researcher tested data collection equipment including the BIA, handgrip dynamometer, stopwatch, notepad, camera,

and digital audio recorders. All devices were re-calibrated by the researcher according to the product protocol. The researcher was trained in the use of equipment according to manual instructions.

3.4.4 Questionnaires: The questionnaires for data collection in the proposed study were as follows:

3.4.4.1 Socio-demographic characteristics questionnaire: A questionnaire developed by the researcher was used to collect personal information from older individuals and relevant stakeholders who took part in the study. Information related to the name, residence, phone number, gender, age, marital status, religious, educational level, occupation, caregiver, average monthly income, source of income after retirement, and health status were collected. This information was collected by using multiple-choice and fill-in-the-blank questions.

3.4.4.2 Sarcopenic obesity record form: This data included body composition data comprised of body weight, height, body mass index (BMI), body fat mass (BFM), body fat percentage (BF%), SMM, SMI, handgrip strength, and SPPB.

(1) Bioelectrical impedance analysis (BIA) was the instrument for assessing body composition in this study which reports body weight, body fat mass (BFM), body fat percentage (BF%), and skeletal muscle mass (SMM). Afterward, body mass index (BMI) was calculated using the equation: $BMI = \text{body weight (kg)} / (\text{height-meter})^2$ (Chen et al., 2020). Skeletal muscle index (SMI) was calculated using the equation: $SMI = SMM \text{ (kg)} / (\text{height-meter})^2$ (Janssen et al., 2020).

(2) Muscle strength assessment tool: handgrip strength by hydraulic hand dynamometer measurement (Jamar hand dynamometer) was the instrument used in the proposed study to measure muscle strength. The procedure for hydraulic hand dynamometer started with giving the participant instructions about its use, followed by a demonstration before the measurement, and told the participant to try the handgrip dynamometer. Participants were asked to sit up straight in a standard chair and bend the lower arm to 90 degrees without touching the trunk. They were told that shoulders should be relaxed, and the wrist should be in a neutral position. The participants squeezed as hard as possible when directed to do so by the researcher. The maximum value of handgrip strength was read. The measurement was

taken 3 times in each arm. Between each measurement, the participants took a rest period of 30 seconds. The highest value out of 6 measurements was reported as the final result (Langius et al., 2017).

(3) Physical performance assessment tool: “Short Physical Performance Battery (SPPB)” was the instrument used to measure physical performance, used as indicators of standing balance, strength, and gait speed measurements.

1. Standing balance was measured through static standing balance in the position of joining feet together, semi-tandem or the side one foot in front of the other and next to each other, and full-tandem by putting the feet in front of each other. During the measurement procedure, the participants were asked to hold the position for 10 seconds to indicate a complete measurement. The participants were able to move their armchair or bend their knees, but not move their feet.

2. The strength measurement was done through repeated chair stand (5-times chair stand), the participants were asked to get up and sit down 5 times as quickly as they could with their arms folded over their chest. The mission was completed within 12 seconds.

3. Gait speed (6-meters walk) was measured on a flat, obstacle-free floor, which was all that was required. Participants were asked to walk 10 meters at the usual pace; the timer recorded at 2 to 8 meters for acceleration and deceleration. In frail older adults or who could tolerate 6-meter walk, 4-meter walking distance was performed with the cutoff point of < 0.8 m/s (Mehmet et al., 2020).

4. The score in each test had a range of 0 to 4 points (inability to take action to excellent performance). The SPPB total score ranges from 0 to 12 points (worst to best performance) (de Fátima Ribeiro Silva et al., 2021).

3.4.4.3 “SARC-F questionnaire”: The SARC-F was an acceptable tool for initial screening for sarcopenia as the simple, speedy, suitable, and affordable tool. The SARC-F comprised of 5 questions including strength, assistance in walking, rise from the chair, climb stairs and falls. Each response received a score of 0, 1, or 2 points. The possible total score ranges from 0 to 10. A risk of sarcopenia is indicated by a score of 4 or above (Malmstrom et al., 2016). Cronbach’s alpha coefficient was 0.85 (Nguyen et al., 2020).

3.4.4.4 “Barthel activities of daily living (ADL)”: The Barthel Scale/Index (BI) was an ordinary scale used to assess performance in activities of daily living (ADL). Barthel included 10 personal activities: feeding, grooming, transfer, toilet use, mobility, dressing, stairs, bathing, bowel control, and bladder control. It contains 10 variables that describe ADL and mobility. The Barthel ADL index has a total score of 20. Cronbach’s alpha coefficient was 0.82 (Petchprapai, 2019). Interpretation of the classification of the elderly was based on the criteria for assessing the ability to perform daily activities on the Barthel ADL index, which is divided into three groups as follows:

(1) A group of older people who are self-reliant/helping others, community, and society with a total ADL score of 12 points or more.

(2) A group of older people who can take care of themselves partially, but are dependent on others for the rest, which has a total ADL score of 5 to 11 points.

(3) A group of older people who cannot be self-reliant/cannot help themselves/have disabilities/or are handicapped, which has a total ADL score of 0-4 points.

3.4.4.5 “The Thai Mini-Mental State Examination (TMSE); The Thai Mini-Mental State Examination (TMSE) is a modified and improved version of the Mini-Mental State Examination (MMSE) by Folstein and colleagues (1975). It consists of 6 questions, including orientation, registration, attention, calculation, language, and recall. The maximum score on the TMSE is 30 points. Patients who score below 23 on the TMSE are considered to have cognitive impairment. Cronbach’s alpha coefficient was 0.77 (Kanjnanopinit et al., 2014)

3.4.4.6 In-depth interview guidelines: The interview guidelines were built based on individual behaviors relevant to the risk of SO and non-pharmacological strategy management of SO among older adults. This instrument was used to collect information among older adults with SO to developed the preliminary family and community-based care model. Open-ended questions were used in the in-depth interviews.

3.4.4.7 Focus group interview guidelines: The guide followed significant themes gathered from the literature and open-ended questions followed by an

in-depth interview. The focus group interviews gathered information and opinions from older adults with SO, their families, and other stakeholders (e.g., registered nurses, village health volunteers, and community leader). It was an opportunity to express attitudes and exchange experiences in a variety of ways according to the predefined framework of issues or questions.

3.4.4.8 Voice recorder: The recorder was used for audio recording while conducting in-depth interviews and focus groups interviews with permission from the participants by signing in consent form. Voice recording is a useful tool to check the information obtained. It also prevents the loss of data that cannot be recorded while doing an activity.

3.5 Protection of human subjects

The study was submitted for ethical approval from the “Human Research Ethics Committee of Thammasat University (Science)” on March 2, 2023, Certificate No. COA 015/2566. After the research was approved, further steps were conducted under the human’s protection criteria as follows:

3.5.1 Conflict of interest of the researcher: The researcher conducted the study according to the written plans and did not take any actions that were not specified in the human research ethics request. The researcher did not ask participants for any information other than the answers to the questions. Only the research participation statement and permission form were displayed.

3.5.2 Informed consent processes

3.5.2.1 The researcher collected only the specified data, included handing out questionnaires and obtaining consent from the research participants, in person.

3.5.2.2 The researcher outlined the study's aims, research procedures, potential advantages, and dangers associated with participation. Participants received datasheets before the data collection began. Participants were not forced to participate; instead, they were given the freedom to make their own decisions and had the option to withdraw from the study whenever they felt to do so.

If an informant has been informed and chooses to engage in the study project voluntarily, the researcher made them sign a research consent form and provide them a copy of the participant information

3.5.3 No coercion to participate in research projects: Neither the researcher nor the study participants were forced to participate in the research project, either directly or indirectly. In other words, to recruit research volunteers, the investigators did not exaggerate the benefits or demonstrate exceptional privileges in providing services above others.

3.5.4 Privacy and confidentiality

3.5.4.1 Privacy was protected in the location where the research data was collected.

3.5.4.2 The information collected from research participants was kept private by storing it in a secure location and assigning access codes to audio and document files saved on the computer.

3.5.4.3 The study report was a summarized to avoid tarnishing the image of research participants and agencies by not releasing their names, surnames, or places of employment.

3.5.5 Physical, mental, social, economic, or belief risks of the subjects participating in the research project: The participants were informed that participating in the research experiment posed no physical, mental, social, economic, or belief hazards to them. Access to health services was not harmed as a result of the information provided.

3.5.6 Concerns about the physical and mental safety of participants: The researcher examined the individuals' willingness to participate in interviews. If they were sick or tired, the researcher did not ask them to participate in the study. Furthermore, the researcher emphasized the importance of adhering to strict practice guidelines to prevent the spread of COVID-19.

3.5.7 Compensation/souvenir/travel expenses: The researcher gave some compensation at the end of the study to thank the participants for their valuable time and participation in the study.

3.5.8 Handling of personal data and data destruction: The data of the study was maintained in a secure location where only the researcher had access to

it. The data will be destroyed as soon as the research is finished, with the researcher deleting all recorded audio files and shredding all documentation relating to the research participants.

3.6 Data collection

In this study, data collection took place from March to August 2023. After being approved by the Human Research Ethics Committee of Thammasat University (Science), the researcher collected the data in person with the assistance of research assistants. Before going to the study area, the researcher prepared a letter of request for permission and sent it to notify the relevant agencies. The researcher collected the data according to the research process, which was divided into two phases as follows.:

Phase 1: Analysis of perception of SO, factors related, effect to health, care needs, roles, environmental resources, and problems as well as participation in action planning. Family and all stakeholders participated to explore the problems and their roles in solving the problem. The data collection in Phase 1 was conducted from March to May 2023.

Phase 2: Developed the family and community-based care model for SO in older adults through the PAR. The process in Phase 2 was conducted from May to August 2023.

Phase 1: The research process conducted in Phase 1 was as follows:

1. In-depth interviews: This process was conducted among older adults with SO.

(1) The researcher established good relationships and familiarity with healthcare professionals. Additionally, observed the behavior and lifestyles related to the real situation of older adults, their families, the health personnel team, and stakeholders in the community.

(2) The researcher studied documents and reports to collect information about the community's history, geography, culture, community calendar, demographic structure, general facilities in the community, and the health status among older adults.

(3) Nurses and village health volunteers served as the gatekeepers in the community. Gatekeepers were the individuals on-site who welcome researchers into the community, introduce them to the target group and all stakeholders in the study, and help obtain access to the setting and permission to study the participants. The researcher greeted, introduced herself, and built good relationships with these gatekeepers. A brief research proposal was developed for the gatekeepers.

(4) In the first meeting with older adults, the researcher introduced herself and established trusting relationships with them. The SARC-F assessment was conducted for older adults who had obesity. Body composition and health information, including body weight, height, body mass index (BMI), body fat mass (BFM), body fat percentage (BF%), SMM, handgrip strength, SPPB, and health status, were collected. The researcher also assessed ADL performance and TMSE among the older adults to screen the inclusion criteria.

(5) Next, a brief proposal outlining the study's objectives, data collection procedures, expected benefits, and potential risks was provided to the target participants. The researcher explained issues regarding the participants' right to withdraw from the study at any time and the confidentiality of the participants. Then, the researcher asked the participants about their convenience and willingness to participate in the project. If they were willing to participate, the researcher distributed a consent form. To ensure that participants understood the information presented, the consent form was written in basic Thai language for easy comprehension. A signed consent form was obtained from all participants.

(6) Interviews were scheduled at a convenient time and place for the participants. Participants were contacted in advance by phone to confirm their appointments at least one day prior. An appropriate venue was selected, free from distractions, where participants could talk openly. The average duration of the interview with each participant was approximately 45-60 minutes.

(7) The researcher conducted individual in-depth interviews with older adults who met the inclusion criteria and were willing to participate. The interview questions were open-ended, with 21 probing questions. During the interviews, the researcher recorded audio. All notes taken were compared with the verbatim transcripts to

ensure the accuracy of the information collected from the participants. The researcher continued the interviews along with the content analysis until data saturation occurred. 25 older adults with SO were interviewed.

The saturated data were used to create a preliminary core model from the perspectives of the older adults. Throughout this process, the researcher worked with an advisor who is an expert in qualitative research. At the end of the interviews, the researcher thanked all the participants for their participation in the study and provided a small token of appreciation to each participant

2 Focus group interviews: This process was conducted among the older adults with SO who did not participate in the step of in-depth interviews and all stakeholders (family members, registered nurses, village health volunteers, and community leader), who were mentioned as secondary target groups. The steps of preparation and data collection were as follows:

(1) Older adults with SO and all stakeholders were divided into two groups for triangulate data.

(2) Participants were contacted by the researcher at least 3 days before the session. The dates, times, and location of the focus group interviews were conducted at Subdistrict Health Promoting Hospital that was convenient for all participants. A place known to all participants at the center of the community. It had privacy, good ventilation, and nothing to disrupt the focus group interviews or data collected from the participants.

(3) The researcher collected basic information on the groups of participants, including age, occupation, job description, education, religious beliefs. The researcher developed familiarity with the discussion topic by reading and understanding the questions to be used in the focus group interviews several times.

(4) The research assistant was trained to capture the issue in the discussion and take note of participants' nonverbal expressions to be used in the focus group interviews.

(5) The researcher acts as a moderator who leads the discussions according to the predetermined points or line of questions to obtain clear, insightful, and pertinent information. The group activities include a research assistant who serves as a note-taker and a general facilitator. The focus group interview records

are kept for every speech and expression of the participants, in addition to creating seating charts for the participants.

(6) The researcher and participants jointly established and followed the rules of the focus group interviews, such as speaking one at a time and the ability to express opinions, even when they differ from others. During the process, the researcher prompts the participants to engage in conversation with one another. The researcher requested permission from the participants for audio recording during the group discussions and used two recording devices in different locations. The duration of each focus group interviews is about 120 minutes.

(7) The researcher thanked all the participants and gave them tokens of appreciation after the completion of each group process.

At the end of the process in Phase 1, the researcher reviewed the data to create the preliminary care model, confirmed data validity, and assessed practical feasibility before proceeding to Phase 2.

Phase 2: Developed a family and community-based care model for SO in older adults through the PAR. In this phase, the researcher designed an action to develop the model through an action research spiral process based on PAR. The PAR process cycle involved planning, acting, observing, and reflecting, allowing participants to formulate a spiral process until care model was developed and suitable for this context. The participation group divided into 2 groups, and consists of 4 cycles in each group.

The researcher used information from in-depth interviews and focus group interviews as the foundational information for activity planning. This involved allowing participants to participate in setting the objectives of the activities, planning the activity formats, and reflecting on the results of the activities. Then, the data obtained from the reflection on results were used in planning the next cycle of work until the desired health care model results were achieved.

The end of the 4 cycles received the family and community-based care model in sarcopenic obesity in older adults in this community. The PAR process was also encouraged participation by all involved in activities that promoted healthy SO for older adults with SO in the community. This model was a suitable model for context and sustainability in practice and development.

3.7 Data Analysis

Qualitative data analysis is the systematic process that distinguishes the elements of data and organizes data to find meaning, structure, and finding relationships of information, ultimately leading to a deeper understanding of the study. Qualitative data analysis was initiated simultaneously with data collection and continued in parallel throughout the data collection process. As the researcher obtained data from the collection, she analyzed the data and adjusted or refined the data collection questions. This process continued until data saturation was achieved (Holloway & Galvin, 2016).

3.7.1 Quantitative data: The socio-economic status of the older adults and all stakeholders in the proposed research study was collected through questionnaires. The personal biodata questionnaire contained information such as name, gender, age, marital status, religion, educational level, primary occupation, family caregiver, average monthly income, and underlying disease all of which was analyzed in terms of frequency distribution, percentage, mean and standard deviation using a statistical data analysis software called SPSS.

Data from the SO record form, including weight, height, BMI, BFM, SMM, handgrip strength, SPPB score, waist, and hip circumference, were collected using measurement tools. All the data were analyzed for frequency distribution, percentage, mean, and standard deviation using statistical data analysis software (SPSS).

3.7.2 Qualitative data: Qualitative data were collected from observations, in-depth interviews, focus group interviews, and the action research spiral of PAR. The observed data was converted into field records. At the same time, the recorded information from the in-depth interviews, focus group interviews, and spiral process of PAR were transformed into transcripts.

This study used data analysis strategies by Miles and Huberman. Detailed steps of the data analysis process (Miles et al., 2020) were as follows:

Step 1: Prepare and structure the data for analysis, incorporating interview transcriptions, focus group interview records, voice recordings, observation records, and field notes in text format. The data includes labels with interviewee names and codes, along

with date, time, and location of data collection. During the initial stages of analysis, the researcher systematically arranged the data into files and established a standardized file naming convention. This uniform file naming approach ensures easy discovery of objects within extensive databases, facilitating analysis, whether conducted manually or using computer-based methods.

Step 2: Review and familiarize oneself with the entire dataset. The researcher made field notes during their time in the field, capturing reflective thoughts and crafting passages that started to give form to the visual data. To effectively handle the text data, the researcher generated a summary sheet from the field notes, employing metaphors as a technique.

Step 3: Initiate the coding process for the entire dataset by assigning codes or themes to sets of field notes, interview transcripts, or documents. Throughout the data collection phase, written data or photographs were collected. Sentences (or paragraphs) and visuals were categorized, with each category being labeled, often based on the language used by the participants. The researcher used qualitative data analysis software (ATLAS.ti) in the qualitative data analysis process. ATLAS.ti is a “qualitative research instrument that can be used for coding and analyzing transcripts and field notes, building literature reviews, creating network diagrams, and visualizing data.” ATLAS.ti provides qualitative data that is more visual, and portable, and also simplifies the analytical discussion process between two or more researchers. The software has improved skills in undertaking data analysis by presenting a multitude of means and ways of retrieving, sorting, and interrogating raw data (Friese, 2019). It also facilitates the application of a particular methodology and supports the analytical process through coding, making memos, linking, and networking view functions. The example of step for data analysis shows in appendix M)

Step 4: Utilize the coding process to produce a depiction of the setting or individuals, along with categories for subsequent analysis. The description encompasses comprehensive information about people, places, or events within a given setting. Codes were generated for themes or categories representing recurring and significant findings in qualitative inquiries. These themes often served as headings in study findings sections, incorporating diverse perspectives from various individuals, supported by a range of quotes and specific evidence. The researcher conducted counts for both frequency and codes.

Step 5: Anticipate the manner in which the qualitative narrative will portray the description and categories. This involves presenting events in a chronological sequence during an in-depth exploration of diverse themes, encompassing subthemes, specific illustrations, multiple perspectives from individuals, and citations. Alternatively, it may involve a discussion of interconnected themes. The researcher established a cohesive chain of evidence by documenting relationships between variables.

Step 6: The researcher interprets the research findings through contrasts and comparisons. The concluding phase involved generating a report containing a concise summary of relevant themes and an academic analytical report. While providing an anonymous overview of the participants in the study, the researcher expressed concerns about maintaining confidentiality.

Step 7: The researcher utilized the information as input data to developed the preliminary care model for sarcopenic obesity older adults through the PAR process. The researcher and participants formulate a spiral process until care model was developed and suitable.

Step 8: Data in each cycle of PAR were analyzed and summarized the care model.

3.8 Trustworthiness

Trustworthiness or rigor of the research refers to the level of confidence in the study process and presented results of the study that to ensure that the research have credible quality (Connelly, 2016). The researcher was responsible for engendered trustworthiness in research information with determination and confirmation of the information obtained from the research. Guba and Lincoln (Guba & Lincoln, 1994) identified operational techniques and terms to support the trustworthiness of the research study. This proposed study maintained its trustworthiness as follows:

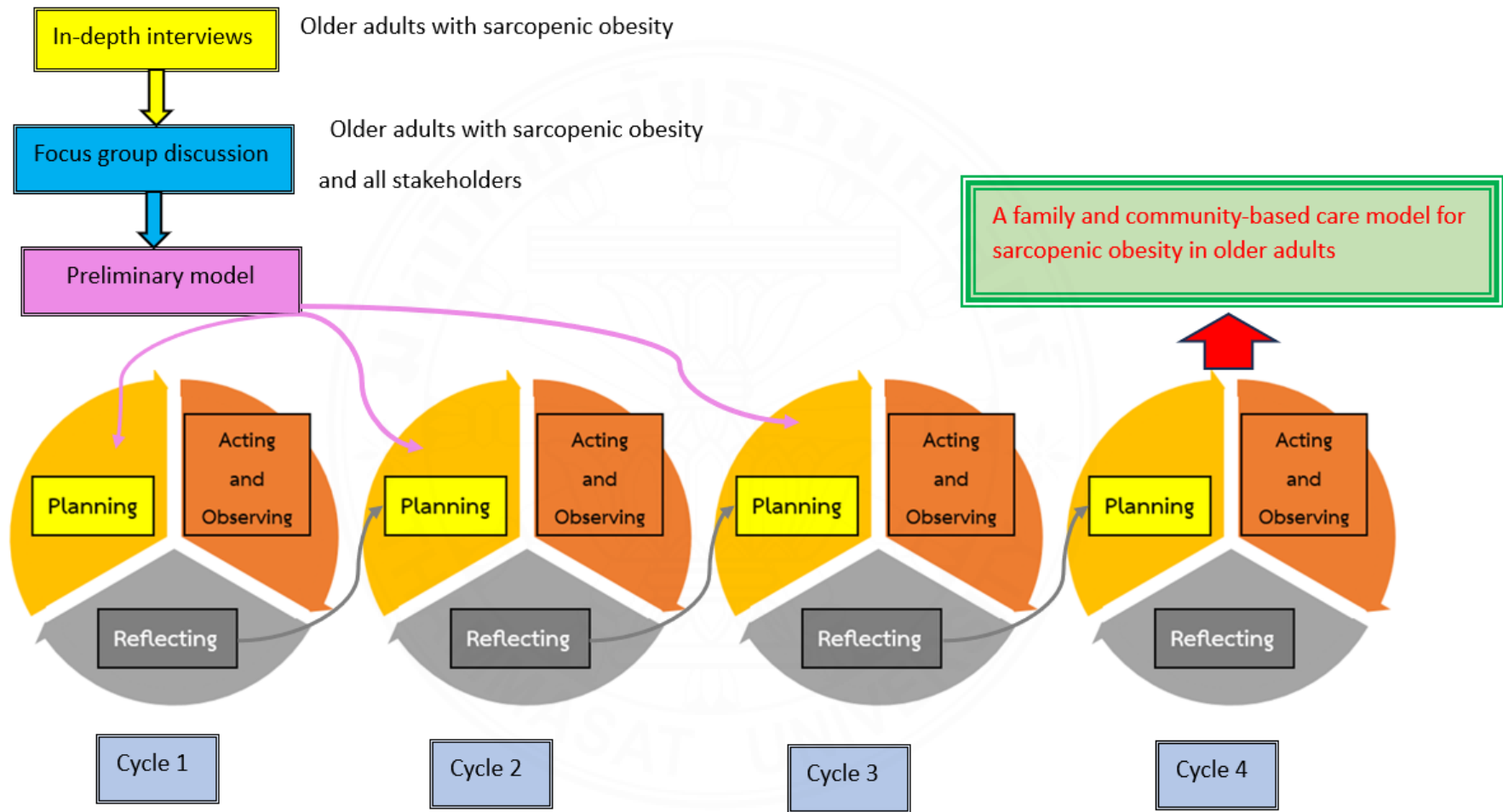


Figure 3.2 Summary of the action research spiral process

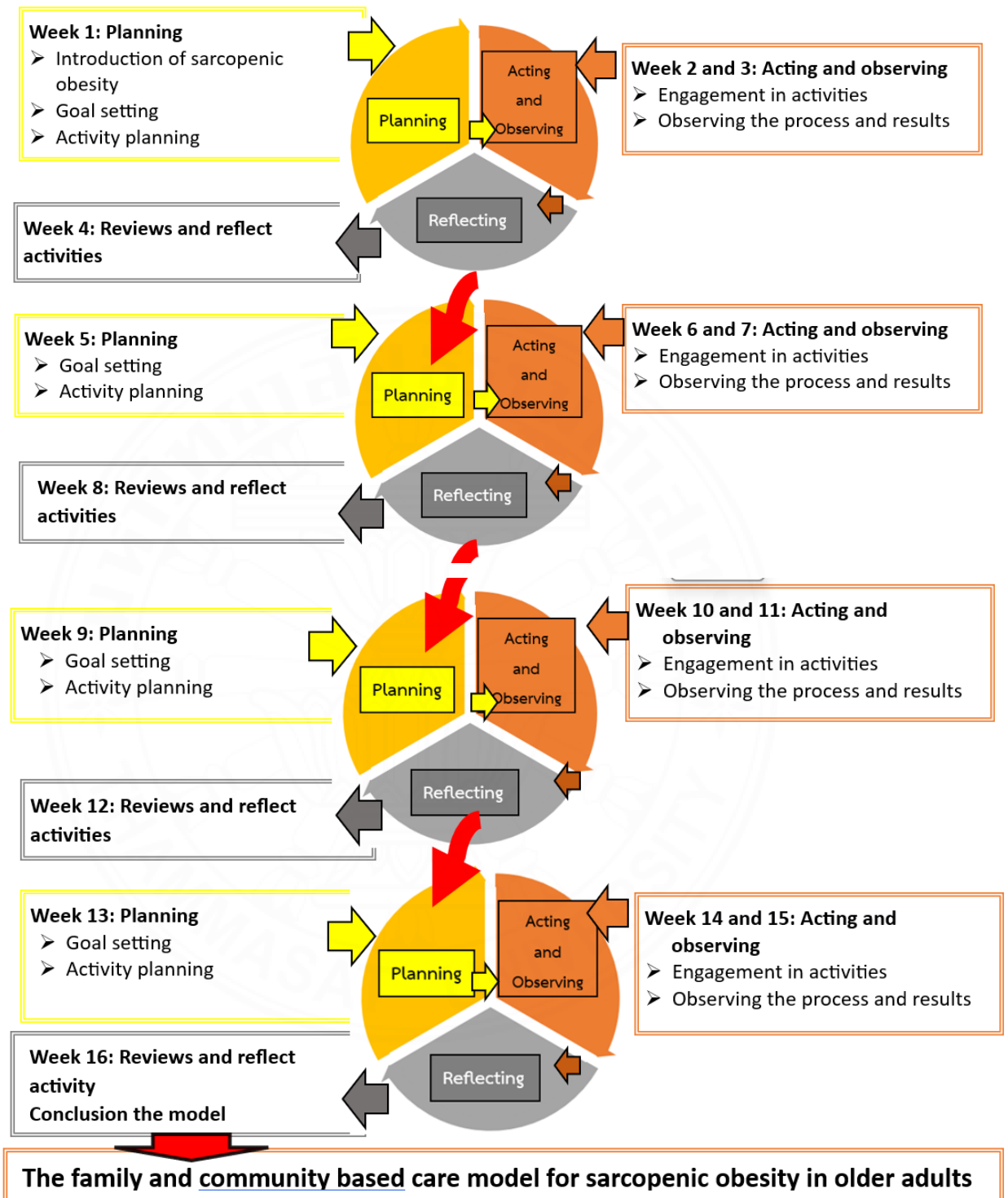


Figure 3.3 Participatory action research process for developing a family and community-based care model for sarcopenic obesity in older adults

3.8.1 Credibility is defined as the accurate meaning of study as a result of suitable collected information. Credibility reflects the reality of a variety of phenomena or truth values. Researchers established credibility through prolonged participation in the field until able to eliminate bias and understand the important issues of informants, and data triangulation. The researcher regularly participated in various community activities, including religious activities, and discussing with individuals in the community. Information obtained from various methods of gathering information can help verify that information was consistent with, or contrary to, the findings (Holloway & Galvin, 2016). Triangulation of this research study included combining more than one research technique in a single investigation or using three different reference points. Because the strengths of one approach may serve to compensate for the limitations of another, triangulation can increase data dependability and validity (Holloway & Galvin, 2016). In proposed study apply triangulation methods as follows:

3.8.1.1 Data triangulation by obtaining data from different groups, including older adults with SO, family members, healthcare professional teams, village health volunteers, and community leader. For the group activities in Phase 1.2, and Phase 2 the participants were divided into 2 groups.

3.8.1.2 Investigator triangulation. In this proposed study, the main researcher collected the data. Advisors and co-advisors who are expert researchers involved the study by consulting and reflecting the data.

3.8.1.3 Methodological triangulation. The researcher used multiple data sources, including in-depth interviews, focus group interviews, field notes, observation, and documentation in this study.

3.8.2 Dependability is defined as the confirmation that the information presented reflects the condition of the phenomenon under study. The data represented should be consistent with time, researchers, and techniques of analysis (Creswell & Poth, 2016). The process of checking and confirming done by the research advisor through verified procedures was followed correctly. Peer reviewers can examine the event details of research activities and processes or evidence to determine the credibility of the research findings.

3.8.3 Confirmability is defined as the ability to confirm the output of the data obtained from the study research. The purpose of confirmability is for two or more

independent persons to agree on the data's relevance, accuracy, or significance. To satisfy these criteria, the results represented the participants, their voices, and the circumstances of the inquiry, not the researcher's preconceptions. The researcher conducted a check of the peer debriefing as activities at every stage of the research, the researcher took note of every detail and asked a qualitative expert advisor to share details, critique, and comment on the information/ findings to determine whether the information received were accurate and relevant to the research question or not and how. These discussions help to avoid biases resulting from a single person's perspective on the research (Moon et al., 2016). According to Guba and Lincoln (1989), the process of confirmability was generated after credibility, transferability, and dependability were all achieved (Nowell et al., 2017).

3.8.4 Transferability is defined as the ability to apply research findings in another similar phenomenon or context (Holloway & Galvin, 2016). Transferability in research arises through the researchers explaining the findings clearly with thick descriptions based on information drawn from the perspectives and experiences of participants, research methods, interpretations of study results, and peer debriefs. There was enough detailed information from the audit trail and a memo should be provided for other researchers to be applied in similar contexts.

The advantages of PAR for generating the model of care are collaborating, activity engaging, and empowering all stakeholders in the community results in sustainable changes, because PAR must be learned and understood in the context of each circumstance and culture. It must build coherence and connectedness with the community's popular knowledge production heritage. Therefore, it was a suitable method to be used in studying the determination of this research. The proposed study aimed to create a family and community-based care model for older adults with SO by learning from background experiences and views among older adults with SO and stakeholders in the area who need PAR and are concerned about these issues. The research process was divided into 2 phases. The first phase focused on the study of perceived situations of older people with SO, relevant factors, care needs, problems, roles, and other issues related to creating healthy SO in the community among older people with the experiences and views of SO and relevant stakeholders to bring the data for creating the preliminary core model. The second phase was focused on developing

the family and community-based care model for older adults with SO through group activity based on the PAR process. At this stage, the model was improved based on the PAR process until model saturation was achieved. The PAR cycle consisted of planning, actions, observing and reflecting on performance to improve plans, and implementing revised activities. The cycle of these 4 steps was characterized by an action research spiral process that repeated the cycle until the transformational effect was achieved. These processes led to a unique practice model that met the needs of older adults with SO. Assessing the process, practice activities, success factors, obstacle factors, satisfaction, and outcomes were addressed at every step of working based on the PAR process.



CHAPTER 4

FINDINGS AND DISCUSSION OF THE FINDINGS

The objectives of the research on the development of a family and community-based care model for SO in older adults is to explore the perception of SO, the factors related to SO, effects of SO on the health status and care needs, necessary and environmental resources for managing SO in older adults to design and develop a care model for older adults with SO by engaging the family and community through the PAR. In presenting the finding of the study, the researcher presents the following information:

4.1 General information of the participants

4.2 Community contexts

4.3 Community health systems

4.4 Research process and finding

4.5 Synthesis finding of the development of a family and community-based care model for SO in older adults

4.6 Discussion

4.1 General information of the participants

4.1.1 Participants

The participants of this study included primary participants, older adults with SO, and secondary participants, relevant stakeholders in the community including family members, registered nurse, village health volunteers, and community leader. All participants are relevant to managing SO in older adults and preventing complications. This research was conducted in a community in Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province. The participants include 33 older adults with SO, 2 family members of older adults with SO, 1 registered nurse, 3 village health volunteers (VHV), and 1 community leader. The general information of the participants is shown in Table 4.1 and Table 4.2.

Table 4.1

Number and percentage of the participants classified by general information (n=40)

General Information	Number	%
1. Participants		
Older adults with SO	33	82.50
Family members	2	5.00
Registered nurses	1	2.50
Village health volunteers	3	7.50
Community leader	1	2.50
2. Gender		
Male	6	15.00
Female	34	85.00

Based on Table 4.2, the details of the research findings on the demographics of the participants who are older adults with SO in Phase 1 are as follows:

Gender: The participants included both males and females with a higher percentage of female than male (86.67% and 13.33%, respectively).

Age: The Majority of the participants (n = 17) were from the age group of 60 – 69 years. The youngest participant was 62 years old and the oldest was 88 years old.

Religion: The participants' religions included Islam and Buddhism with a higher percentage of Muslims than Buddhists (93.33% and 6.67%, respectively).

Marital status: Most of the participants were married/in committed relationships (60.00%), followed by widowed and separated/divorced (36.67% and 3.33%, respectively).

Education level: Most of the participants completed primary education (86.67%), followed by participants who were uneducated (13.33%).

Table 4.2*Demographics data of older adults with sarcopenic obesity in Phase I (n=30)*

Demographics data	n	%
1. Gender		
Male	4	13.33
Female	26	86.67
2. Age (years)		
60-69	17	56.67
70-79	10	33.33
80 or more	3	10.00
MIN = 62 years, MAX = 88 years, M = 68.86 years, SD= 7.11		
3. Religion		
Islam	28	93.33
Buddhism	2	6.67
4. Marital status		
Married/committed relationship	18	60.00
Widowed	11	36.67
Separated/divorced	1	3.33
5. Education level		
Uneducated	4	13.33
Primary school	26	86.67
6. Income (bath/month)		
1-1,000	15	50.00
1,001-5,000	11	36.67
5,001-10,000	4	13.33
MIN = 600 baht/month, MAX = 10,000 baht/month, M = 2,270 baht/month, SD = 2,386.19		

Table 4.2*Demographics data of older adults with sarcopenic obesity in Phase I (n=30) (Cont.)*

Demographics data	n	%
7. Source of income in retirement (more than one answer possible.)		
Elderly pension from the government	27	90.00
Work	7	23.33
Provided by son/daughter	6	20.00
8. Chronic Diseases (more than one answer possible)		
No	1	3.33
Yes	29	96.67
Hypertension	24	82.76
Dyslipidemia	26	89.66
Diabetes mellitus	16	55.17
Heart disease	3	10.34
Asthma	3	10.34
9. BMI (kg/m ²)		
25.00-29.99	13	43.33
30- 34.99	12	40.00
≥35	5	16.67
Min = 25.34 kg/m ² , Max = 44.6 Kg/m ² , M = 32.11 Kg/m ² , SD = 4.86		
10. Body fat (%)		
Male: Min = 24.8, Max = 35.3, M = 29.67, SD = 4.35		
Female: Min = 37.4, Max = 59.9, M = 45.76, SD = 6.10		
11. Appendicular skeletal muscle mass (kg/m ²)		
Male: Min = 4.45, Max = 5.08, M = 4.8, SD = 0.34		
Female: Min = 2.53, Max = 4.87, M = 3.99, SD = 0.56		
12. Hand grip strength (kg)		
Male: Min = 7.3, Max = 23, M = 17.23, SD = 4.53		
Female: Min = 8.0, Max = 16.9, M = 14.74, SD = 3.81		

Income: The participants earned an average monthly income of 2,270 baht with the majority of the participants ($n = 15$ or 50%) were from the income group of 1-1,000 baht per month. As for the source of their income in retirement, it was found that the majority of the participants received income from the elderly pension from the government (90.00%), followed by income from work (23.33%) and income provided by their son/daughter/grandchildren (20.00%).

Health status: It was found that the majority of participants had chronic diseases (96.67%), including dyslipidemia (89.66%), hypertension (82.76%), diabetes mellitus (55.17%), heart disease (10.34%), asthma (10.34%), and osteoarthritis (6.90%), respectively.

Body mass index: Majority (43.33%) of the participants were BMI=25.00-29.99 kg/m², followed by BMI=30.00-34.99 kg/m² and BMI \geq 35 kg/m² (40.00% and 16.67%, respectively).

Body fat: Mean of body fat in male was 29.67%, female was 45.76%.

Appendicular skeletal muscle mass: Mean of appendicular skeletal muscle mass in male was 4.8 kg/m², female was 3.99 kg/m².

Handgrip strength: Mean of handgrip strength in male was 17.23 kg, female was 14.74 kg.

4.2 Community context

The studied community is located in Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province, within an area of approximately 32.69 square kilometers or about 20,431 rai. (Chumphon subdistrict administration organization, 2023) The area of the community is a plain with fertile clay suitable for rice farming. The community is a rural community with 4,417 members, comprising 2,165 males (49.02%) and 2,252 females (50.98%), in 1,127 households. A total of 738 community members (16.71%) are categorized as older adults. (Nakhon Nayok Provincial Public Health Office, 2023) The number of older adults is in line with the report on the number of older adults in Thailand by the Department of Older Persons, Ministry of Social Development and Human Security as of 31 December 2019, which revealed that

Thailand's older adult population accounts for 11.1 million people (16.73%), making Thailand a complete aged society.

The population of the community is of Thai ethnicity, with the majority being Muslim with 5 mosques in the community. Furthermore, some of the population is Buddhist with 1 Buddhist temple in the community (Chumphon subdistrict administrative organization, 2023). According to information provided by older adults in the community, the community area was originally a forest. There are Thai Buddhist living there sparsely. Later, Thai Muslims living in Bangkok started to buy up land to own and do agriculture. Subsequently, Thai Muslims from other areas moved in to get work in agriculture and Thai Buddhists in the area converted to Islam after marrying Muslims. The Buddhists and Muslims populations in this community coexist harmoniously without religious conflicts. There is no discord arising from religious matters, allowing for interactions, discussions, and the exchange of ideas. There is mutual support and understanding, with differences primarily existing in religious beliefs and practices, without any attempts to impose on one another. Although individuals adhering to Islam and Buddhism may hold different religious beliefs and participate in distinct religious ceremonies, their beliefs and behaviors related to health are not fundamentally different. For instance, dietary preferences, daily lifestyle practices, and approaches to life planning or physical activity exhibit similarities rather than disparities.

The majority of the population mainly worked in agriculture, such as rice farming, and some of the population had other occupations such as trading, fishery, general employment and government service. Most of the older generation continued to do agriculture, but some of the younger generation was employed as workers in factories located in the neighborhood. The Rangsit-Nakhon Nayok Road and Lamlukka Road were used as the main transportation routes, and there were several roads connecting villages. Personal cars, personal motorcycles, and private motorcycle taxis were used for transportation. The community had no public transportation access.

The lifestyles in community revealed that the original villagers continued to live a simple rural lifestyle. Neighbors had good interaction with and helped each other, and gathered for religious or other activities in the community periodically. The houses were built on privately owned land in groups near their own relatives. Some

houses were built on land rented out by the mosques because the residents did not own land. The mosques would divide land into 100 square-wa plots for rent and building residences, charging an annual rental fee of 300-500 baht per year. There is a nearby community market that is open all day and a flea market that is open in to sell food in the morning and evening.



Figure 4.1 Community context

4.3 Community health systems

The studied community was within the service area of a Subdistrict Health Promoting Hospital in Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province, which is a primary care unit responsible for the health of the community members and which covered a total of 8 villages. The provided health services included health promotion, disease prevention, treatment and rehabilitation, i.e., the services focused on providing both reactive and proactive services to allow equal access by every person, gender and age. The care provided was holistic care centered on the patients and continued care was provided in all aspects and throughout the path of healthcare to ensure sustainable good health for the population. The H.R.H. Maha Chakri Sirindhorn Medical Center served as the host hospital for service and academic support with a team of family physicians, nurses, and pharmacists to provide treatment services for patients with non-communicable diseases at the subdistrict health

promoting hospital twice a month, as well as provide vaccines and dental services. The services covered older adults, but were not group-specific.

Communities in the service area of the Subdistrict Health Promoting Hospital had established a senior citizen's club since 2013 to serve as a place for learning, recreation, and participation in activities by older adults. These activities included providing health information related to older adults, exercise, handicrafts, or knowledge about local wisdom. There were 100 club members and one activity/month was held, involving both lecturers from inside and outside the community. The subdistrict administration organization served as the agency providing budget allocation and shuttling services for activity participants. During the Covid-19 pandemic, the activities were suspended due to the no-gathering and social-distancing policies. The activities resumed in June 2023.



Figure 4.2 A Sub-district Health Promoting Hospital

The statements above demonstrate that the number of older adults in this community classifies it as a complete aged society, and the services provided by this Sub-district Health Promoting Hospital has not integrated the issues related to the care of older adults with SO. Therefore, this study was designed to find managing approaches for older adults with SO in the community, including the prevention of complications. It focused on designing care programs that are appropriate to the context of the members of the community to be effective in the health behaviors of older adults

as well as take into consideration the factor of community support. PAR is a process that causes change and empowerment, leading to the awareness of personal health and the education of the impacts caused by issues, leading to health behavior changes, a feeling of ownership, the sharing of knowledge in the community, which leads to the achievement of practical objectives and a change in conditions through the researcher and stakeholders. Participation in the issues from the planning, implementation, analysis and application of the research as well as growth and development of the participants are key to designing the desired results in order to achieve success in changing, creating, and evaluating the approaches or policies for health. Thus, PAR was a suitable method for this research.



Figure 4.3 Activities of the elderly club

4.4 Research process

The process of collecting research data was divided into 2 phases consisting of Phase 1, a study to explore the perception of SO, the factors related to SO, effects of SO on the health status and care needs, necessary and environmental resources for managing SO in older adults, from the perspectives of the older adults with SO and related stakeholders in the community. The data were collected through in-depth interviews with older adults with SO in the community and focus group interviews among older adults with SO and stakeholders in the community, including

family members, registered nurse, village health volunteers, and community leader. The results from Phase 1 were then used to design and develop a family and community-based care model for SO in older adults through a PAR in Phase 2.

4.4.1 Phase 1: The procedures were described as follows:

4.4.1.1 In-depth interviews with the older adults with SO in the community. Participant selection was conducted by using the purposive and snowball sampling techniques. In the initial step, the researcher studied data of the older adult's population in the community from the medical records of the Sub-district Health Promoting Hospital to find older adults with obesity in the community, because there had never been a screening for people with sarcopenia. After that, the researcher met with the target population who visited the doctors at the chronic disease clinic of Sub-district Health Promoting Hospital and assessed the target population meeting the research's inclusion/exclusion criteria. Subsequently, the researcher asked for phone numbers to make appointments for in-depth interviews. During the data collection visits, the researcher used the snowball sampling method by asking the older adults interviewed to recommend other older adults in the community who met the preliminary criteria, i.e., people who were 60 years or older and had obesity, in order to screen for additional participants who met the research's inclusion/exclusion criteria. In addition, the researcher visited the older adults in the community along with village health volunteers (VHV), who served as the gatekeepers in the search for participants meeting the criteria set for the research before going in the field for in-depth interviews.

The researcher coordinated the appointment dates, time and location of the data collection with the participants by phone. The steps for in-depth interviews included the researcher introducing herself, speaking with the participants to build rapport, explaining the objectives and details of the research project, screening participants for eligibility to be included in the project by a body composition analysis (BIA) on their weight, body fat and muscle mass using BIA, measuring their handgrip strength, assessing their abilities to do their daily activities using the Barthel activities of daily living (ADL) index and the Thai Mini-Mental State Examination (TMSE). After verifying the inclusion and exclusion criteria for the research, the participants who met the inclusion criteria were asked to sign informed consent forms in case of

voluntary participation in the program. Subsequently, the socio-demographic questionnaire was evaluated and a physical performance was performed according to the Short Physical Performance Battery (SPPB) criteria before continuing with the interview. During the interview, the researcher asked the participants for permission to record the interview with a voice recorder and by writing for confirmability and to allow the information to be compiled for further data analysis. An interview with a participant 45-60 minutes, and the interview was conducted according to in-depth interviews guideline. (The in-depth interviews guideline is detailed in Appendix K)

The interview began with a discussion of general health conditions, awareness of health conditions, and chronic diseases of the participants, as well as health care for both physical and daily living, which encompassed activity performance, exercise, diet, and psychosocial aspects. The researcher inquired about expectations about health conditions and assessed them for consistency with healthcare behaviors and healthcare support from family member and community, and inquired about obesity and SO. The details and sequence of questions were adapted to the conversation situation.

After the researcher obtained data from interviewing each participant in accordance with the planned topics, the researcher summarized the health and behavioral problems of the participants from the interview and provided the participants with behavioral modification information to achieve good health conditions, and if a participant was deemed to have interesting qualities for group activities in Phase 2, such as clear symptoms resulting from SO, several health behaviors that were risk factors, or a personality conducive to a group atmosphere, the researcher invited them to participate in Phase 2 of the research project.

The researcher analyzed individual interview data along with the interview. After the interview with each participant was completed, the researcher transcribed and used the interview recordings for content analysis by using the ATLAS.ti program by implementing the qualitative analysis approaches of Miles & Huberman (2020) as follows: 1) Data condensation is the use of information obtained from the transcription and the interview recordings for coding and categorization to prepare the data for the next step; 2) Data display is the reassembling of the data by using the analysis topics or categories obtained from the data; and 3) Drawing and

verifying conclusions was the interpretation of the data or findings obtained from the data display, and the summarization to create the conclusions as well as the verification of the accuracy and reliability of the conclusions.

Regarding the data obtained from the interviews and the data from the analysis, the researcher presented them to the advisor to discuss and exchange ideas and to verify the information with the advisor regularly for internal validity, investigator triangulation, and verification of the dependability. This method allowed the researcher to learn which topics did not have sufficient data which led to the planning of future interviews to obtain information that matched the research questions that needed to be studied, ensure reasonable conclusions, and ensure that reliable data was presented.

In addition, during the interview process, the researcher received information on issues related to faith and religious traditions that affected the livelihood of people in the community, which affected the occurrence of SO. Therefore, additional lines of interview questions were created to explain the phenomenon in the study for theoretical triangulation. The process of collecting data through in-depth interviews with older adults with SO in the community continued until the data saturation was reached. Data saturation occurs when the researcher cannot find any new data from the in-depth interviews, and there is no need to collect more data because the results from the data collection or analysis would no longer change. In this process, the researchers conducted in-depth interviews with a total of 25 older adults with SO who met the inclusion criteria between March to April 2023.

The researcher summarized the categories obtained from the in-depth interviews to present and verify their accuracy, relevance, and reliability in a subsequent focus group interviews with older adults with SO and stakeholders in the community.

4.4.1.2 Focus group interviews with the older adults with SO and all stakeholders. Focus group interviews was a process done after analyzing data from in-depth interviews. The focus group interviews in older adults with SO and relevant stakeholders in the community included family members, registered nurse, village health volunteers, and community leader. The discussions were held in two groups for the purpose of methodological triangulation to determine whether different data collection methods would yield different data, and data triangulation to verify the data

obtained from participants other than the older adults with SO and achieve internal validity and credibility.



Figure 4.4 In-depth interviews

The selection of participants used the purposive sampling techniques, in which the researcher invited participants who met the inclusion/exclusion criteria to participate in a group interview by presenting conclusions based on the data obtained from in-depth interviews and providing them an opportunity to comment on the data obtained and offer additional information. In this process, the researcher conducted focus group interviews with 5 older adults with SO, 2 family members of older adults with SO, 1 registered nurse from the Subdistrict Health Promoting Hospital, 3 village health volunteers (VHV), and 1 community leader, for a total of 12 participants, in May 2023. During the discussions, the researcher invited the older adults with SO to participate in Phase 2 of the program.

4.4.1.3 Summarization of the data obtained from in-depth interviews and focus group interviews

Regarding to the finding of the in-depth interviews with 25 older adults with SO in the community and the focus group interviews with 12 older adults with SO and related stakeholders in the community, the content analysis results could be summarized into the following five categories:

- (1) Lack of sarcopenic obesity awareness
- (2) Wellness literacy deficiency
- (3) Behavior leading to poor health outcome
- (4) Family and community encouraging unhealthy behavior
- (5) Achieving goals in life



Figure 4.5 Focus group interviews

The research findings from the in-depth interviews and focus group interviews are detailed as follows:

(1) Lack of sarcopenic obesity awareness

Sarcopenic obesity is a condition that lacks widespread recognition in Thailand, both among healthcare professionals and the general public. Consequently, there is minimal perception and awareness regarding the specifics of SO.

1. General awareness of obesity: This study found that all of the participants with whom in-depth interviews were conducted had abdominal obesity, and all of the participants were aware of obesity. They understood the risk factors, impacts of the disease and managing approaches as they were provided information via publications and when they visited doctors for follow up non-communicable disease.

2. Unfamiliarity with sarcopenic obesity. The participants had never previously known or heard of sarcopenia or SO. As a result, the participants had no awareness of health conditions and awareness of SO, which demonstrated that the population's access to information was inadequate. The statements from the participants were as follows:

"I have never heard the term sarcopenic obesity before. I have also never encountered the term sarcopenia, I am not familiar with these diseases at all." 002

"I've heard of obesity before. Doctors often mention it. However, I've never heard of sarcopenia, what is it exactly?" 008

3. Perceptions of sarcopenic obesity symptoms. Regarding body shape awareness, since the older adults did not view body shape in relation to beauty but agility in doing activities and health impacts and viewed that obesity made them not agile when do activity, resulting in chronic diseases being more difficult to control, many of them tried to control or lose weight. However, the majority of them could not adjust their behaviors to maintain their body weight within a normal range.

When complications caused by SO occur, such as knee pain, leg pain, back pain, and aches when walking or doing activities, poor balance, weakness when lifting legs or moving, exhaustion or fatigue when walking or moving, symptoms are treated and activities are suspended without any consultation or request for information to solve the issues from the team of healthcare professionals. They were rest or stop activity which decreases muscle strength and the body's energy consumption to the point where their own daily activities may be affected.

(2) Wellness literacy deficiency

Almost all of the participants who were older adults with SO suffered from at least one chronic disease (96.67%), which health literacy related to chronic disease as follow:

1. Health information access and understanding. All of the participants were aware of the problems caused by chronic diseases and had knowledge and understanding of how to control these diseases by regularly receiving knowledge about healthcare when they have a chronic disease from doctors, nurses,

and multidisciplinary teams, especially regarding diet and exercise, as shown by the participants' statements as follows:

"The doctor forbade eating salty food. The doctor told me to eat bland food. I do what the doctor says. I don't eat salted fish. I used to eat some, but I don't want to eat it now that the doctor said not to." 007

"I went to the doctor once and my blood sugar was high. The doctor asked what I ate. I told him straight out that I ate mango sticky rice. He said not to eat a lot because mango contains a lot of sugar, not to mention the sticky rice. My blood sugar went up so high, I haven't eaten it since. I stopped eating it." 008

"The doctor told me to eat a lot of vegetables for good health, so I've been eating a lot more vegetables than before. I didn't used to eat much." 017

2. Information appraisal and application. The majority of the participants knew the approaches well but were unable to completely follow them or were unable to follow them continuously. For example, they were aware that diabetes patients should limit the consumption of sugary drinks or desserts, so they consumed desserts that do not taste very sweet but still contain high amount of sugar, such as coconut custard squares, sweet sticky rice, Thai filled with coconut milk and banana, etc., or drink cold drinks by waiting for the ice to melt and dilute the sweetness. However, although the sweetness was perceived as being less, the amount of sugar intake was the same. The participants had a good perception of health conditions and solutions related to their chronic diseases.

Some of the older adults consumed food without consideration to their health. They ate according to convenience or availability and did not recognize their health care, as shown in the following statements:

"I'd eat anything that would allow me to take my medicine, regardless of whether it is good for me. If there's something to eat, that's that. If not, I'd take what I can get." 018

"If there's something to eat, I'd eat it. If not, then I don't eat. I don't consider whether there is a lot of sugar in the food or anything."

004

"I don't eat or take medicine at set times. Sometimes I eat, sometimes I don't. Sometimes we eat out without taking my medicines with me. Sometimes I eat breakfast in the morning and sometimes later, depending on if I'm hungry. Some days I eat two or three meals. I don't eat if I don't want to. If I'm not hungry, I won't eat." 023

"I've never thought about losing weight. When the doctor told me to lose it, I didn't want to. This weight is not a problem. My aching legs are normal for an older person. It's not related to being fat or thin."

024

Concerning cooperation when receiving health advice from healthcare professionals to take care of health and control chronic diseases, some participants tried to follow the advice and some were not prepared to follow the advice. Some older people were aware of the effects of food on health, and so tried to take care of themselves and controlled their diet according to the following statements:

"Nowadays, when I eat something, I always think first whether it will be good for me or not. I'm afraid of gaining a lot of weight. Sometimes I want to eat as well, but when I think about it, if it's not beneficial, then it might be harmful, so it's better not to eat it." 014

"Whenever I want to eat, I think about what the doctor taught me. Sometimes, my daughter makes coconut milk curry, but I avoid it and eat something else instead." 017

"I've consulted with the doctor on how to lose weight. He said to eat less food. How's that filling? It's the same with a lot of the doctor's advice. I've exercised like the doctor said. My weight stayed at seventy. It doesn't go up, but doesn't go down either, so I don't do it anymore. It didn't work." 008

"In the past, the doctor at the health promoting hospital told me to exercise. He said I had to lose 30 kg. Whoa! Doctor, I'm not a star. Why are you making me lose 30 kg? Just focus on one kg first." 025

(3) Behavior leading to poor health outcome

These consist of eating habits and physical activities as follows:

1. Inappropriate eating behavior. The information obtained from the interviews revealed that the eating habits related to SO in older adults in the community included excessive energy intake, insufficient of protein intake, and issues related to loss tooth. It was found behaviors and factors related to eating as follows:

1.1 Excessive energy intake due to eating large amounts of food and high-energy diet, sugary drinks or desserts, fruits, and fatty foods. Most of the participants ate desserts, which they or a family member bought or prepared, almost every day. In addition, the food culture of people who practice Islam usually involves making food or giving snacks to neighbors, which is like making merit by offering alms in Buddhism. The food or snacks usually contain oil or coconut milk as an ingredient, such as biryani, green curry, massaman curry, lod chong dessert in coconut milk, dumplings in coconut cream, mango sticky rice, etc. Some participants ate fruit without controlling the amount. As a result of such eating patterns, the older adults were receiving more energy than their bodies needed and accumulated excess energy in their bodies, which was a cause of obesity, as shown in the participants' statements as follows:

"The desserts... Right after eating a meal, I have to find some sweets to eat. Just a little bit is better than nothing. I eat egg cake, roti, or something like that. I eat dessert with every meal. Normally, I go buy it myself from the shop, they sell it in the morning. I walk out to buy it." 007

"I need dessert after a meal. Sometimes its bread topped with condense milk. Sometimes my sons buy bread stuffed with black sesame seed filling. I need something after a meal. It's refreshing. But I never buy lod chong dessert in coconut milk or dumplings in coconut cream myself. I only get to eat it if my sons buy it. They buy it for their father and I'd also get some. I eat dessert after almost every meal." 009

"There are vendors that drive in here to sell snacks. My son buys them every day. The snacks we share are fa gao, Thai layer dessert, Thai coconut pancakes, and coconut custard squares. I eat it with them every day." 011

"I snack all day. My sons and daughter buy them and I eat them all day. When I'm bored, I just turn around and eat a snack. Sometimes I pour syrup on ice and eat that." 017

"I eat three kilograms of ripe mangoes over two or three days. About one kilogram per day. I eat that alone without sharing. When my grandchildren go to the market and see nice ones, they buy them. There are lots of other kinds of fruits each day, not just mangoes. I eat two kilograms of longan at a time. I just set it up and keep snacking on it. I even turn around to eat it when I work." 024

1.2 Insufficient protein intake, most of the participants ate two main meals a day: a late morning meal and an afternoon or evening meal. During the day they ate fruits or desserts. The main meals included cooked rice and a side dish of curry or chili dip. Curry or vegetables were eaten, but meat or food high in protein was rarely eaten. The information on eating habits in terms of protein diet of the older adults with SO was as follows:

Fish is the most abundant food that is high in protein in the community as the area is a lowland with several natural canals or water sources. Therefore, fish can be caught from nature for cooking year-round. Fish can be cooked in many ways such as boiling, steaming, in a sour curry, in a spicy stir-fry, in a spicy curry, or made into jerky. Most of the participants ate fish in the amount of 0.5 to 3 portions per meal.

Pork: The majority of the participants did not eat pork because they were Muslim. The Buddhist participants did not eat a lot of pork as they felt bored of it, did not want to eat it, or only ate a small amount.

Chicken and Beef: Most of the participants did not like to eat chicken and beef due to chewing issues. Sometimes, even when minced or tendered, they felt bloated after eating. Otherwise, they felt bored of it or did not like the smell or did not want to eat.

Eggs are an easy source of protein. They are inexpensive and simple to cook. The majority of the participants ate eggs, but not often as they did not want to eat them.

Seafood is a source of protein that the participants rarely eat because it is expensive.

Milk and dairy products: The older adults in the community abstained from consuming cow's milk due to their dislike for its flavor. Dairy products such as yogurt or cheese were never eaten and were unfamiliar.

Tofu and soy milk: The participant occasionally consumed tofu, and some individuals drank soy milk, but not on a daily basis.

Information gathered from the interviews indicated that the participants had a limited intake of protein, not enough to the body's requirements. In some instances, meals lacked any protein content due to a lack of awareness regarding the significance of a protein-rich diet for health, as evidenced by statements provided during the interviews:

"Most of my meals are soupy. I don't eat much meat. I eat soups. I don't like fish or any meat. I can eat just a bit. I don't eat vegetables often. I eat a little bit. I mostly eat soup with rice." 006

"I don't eat any chicken. I'll eat beef once a month. I don't eat much fish, it kind of stinks. I eat eggs sometimes, but not often. I drink milk once in a while. I don't drink it much because I'm afraid of getting diarrhea. I never know if I'm going to get it." 011

"I don't like chicken. If it's boiled or in a curry, then I will only eat the soup. I like porridge. I add salt to make it salty or eat porridge with fried mackerels. I eat simple meals." 012

"Nowadays, I pound some chili paste. Sometimes I have my daughter buy bottled fermented fish sauce, and then add chili powder and mix it with rice for eating. Sometimes I chop some mangoes, add fish sauce, chili and sugar, and mix them in rice and eat like that all day. Sometimes I eat ripe mango or banana with rice. The mangoes my daughter buy, I can eat three mangoes in three days. Sometimes I eat a wedge per meal. I don't eat complicated meals. I don't emphasize soups. When my daughter buys me a bag of a side dish, I can eat it for three meals." 014

"I don't eat as well as other people. Just chili dip and salted fish. That's what I always eat. I don't eat good food." 018

"There's chili powdered. Add in chopped mango, dried shrimp, fish sauce, MSG, a bit of sugar. Mix it a bit and then eat. That's my delicious meal. Salted fish and beef lung are salted and dried in the sun, then fried. That's what I like to eat." 024

"Older people don't emphasize side dishes. Like my mother. One mackerel could last her three meals. Although, I said to eat a lot of side dishes, she insisted that she was used to it." VHV3

1.3 Issues related tooth loss, prevalent among the majority of elderly individuals in the community, resulted in tooth loss. Insufficient teeth for chewing led to a reluctance to consume solid foods such as vegetables, fruits, and meat. Some participants employed boiling or stewing methods to soften their food, while others utilized a mortar and pestle to pound the food before consumption. For older individuals who had not undergone tooth replacement, these methods were described as the approach to eating when faced with chewing difficulties, as indicated by the participants' statements:

"I don't eat chicken or meat, only soup. I don't eat things like stir fried Thai basil. I can't chew it. It's too chewy. My teeth would break. How can I chew anything? I can't eat meat. I don't like it. I can't chew. I haven't had meat in a long time." 004

"I only have four teeth here, and only three here. I eat whatever I can. Cucumber can be sliced thinly. If it's eggplant or bitter melon, I'd boil them. I boil vegetables until they're very tender because I don't have teeth to chew with. Fried fish or fish jerky would be pounded until soft before eating. I can't eat anything hard. Sometimes I'd have to spit it out." 021

"I have no teeth and don't wear dentures. I pound the food if I want to eat. It's not hard. I have a mortar and pestle to do it. After frying, I pound it until it's soft enough to eat. If I go somewhere without soft food, I'd just eat soup mixed with rice." 024

The participants could make an appointment for treatment or consultation with dental problems. There were tools for tooth extraction, filling, and scaling, and a team of dentists is available at the Subdistrict Health Promotion Hospital. However, specialized treatment or dental replacement required going to get treatment at H.R.H. Maha Chakri Sirindhorn Medical Center. Most of the participants had problems with tooth loss but did not want dental replacement because they did not see the need for it, or it was not convenient to go to the hospital, or they felt that tooth

replacement would make it difficult to chew food. The problem with chewing was a factor that encouraged most of the participants to eat rice, sugar, fruit and fatty foods in high amounts, and to have inadequate protein and vegetable intake.

2. Low physical activity and energy expenditure

The participants lived a rural lifestyle based on agriculture, which meant waking up early, cooking food to eat at home, doing household chores or going out to farm, and then coming home in the evening to eat dinner and go to bed.

2.1 Ability to performed activity of daily living. The participants having limited health and mobility, the majority of their activities was limited to inside the house. The levels of activity could be classified as follows:

Activities that could be done on independently without assistance: Activities of daily living regarding eating, personal hygiene, bathroom visits, and putting on clothes.

Activities requiring assistive devices or a change in the performance method: All of the participants were still able to walk. Some could walk on their own without assistive devices. Some could walk with walking aids, such as canes and wheelchairs, for support. However, most were able to walk short distances due to knee pain or muscle weakness or fatigue when walking long distances. Although most of the older adults could still do household chores, such as cooking, laundry, wiping, sweeping or growing vegetables in the kitchen garden, there may be changes to their methods of performing such tasks due to inability to stand or walk for long periods of time, such as using a low stove to sit and cook food, moving in or around the house by scooting or crawling.

Activities that could not be performed: Most of the older adults used to work in agriculture, farming and raising cattle or buffalo. With age, coupled with limited mobility, they were unable to work outside the home. Each day they would spend a little time doing household chores in the morning and evening. Most of them had little physical activity and spent a lot of time sitting or lying down, according to the participants' statements as follows:

"I usually stay in the house, I would use scoot on my buttocks or crawl. I rarely walk. I'm afraid of falling. But if there was anything to support me, I would walk around the house often by using a cane. I'm

afraid of falling. Look at my knees. I've been crawling until my knees are all calloused." 002

"It's so hard to do anything. I can't do anything. When I stand, my legs shake. I have to keep holding on to closets and tables to walk. But I cook and pound chili on my own. I don't walk often. I can't do it, I'll fall. I walk around the house once in a long while. My sons and daughters don't want be to go outside because they're afraid of me falling without anyone around to help." 003

On occasion, the activities of the elderly were restricted by their sons, daughters or grandchildren. The younger family members were concerned about the older adults walking excessively, fearing potential falls, and discouraged them from engaging in physical work to ensure they prioritized rest, as expressed in the statements provided by the older adults:

"I wake up at eight in the morning. And if I wake up early, my daughter complains about what I'm doing up so early, telling me to go back to sleep. I wake up and sweep the house. I don't mop the house, my daughter does that herself. I only clean the kitchen, wiping things. Doing a little here and a little there. If I don't have anything to do, I sleep. Sometimes, I come to sit here. Just sitting, often all day, without doing anything. I just sit and sleep without doing much. I don't walk to a lot of places. I just walk around here, to hang clothes behind the house sometimes. That's it." 015

"I don't do anything all day. I sweep the house and wash the dishes, but I can't let my grandchildren see it. He'll scold me. He'd come back and do it himself. I don't even walk on the road in front of the house. I wait for my grandchildren to come home to throw out the trash. He does it for me." 025

2.2 Inadequate physical activity and exercise. All participants were cognizant of the favorable impacts of regular exercise in maintaining health and managing or preventing complications arising from chronic diseases. The majority engaged in daily exercise sessions, typically 1-2 times per day., 5-10 minutes per time. Common exercise routines included walking, arm swings, and seated foot

swings, performed in sets of 10-20 repetitions. Most exercises were conducted independently at home without the use of assistive devices. While some participants had previously received elastic rubber resistance exercise equipment from senior citizens' clubs, the degraded condition of the rubber rendered it unusable. Consequently, participants refrained from utilizing the elastic rubber and abstained from other forms of resistance exercises, as indicated in their statements:

"In the morning, I sit at the table watching TV, stretch my legs, lift my legs, clench my hands, do breathing exercises, move my head up and down. I do it every morning in the house. Not for a long time. If it's too long, I'm afraid of passing out. I lift my legs up and down twenty or thirty times and keep going. I try to manage myself." 012

"I exercise regularly. I sit and raise my arms and swing them. I lift my legs up and down like this. When I come out to sit here, I try to move my legs." 025

"I don't do any exercises now, just housework like cooking rice, washing dishes, wiping and sweeping. I don't move my legs around or stretch at all." 016

(4) Family and community encouraging unhealthy behavior.

The majority of both the Muslim and Buddhist population in the studied community believed that doing good deeds and showing gratitude to ancestors was a moral duty. Therefore, most of the sons, daughters, and grandchildren expressed their gratitude by taking care of their parents, grandparents and relatives to make them happy by preparing or buying food without fail and taking care of them when ill, taking them to the hospital at every appointment and assisting in their work or activities. Some prohibited activities or work for fear of a danger, such as prohibiting walking around the house or doing household chores. Such beliefs impacted the health conditions of the older adults, such as buying food, snacks or drinks without considering health conditions, limiting activities that require movement, making free time useful, and feeling self-value. The aforementioned factors contribute to the development of SO in older adults, as in the following statement:

"My sons/ daughters never forbid me to eat anything. They only to remind me to eat. They buy me delicious things. They know I have

diabetes, but they say just to eat, I won't die. They don't forbid me, they're afraid I'd starve. If I'm sick, they take me to the doctor and say to eat because you can't eat when you're dead." 016

"My sons/ daughters never warned me, never forbade me to eat. They say if there's something I can eat, then eat it. They prefer that I eat. They say that they'd buy me anything I want to eat." 017

"I know I eat a lot of fruits. I like longan, mangoes, grapes, custard apples. My grandchildren know, so they buy it. They buy it when they come from Bangkok. My sons buy them regularly. My husband rides a bicycle to the Khlong 16 Market and buy it to me. He buys it especially for me to eat. He also cooks food for me." 024

"My sons/ daughters don't want me to do anything. They want me to stay still. If I did something and fell down, it'd be a problem." 019

The studied community was a service area of a Subdistrict Health Promoting Hospital that focused on the care of chronic diseases and metabolic syndromes in terms of prevention, treatment and complication prevention, providing knowledge about diseases and advising on how to behave after being diagnosed. Furthermore, there were village health volunteers to monitor blood pressure and test blood glucose levels, which are services that make the people in the community feel like they were cared for and were receiving continuous health services. In addition, the Subdistrict Health Promoting Hospital had equipment for exercising, such as resistance bands, cycling equipment, and foot massage equipment. Most of the participants used such equipment while waiting to see a doctor or if they lived in the vicinity of the Subdistrict Health Promoting Hospital.

The subdistrict administration organization, the agency responsible for the area in the community, had collaborated with the senior citizens' club to organize activities for older adults, such as health training, home appliance crafting, exercise, field trips, or public benefit activities, which were attended by a large number of older adults in the community. However, after the Covid-19 pandemic, the activities were suspended, and there was a plan to resume activities for older adults in the community.

In terms of equipment and facilities for health activities, this community did not have exercise equipment for community members or a park or open grounds for activities, but there were open spaces around mosques where activities could be held. However, since the Covid-19 pandemic, no activities have been held other than religious activities. Moreover, the community roads which used to contain a lane for health activities, jogging, or cycling were damaged and dilapidated, and the lines were faded. Therefore, they were not used for exercising.

(5) Achieving goals in life

For general health conditions, the participants were able to carry out their daily activities on their own. However, the problems associated with SO included decreased ability to perform activities, knee pain, leg pain, back pain, and aches when walking or doing activities, poor balance, loss of strength to lift legs or move, exhaustion or fatigue when walking or moving, and lack of dexterity when doing activities. However, the participants had not previously known that these resulted from SO, and thought they were due to increased age or from working hard when they were young. The statements from the participants were as follows:

“It's hard to walk. I feel tired when I walk, unlike before. I feel like I don't have a lot of strength. My legs feel weak and I need to take breaks.” 021

“It's a problem to walk. I'm not agile. I feel so clumsy and heavy.”
024

“My legs still feel good. They're not painful. It's just my knees. Sometimes I'd stand and they'd just suddenly feel weak and I'd fall.”
003

“It's worse this year than last year. My legs ache and I can't walk far. I could walk a long way last year. On a long walk I'd need to stop for a while before continuing. My legs ache. Both of my knee's ache.”
007

5.1 Independent of activity daily living. Regarding health expectations, each participant expressed a desire to independently perform their daily activities without relying on assistance from others. While all participants resided with their sons, daughters, or grandchildren, who provided care and accompanied them to

medical appointments, when necessary, there was an acknowledgment that, during the regular working hours of the younger family members, attending to the participants' illnesses would necessitate interruptions or leave from work. Consequently, participants were keen on avoiding any imposition or burden on their sons, daughters, or grandchildren, as articulated in their statements:

"I still want to be able to walk. Everything in the body is intact, allowing me to help myself. Don't want to be a burden to my sons, daughters, or grandchildren. I'm afraid of one thing: being bedridden. My sons, daughters have to work and my grandchildren have to study. Everyone's got a burden. They can't be taking care of me all the time. I have to help myself. I never thought to have my sons, daughters help me. If I can do it, I have to help myself first. The sons, daughters have the duty to work to earn their living." 012

"If I lose a little weight, I think I'd be able to walk easily. I've dreamed in my sleep before that I could walk and didn't need a wheelchair. It was so nice in my dream. I was happy. I want it to be real." 013

"I want to be able to walk and do normal activities. I want my body to be strong. I don't want to be a burden to my sons or daughters."

020

The participants were accustomed to living on their own, unable to work outside the home or farm due to physical limitations. They tried to understand the factors and reasons why their sons or daughters had to go to work during the day, leaving most of the older adults to stay home alone. Some of the older adults felt lonely and, coupled with physical limitations preventing long distance walking, mostly lived inside the house, leaving home only for important festivals or events at relatives' houses, such as merit making ceremonies or funerals. Some of them did not leave their homes at all because they could not walk well and feared that they would burden their sons or daughters who had to take them. Regarding buying food or supplies, the older adults would ask their sons, daughters, or grandchildren to buy them, according to the participants' statements as follows:

“I don't go anywhere all day. I just stay at home. Every one of my neighbors had Covid, but I stayed in the house, so I've never had it. They said they were sick from one side of the street to the other. It's because I only stayed indoors.” 018

“I don't go anywhere now. Haven't left home in years. My grandchildren are worried that I'm going to fall. My grandchildren don't let me go anywhere. They'd complain if I went. It's comfortable to stay home. My grandchildren never take me anywhere and I don't want to go anywhere. It's better to stay home.” 013

“I don't go to any merit-making ceremonies or funerals. I have my sons or daughters go. I don't go. There's no one in the house. I have to stay and watch the house. I can't drive. If they went, they could drive themselves. If I went, they'd still have to take me. I don't like to go. I haven't been to the market in years. If I wanted anything, I'd tell my sons or daughters. They'll buy it for me.” 006

“I still always go to events. If I wanted to go anywhere, I'd have my daughter or grandchildren take me. I go to merit-making ceremonies two or three times a month. If there was one on this street, I'd walk there and joint them all the time. I help prepare things.” 008

“When there's a merit-making ceremony or party, I go. If they hold it, I have to go. When they hold a party, I have to go to help them do things like peel onions and garlic. I always go to help them.” 009

5.2 Stress due to activity limitations. Most of the participants were satisfied with their lifestyle and well-being. They used religious principles in their lifestyle. Islamic participants believed in God, and that everything that happen in life was God's will. If a problem arose in life, it was believed to be a test from God, and the person must accept it and find solutions to overcome the obstacles. Buddhist participants believed in the law of karma, and that things that happen in life were dictated by old karma. Stress in older adults occurred mainly in the form of minor family problems, or some people were stressed by health conditions that prevented them from doing activities or working as they did in adulthood. One participant cried as she spoke to the researcher as follows:

"I feel like my body has gotten a lot worse this year. Sometimes I look around the house and tear up. I think to myself, "Why has it gotten to this? How come other people can walk and I can't? Why can the others still work in the fields and do this and that and I'm always in the house? If I walk out of the house, my sons and daughters are afraid that I'd fall without anyone to see or help me." 003

4.4.2 Phase 2: The development of a family and community-based care model for sarcopenic obesity in older adults through the participatory action research (PAR) process.

The researcher used data obtained from the study in Phase 1 to construct the preliminary model of family and community-based care model for SO in older adults. Next, the process of PAR was conducted as an action research spiral of planning, acting, observing, and reflecting. The researcher then followed the process, starting with planning and taking action through the group process in order to exchange knowledge, including finding ways to adjust behavior to solve problems together, observing the results of the practice, reflecting and evaluating the performance in the previous phase and planning the implementation for the next cycle until practice guidelines for sustainable solutions were formed.

The participants in Phase 2 of the research were the same 12 participants from Phase 1 with 8 participants from the in-depth interviews and 4 participants from the focus group interviews. In addition, there were another 3 older adults who met the set criteria and had never participated in the program in Phase 1 with 15 participants from Phase 2. The activities were divided into 2 groups, Group 1 (7 participants) and Group 2 (8 participants) for data triangulation. The demographic characteristics were as shown in Table 4.3.

Table 4.3*Demographic data of older adults with sarcopenic obesity in Phase 2 (n=15).*

Information	No.	%
1. Gender		
Male	2	13.33
Female	13	86.67
2. Age (years)		
60-69	9	56.67
70-79.	6	33.33
MIN = 62 years., MAX = 78 years., $M = 67.93$ years., $SD = 4.91$		
3. Religion		
Islam	12	80.00
Buddhism	3	20.00
4. Marital status		
Married/committed relationship	9	60.00
Widowed	5	33.33
Separated/divorced	1	6.67
5. Education level		
Uneducated	2	13.33
Primary	13	86.67
6. Income (baht/month)		
1-1,000	7	46.67
1,001-5,000	6	40.00
5,001-10,000	2	13.33
MIN = 600 baht/month, MAX = 6,000 baht/month, $M = 2,366.67$ baht/month, $SD = 2086.58$		

Table 4.3*Demographic data of older adults with sarcopenic obesity in Phase 2 (n=15) (Cont.)*

Information	No.	%
7. Source of income in retirement (more than 1 answer possible)		
Elderly pension from the government	15	100.00
Received from son/daughter	6	40.00
Work	1	6.67
8. Chronic diseases (more than 1 answer possible)		
Yes	15	100.00
Hypertension	13	86.67
Hyperlipidemia	15	100.00
Diabetes mellitus	8	53.33
Heart disease	1	6.67
Other (asthma, osteoarthritis)	1	6.67
9. BMI (kg/m ²)		
25.00-29.99	6	40.00
30- 34.99	5	33.33
≥35	4	26.67
BMI: Min = 25.44 kg/m ² , Max = 44.6 kg/m ² , Mean = 32.59 kg/m ² , SD = 5.81		
10. Body fat		
Male: Min = 28.6%, Max = 35.5%, Mean = 32.05%, SD = 4.74		
Female: Min = 37.4%, Max = 59.9%, Mean = 46.05%, SD = 7.43		
11. Appendicular skeletal muscle mass		
Male: Min = 4.41 kg/m ² , Max = 4.45 kg/m ² , Mean = 4.43 kg/m ² , SD = 0.03		
Female: Min = 2.53 kg/m ² , Max = 4.18 kg/m ² , Mean = 3.54 kg/m ² , SD = 0.52		
12. Hand grip strength		
Male: Min = 21.4 kg, Max = 23.5 kg, Mean = 22.45 kg, SD = 1.48		
Female: Min = 8.2 kg, Max = 17.6 kg, Mean = 14.08 kg, SD = 2.98		

According to Table 4.3, the demographic characteristics of the participants, who were older adults with SO in Phase 2 could be described as follows:

Gender: The participants were both male and female with a larger percentage of participants being females than males at 86.67% and 13.33%, respectively.

Age: Most of participant were age 60–69-year-old (56.67%), followed by 70-79 years old (43.33%). The lowest age was 62 years, and the highest age was 78 years.

Religion: The participants were Muslims and Buddhist with a higher percentage being Muslims than Buddhism at 80% and 20%, respectively.

Marital status: Most of the participants were married/in committed relationships at 60%, followed by those who were widowed and separated/divorced at 33.33% and 6.67%, respectively.

Education level: Most of the participants had completed primary education (86.67%), followed by those who were uneducated (13.33%).

Income: Most of the participants had income 1-1,000 baht/month (46.67%), followed by 1,001-5,000 bath/month (40.0%). The participants' lowest income was 600 baht/month, and the highest income was 6,000 baht/month. As for sources of income in retirement, all of the participants (100%) were found to receive a senior living allowance from the government, followed by those who had income from children/grandchildren (40%) and occupational income (6.67%).

Health status: It was found that all participants had chronic diseases (100%) in which hyperlipidemia accounted for 100%, hypertension accounted for 86.67%, diabetes mellitus accounted for 53.33%, heart disease accounted for 6.67% and others accounted for 6.67%, respectively.

Body mass index: Majority (46.67) of the participants were BMI=25.00-29.99 kg/m², followed by BMI=30.00-34.99 kg/m² and BMI≥35 kg/m² 33.33% and 26.67%, respectively).

Body fat: Mean of body fat in male was 32.05%, female was 46.05%.

Appendicular skeletal muscle mass: Mean of appendicular skeletal muscle mass in male was 4.43 kg/m², female was 3.54 kg/m².

Handgrip strength: Mean of handgrip strength in male was 22.45 kg, female was 14.08 kg.

The group activities were divided into 2 groups for data triangulation in order to determine whether organizing activities in different groups would yield different outcomes. The division also checks for dependability and further improves the group process in the next group. PAR process in this study was span a duration of 16 weeks for 4 cycles. Each cycle of the activities took 4 weeks. The activities were held in May to August 2023 with activities held 1 day per week, and the duration of each activity was approximately 90-120 minutes.

The details of the activities for the development of the family and community-based care model for SO in older adults according to the PAR were indicated in Figure 4.6 and could be described as follows:

Cycle1 Sarcopenic obesity literacy facilitation: SOLF

PAR in Cycle 1 focused on produce perception and awareness of health conditions, especially SO. The researcher provided information to the participants about statement of SO, risk factors, health impacts, and management strategies. Reflecting the participants' body composition linking of theories to evidence-based outcomes on themselves or fellow participants. The inputs in this cycle were lack of SO awareness and wellness deficiency literacy. The process was carried out in a weekly cycle as follows:

Week 1: Planning

The initial phase of the operational cycles was dedicated to planning, allowing the researcher and participants to establish goals and operational guidelines collaboratively for the inaugural activities in Cycle 1. The commencement involved the development of acquaintance and rapport among the participants and between the researcher and participants. Despite residing in the same sub-district, and some potentially having prior interactions, there were varying degrees of familiarity among the participants. While some may have been well-acquainted, others might not have previously engaged in conversation or established connections. Concerning the rapport between researchers and participants, a subset had engaged in Phase 1, involving interviews or focus group participation, while others were entirely new to the project, contributing to a sense of distance. To address this, the researcher initiated the activity

by introducing herself, providing a comprehensive overview of the research project, reiterating the activity format, and elucidating participation rules, with a particular emphasis on fostering open and logical dialogue. Participants were encouraged to express their opinions freely, devoid of judgment as to their correctness. The emphasis was on open and logical discussion. Additionally, participants were encouraged to maintain comfort both during activity participation and behavior transformation at home. Any concerns or questions could be communicated to the researcher at any time, either directly or through the Subdistrict Health Promoting Hospital. Subsequently, participants were given the opportunity to introduce themselves and engage in conversation.

The researcher measured body weighed, body composition, and muscle strength of the participants, then explained the results of the measurements to the participants individually. Next, the standard values of each measurement results were communicated, explaining the links between the measured values and SO in relation to the definitions and meanings of risk factors, health impacts and complications of the disease, as well as prevention and treatment guidelines. This process created perception and awareness of personal health status and problems in order to find solutions together. The researcher provided an opportunity for participants to share knowledge about the effects and sensations of sarcopenic obesity, as in the following statements:

"I used to have it; I couldn't raise my legs. And when I walked, my daughter told me to raise my legs high. I said I was lifting my legs, but they wouldn't go up. When I walked, I'd kick things all over the place." G1_06

"I walked well, but I suddenly felt like I was tired, and suddenly went down. I used to have it, too. Sometimes it would just happen, Doctor (researcher)." G1_03

The researcher and the participants set short-term goals together over the 4 weeks of Cycle 1 and long-term goals throughout the 16 weeks of participation in the program. The participants had set goals for Cycle 1 together: *We seek information regarding sarcopenic obesity, its causes, consequences, and strategies for addressing issues when the disease arises.* As for long-term goals, the participants had the following goals for after participation in the project: *"A stronger, firmer body with the*

ability to stand and walk more easily; no aches or fatigue when walking long distances; less leg and knee pain. As for weight loss, we aren't concerned feel anxious, but it would be a good thing to lose some weight." The activities were planned for Weeks 2, 3, and 4.

After participating in the planning phase of the activities, all of the older adults in both groups were more familiar with SO, were able to analyze individual health problems related to the disease, understood and gained awareness about their own health and were focused on changing their behavior to solve problems and prevent the impacts of the disease. The activities they had scheduled together for implementation at weeks 2 and 3 were activities that focused on increasing knowledge and understanding about adjusting health habits in terms of eating properly and exercising to increase calorie consumption and promote muscle strength.

The researcher urged the participants to go back and observe the food eaten at each meal in terms of both type and amount of food to be used as information for the next week's activity.

Weeks 2 and 3: Acting and observing

Activity 1: Good food, good health

This was the first activity of the project, which was held at Week 2. It was an exchange of experiences about the appropriate diet for older adults with SO. The researcher was the main leader in the learning exchange. The researcher prepared food for the activity with model food for learning as follows:

Carbohydrate group: steamed rice and glutinous rice.

Fruit group: mangoes, oranges, grapes, watermelons, and Thai bananas (*pisang awak*).

Protein group: chicken, eggs, and milk.

The activity emphasized participants participation and used participants' data as a base for providing information by weighing the food against the amount served from a standard ladle, then comparing the amounts of steamed rice and glutinous rice providing the same amounts of carbohydrates and calorie. The participants were then received the information to eat steamed rice to avoid getting more calorie from carbohydrates. The steamed rice and glutinous rice that should be eaten at each meal were then weighed to see the amounts clearly. Information was then provided on the

proper amount of rice at each meal at 2-3 ladlefuls based on the calorie needs of each participant.

Fruit group: The researcher prepared fruits as snacks for the participants every time an activity was organized. This time, grapes or watermelons were arranged for the participants to see as examples and to show examples of fruit exchanges prepared to keep the amount of fruit eaten from being excessive. The following information was provided: *“All fruits contain starch or sugar. No fruit can be eaten in large quantities without limitation. If too much fruit is eaten, it can lead to excessive calorie intake and even overweight. And at times when you want to control your weight, you should also control the amount of fruits eaten.”* On this topic, the participants admitted to consuming a lot of fruit each day.

“I eat 3 mangoes at a time, fruits about this size, not small ones (about 350 grams each). I only eat them once a day, and there are other fruits. I’m not going to lie. When it comes to Thai bananas, I eat them all day long. I walk around eating Thai bananas all day. I eat a bunch a day.” G1_04

The researcher provided information on fruit, specifying recommended serving sizes per occasion. A fruit roughly the size of a fist is considered equivalent to one serving. In the case of larger fruits requiring cutting, the sliced portions placed on a plate, no larger than a coffee saucer, represent one serving. The suggested intake is 2-3 servings per day. Individuals accustomed to consuming larger quantities of fruit are suggested to gradually reduce their intake.

For the protein group, the researcher calculated each participant's recommended daily protein intake based on the current body weight multiplied by 1.5 (actual weight x 1.5), which is equal to the recommended daily amount of protein in grams. The researcher then calculated the recommended amount of protein from high-quality protein sources (high bioavailability protein) that containing completely essential amino acids at 60%. The researcher then weighed the chicken meat to compare its protein content in 1, 2, 3 and 4 portions, and give examples of food exchanges belonging to the protein group. According to the researcher, fish should be eaten mainly because it is an easy source of protein in the community, easy to digest, suitable for older adults, and a highly nutritious food. In addition, the researcher documented

protein foods with pictures accompanied by captions and a table for recording the daily intake of protein for each participant. The researcher wrote down the recommended daily intake of protein to increase and strengthen the muscles of each participant and compared protein into units to facilitate understanding and had the participants record the amounts of protein consumed at each meal every day. In addition, the researcher also documented the protein consumed in the morning preceding the activity for all participants as samples. It was found that participants ate 0-1 protein units per meal, which shows that they did not eat enough protein to meet the needs of their bodies. According to the participants said:

"I'm easy when it comes to eating...meat, eggs, milk, and I eat less like the doctor said. If there's nothing to eat, I can sometimes pick and boil flowers from the butterfly tree; add a little chili sauce and I'll be full for a meal. I sometimes eat rice with mangoes. Hot steamed rice with chili fish sauce is delicious." G1_01

For other food categories in which samples were not shown, the researcher provided information without specific amounts, namely, eating plenty of leafy green vegetables without limitation to satisfy the appetite and help control blood glucose, blood lipids, and blood pressure levels as well as full bowel feeling. Bulb vegetables were to be classified in the carbohydrate group. In addition, the amount of oil used for cooking should be controlled in order to control calories by avoiding fried foods or coconut milk curries, in addition to avoiding eating dessert or sweetened beverages.

The researcher provided a record of the daily amounts of protein eaten at each meal and the recommended daily allowances for the participants to record at home.

The scheduled activities the following week which involved exercise. The researcher asked for information on physical needs, limitations, and religious restrictions on exercise as information for organizing the activities.

Upon completion of the activities, the participants had gained understanding about diets that caused their sarcopenic obesity, knew how to divide foods into categories, had become more familiar with protein, and had dietary

guidelines to manage of SO. Nevertheless, monitoring of knowledge and understanding is required and obstacles are encountered when applied in daily life.

ชื่อ-สกุล _____ อายุ _____ ปี น้าหนัก _____ กก. ส่วนสูง _____ ซม.
 ความต้องการโปรตีนต่อวัน _____ กรัม หน่วย








โปรตีน/วันที่	8 มิ.ย.	9 มิ.ย.	10 มิ.ย.	11 มิ.ย.	12 มิ.ย.	13 มิ.ย.	14 มิ.ย.
เนื้อสัตว์ 2 ช้อนโต๊ะ 							
เนื้อไก่/เป็ด 2 ช้อนโต๊ะ 							
เนื้อปลา 2 ช้อนโต๊ะ 							
ไข่ 1 ฟอง 							
นม/โยเกิร์ต 1 ถ้วย 							
เต้าหู้ครึ่งแผ่น 							
อาหารทะเล 2 ช้อนโต๊ะ 							

Figure 4.6 Daily protein consumption record form



Figure 4.7 The activity of good food, good health

Activity 2: Moving and resistance training.

This activity was held at Week 3. It was an exercise activity to increase energy expenditure and increase muscle strength in older adults with SO. The researcher invited a professor specializing in exercise to increase muscle mass in older adults from the Faculty of Physical Education, Srinakharinwirot University, to come as an instructor on this activity. The researcher provided information about the objectives, characteristics of the participants and participant needs. Some participants were unable to stand for long periods of time, while others had knee pain. To ensure that the instructor prepared content in accordance with the objectives of the activity and appropriate for the participants, the instructor came to organize the activity in the meeting room of Ban Tham Nop Health Promoting Hospital. The two groups of participants organized activities together. During the event, chairs were arranged in a U-shape, so everyone could see the instructor clearly. All participants were eager to participate and some of them were properly attired in pants.

The instructor demonstrated and practiced both equipment and non-equipment exercises in both standing and sitting positions. The instructor prepared elastics band and iron rods as exercise equipment; the participants were able to practice according to the instructor's demonstrations in every position. Some participants who were unable to stand for long sat and exercised. During the activity, everyone cooperated very well with smiles, laughter and fun.



Figure 4.8 The activity of moving and resistance training

Week 4: Reflecting

The researcher and the participants reflected on the results of the activities over the past 3 weeks. The researcher measured body weighed, body composition, and muscle strength for the participants and distributed the results to each participant to consider their own results of body composition measurements. The researcher then interpreted the results of the participants one-by-one. It was found that most participants had similar body weights, body fat, muscle mass, and muscle strength as before starting the program, because they had just begun to modify their behavior, as in the following statement by G1_04, who said:

"I tried to eat less rice, but not much less, and I tried to drink milk from never having drunk it before, like yesterday when I ate rice mixed with stir-frying chili paste and boiled vegetables."

The researcher asked the participants to consider and exchange knowledge about the food that G1_04 had eaten by providing information on diet, changing to chili paste with fish paste instead of stir-frying chili paste to increase protein and reduce calories from cooking oil in stir-frying chili paste and increasing consumption of boiled eggs or grilled fish to get more protein.

G2_06 said, *"This morning, I ate rice with 2 boiled eggs and stir-frying chili paste."* The researcher provided information that changing the stir-frying chili paste to fish paste, such as mackerel paste or grilled fish paste, eating more vegetables and reducing rice would increase the amount of protein and reduce the calories from cooking oil in the meal. In addition, seasoning with chili and lemon could be done based on preference, since it does not affect the calories in food, but reduces saltiness to reduce water retention in the body and regulate blood pressure.

For some participants who had reduced body weight and body fat, while increasing muscle mass, the participants complimented their accomplishments. The researcher encouraged G2_01 share the experiences over the last 2-3 weeks what had caused weight loss of 3 kilograms. G1-01 said, *"Since learning about food, I have reduced my rice and increased my exercise. When I eat less, I feel lighter."* The participants saw the changes in G2_01, which encouraged behavior transformation.

The researcher reviewed participants' protein intake records, addressing errors found in the documentation. A comprehensive guide on accurate recording was

provided, with examples of recording breakfast and dinner. Participants affirmed their understanding. Furthermore, the importance of sufficient daily protein intake for muscle strengthening, crucial for movement, activity, and infection prevention, including COVID-19, was reiterated.

The participants reflected on the feelings from participating in the project during the past 3 weeks. Most of the participants stated that participating in the activity led to increased knowledge about SO, knowledge of health care that was appropriate for them. The acquired knowledge has influenced adjustments to eating habits and exercise, though its full and serious implementation is pending. The researcher encouraged the participants and reviewed the goals for participation by challenging everyone to apply the knowledge gained and put it into practice to suit themselves, in addition to weighing and measuring body components again in next 4 weeks to monitor changes in body weight and body composition. The participants were interested and ready to modify behavior.

The outcome of the activities in Cycle 1 was that participants access and understand information about SO including statement of SO, risk factors, health impacts, and management strategies resulting in SO awareness. The older adults perceived their current health status and took regular surveys of personal health status in order to perceive changes in physical and mental states to gain awareness of such changes and have appropriate solutions to health problems.

Cycle2 Enrichment in healthy behavior

In Cycle 2, the project implementation centered on applying the knowledge acquired in Cycle 1 to modify eating and exercise habits, becoming an older person with healthy SO. The inputs for this cycle were behavior leading to poor health outcome and family and community encouraging unhealthy behavior. The operations carried out each week of the cycle were as follows:

Week 5: Planning

The researcher reviewed the areas of knowledge gained from conducting the activities in Cycle 1 and long-term goals of participation in the project. Next, the researcher inquired about the needs, activity goals, and activity patterns that would support behavior transformation related to diet and exercise to managing and prevent complications from SO. The needs and activity goals of the participants in Cycle 2 can

be summarized as leading to the planning of joint activities by the participants, which could be described as follows:

Exercise equipment requirements: During the practical sessions aimed at enhancing energy expenditure and building muscle mass and strength in older adults with SO, the instructor utilized elastic bands as exercise tools. Participants, upon trying the equipment, perceived it as user-friendly, effective in exercising and strengthening muscles, and suitable for independent and convenient home workouts. Consequently, participants expressed a desire to acquire elastic bands for home exercises.

The necessity for practical demonstrations of implementing low-calorie and high-protein diets: Participants acknowledged the importance of consuming low-calorie and protein-rich foods but struggled to integrate this knowledge into their daily routines. During certain meals, participants found it challenging to plan menu items and expressed a desire for sample menus to guide their choices.

In response to the participants' needs for behavioral modification and the availability of equipment facilitating enjoyable muscle strengthening, the researcher and participants collaboratively chose the activities to be conducted. These activities were designed to address the identified needs and goals. Consequently, joint plans were established to create elastic exercise bands collectively and introduce low-calorie, high-protein menus in upcoming events.

Weeks 6 and 7: Acting and observing

Activity 1: Rubber resistance invent

This activity involved making elastic bands for resistance exercises to strengthen muscles. The researcher had prepared 0.5 mm thick rubber bands to create more traction resistance and strength, so the participants could invent elastic bands for exercise. The researcher designed 2-line and 3-line elastic resistance bands examples for the participants to choose to make to fit their physical capacity and functional needs.

The participants made elastic bands for exercise together. Some sat on chairs and others sat and made them on the floor. The participants helped hold the elastic bands for fellow members or threaded rubber bands for fellow members who had poor eyesight or were slow. During the making of the devices, the participants discussed matters in general and teased one another; the atmosphere was relaxed, casual and fun.

When the making of the elastic exercise bands was finished, the researcher led the exercises by reviewing the positions provided by the instructor. Together, the participants chose exercises that were easy to do and could be practiced by anyone. The researcher provided guidelines for observing how the participants felt while exercising, which muscles were active while exercising and that exercise should not be performed until the participants felt too tired. Rather, participants were instructed to gradually increase the number of times based on personal capacity.

After the activity, the participants used the exercise rubber that suited their needs and physical capacity to be used for home exercise. In addition, the activity also built rapport amongst the participants. There were discussions and exchanges about health and general matters, which caused enjoyment and reduced the loneliness of the older adults, thereby strengthening mental health.

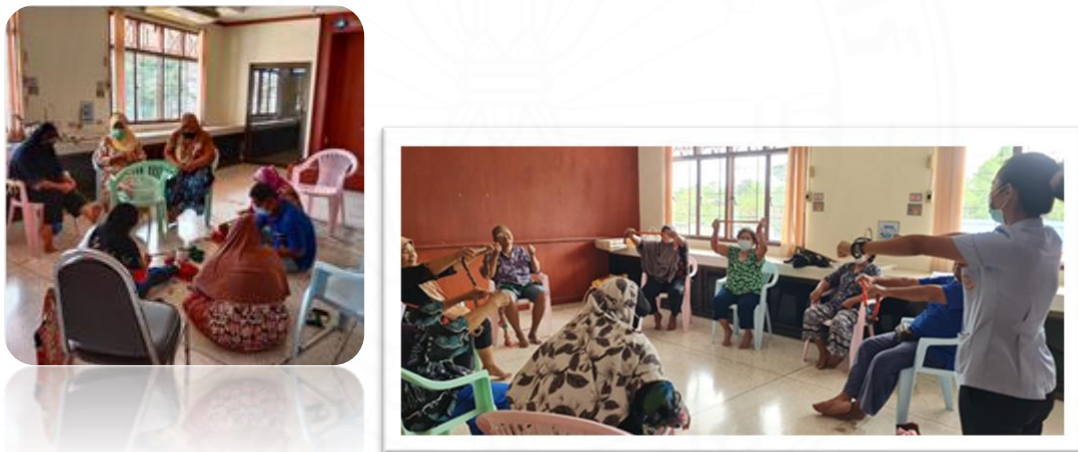


Figure 4.9 The activity of rubber resistance invent and exercise

Activity 2: Calories, where are you hiding?

This activity provided information about calories from sugar hidden in different types of beverages, because the information obtained from the in-depth interviews during the data collection in Phase 1 and the activities in Phase 2, the participants often provide the following information: *“I don't eat a lot of food, but why am I still fat?”*, as in the following statement:

"I don't eat much these days, Doctor (researcher). I have meals twice a day and only one ladle of rice per meal, and I don't eat a lot of side dishes with the rice. I don't get it, I can't eat any less, it's already very little." G1_05

The researcher found that most participants ate a small amount of rice and side dishes, which were the main meals, but often had calorie-rich and negatively impactful snacks or beverages between meals. The researcher, therefore, focused on the beverage segment because most beverages were finished products with sugar content labels on the packaging boxes. The sugar content in products the participants frequently drank could be used to clearly distinguish the amount of sugar in the ingredients.

The researcher prepared different types of beverages and weighed the amounts of sugar stated on the nutrition label on the packaging and put them in a bag, having the participants play a guessing game about the sugar content in the beverage products. The researcher prepared the following beverage products: sugar-free soy milk, low-sugar soy milk, small bottles of drinking yogurt, large bottles of drinking yogurt, small boxes of fruit-flavored milk, chocolate flavored milk, fruit juice and green tea.



All the participants tried sugar-free soy milk to test the perception of sweetness in soy milk and exchanged knowledge about the sugar content in the drink. Sometimes, the flavor of the beverages might not indicate the sugar content in the drink. For example, 1 glass of iced tea uses sugar as an ingredient by mixing in 3 tablespoons. If the tea is drunk before the ice melts, the taste might be perceived as very sweet. If, however, the ice is left to melt, the sweet taste will be reduced, despite the sugar content in the drink, even though the 3 tablespoons remain the same. If, however, the beverage is diluted with ice, the sweet taste will not be as strong.

Figure 4.10 The activity of calories, where are you hiding?

Post-activity, participants acquired improved comprehension regarding the concealed sugar calories present in various beverages commonly consumed in daily life. They also received guidance on selecting beverages aligned with their individual health conditions. Enhancing awareness of hidden calories in high-calorie foods offers participants a strategy to reduce daily calorie intake, potentially leading to weight loss if consistently practiced.

Activity 3: Simulation meals

This activity simulated a meal with the total quantity of food equivalent to the typical intake, but with modifications to ensure it was low in calories and high in protein. Regular consumption of such a diet was anticipated to result in weight loss and reduced body fat, alongside an increase in muscle mass. For this particular occasion, the researcher prepared a simulated meal consisting of steamed rice, chili fish paste, blanched vegetables, and boiled eggs. The selection was based on information obtained through in-depth interviews and dialogues with participants, integrating an exploration of locally favored culinary offerings. The chosen ingredients are readily available in the community, easy to assemble, cost-effective, and conducive to health.

The researcher prepared 2 ladles of rice, 1 cup of chili fish paste, 1 plate of blanched vegetables and 2 boiled eggs to make the dish for the participants to see the right type and amount of food in a meal and so the participants could practice counting the protein content in the simulated meal, which was approximately 3 units of protein.

After the activity, the researcher provided an opportunity for the participants to exchange about their experiences with changes in health behaviors as well as problems or obstacles arising from behavioral changes. The participants described their changes in eating habits as follows:

"Now when I eat tofu, I eat one at a time. I used to eat just a little bit, just enough to smell it. When the doctor (researcher) told me to eat a lot and it was good, I ate a lot, and I try to eat more fish in the curry. I used to just eat the soup." G1_03

The participants described exercise as follows:

"Ever since the instructor taught me to exercise, I have been working hard to do what the instructor said, but I haven't done much. When the doctor (researcher) gave me an elastic band, I did it at home

all the time. It's good to do it. No pain, no aches. I feel more agile than before, but the knee pain is still the same. It didn't get any worse, but it isn't better." G2_06



After the activity, participants were furnished with guidelines for consuming low-calorie, high-protein, and high-fiber foods, which are beneficial for weight and fat reduction, muscle mass development, and facilitating bowel movements.

Figure 4.11 The activity of simulation meal

Activity 4: Cooking contest

This event constituted a cooking competition featuring fish dishes with an emphasis on the theme of low-calorie, high-protein food. Given the community's geographical characteristics, replete with canals and water sources, local residents engage in fishing, utilizing the catch for family consumption or sharing with relatives and neighbors, sometimes selling any excess at affordable prices. Fish, being a soft, easily digestible, high-protein food that requires minimal chewing effort, serves as a suitable protein source for older adults. Participants, representing both research groups, collaborated in the event to present a diverse array of fish-based dishes, promoting a wider awareness of health-beneficial food options.

The participants who entered their food into the contest presented the ingredients and their food's benefits. The participants analyzed the ingredients, cooking methods, and effects on health together. The researcher helped to provide additional information. Next, the participants were asked to taste the food and give points. The registered nurses at the Subdistrict Health Promoting Hospital was invited on the panel of judges. Food suitable for older adults with SO should be food that could be eaten in unlimited amounts on a regular basis because it is low in calories and provides high

protein and fiber. These include fish tom yam, fish soup with herbs, fish steamed with ginger, grilled mudfish with chili dip, and boiled vegetables.

This activity led participants to better understand the appropriate diet for older adults with SO. The food items from the activity could be prepared at home and they learned to avoid unhealthy foods.

Activity 5: Family support

The finding from in-depth interviews and focus group interviews revealed that family was an important factor in the healthcare of the older adults in the community and may be a contribution or hinderance to eating behavior transformation and physical activity, including exercise in the older adults. The researcher recognized the importance of family members in the participants' behavior transformation. Therefore, the researcher provided information about SO as well as behavior transformation guidelines that the participants were following so that family members could contribute in the behavior transformation. The researcher inquired about the primary caretakers or family members who were influential to the health conditions of the participants, and coordinated the dates, time and places to meet to exchange knowledge or provide the aforementioned information.

Week 8: Reflecting

The researcher and participants reflected on the results of the work done in the past 3 weeks. The researcher measured body weighed, body composition, and muscle strenght of the participants. The researcher distributed the results and interpreted the results of the participants' measurements individually.

This weighing and measuring of body composition was done after an Islamic merit-making day. On the day before the merit-making ceremony, family members gathered to prepare savory and dessert to be eaten together at the mosque on the merit-making day. The activities of the merit-making ceremony included listening to a religious lecture and eating together. After returning from the mosque, they visited relatives to bless each other and ask for forgiveness for any wrongdoings. Some families cooked feasts or slaughtered beef for relatives and poor people in the community, or held parties at home, resulting in unchanged or increased body weight in the participants.

Most of the participants provided additional information about eating savory and dessert, taking into account their health conditions by trying to eat more protein. However, most foods eaten contained high amounts of oil, and so it was difficult to avoid cooking oil consumption, such as oily rice, mussaman curry, green curry, etc. In terms of exercise, all participants reported daily exercise with equipment and postures learned from the project. The exercises lasted about 10 to 20 minutes and done 1-2 times a day.

Based on the data obtained from weighing and measuring body composition, and data from the participants, it was observed that some of the participants feared being blamed for not losing their body weight and fat, as described by the older adults after weighing as follows:

"I thought I had gained weight. Yesterday, I went to my relative's house to make merit. I ate a lot yesterday. Massaman curry and beef soup. I was afraid that the doctor (researcher) would scold me for gaining weight, but it was my own fault. I'd just have to accept the doctor's scolding." G1_07

The researcher reflected on the changes in body weight and fat, which was in line with the community's normal behavior and lifestyle, while providing guidelines for food choices in case a party or merit-making ceremony, which is a religious belief and daily lifestyle in society, by choosing foods high in protein. As for high-fat foods, the participants were to opt for meat and avoid curry sauce. In addition, there were to balance the sweets and carbohydrates. If they ate a dessert, the amount of rice eaten should be reduced. The reflection of the behaviors and the provision of information by the researcher were done with an attitude that expressed an understanding of the social contexts and daily lifestyle. In addition, it was pointed out to the participants that they had the potential to choose their own behaviors and the reflection of the results of their bodies based on their eating and exercise habits.

The outcomes obtained from the implementation of the activities in Cycle 2 were that the participants had appraised and applied information from Cycle 1 to transform their lifestyles with a good attitude to practice health behaviors, which included the following:

1. The ability to choose the SO healthy diet that is sufficient in the amount and nutrients that contribute to good health conditions in the older adults with SO, allowing for the exchange of foods in the same group to create balance in terms of calories and nutrients.
2. The performance of appropriate physical activity, including exercises in terms of increasing the energy consumption and building muscle strength, that are suitable for the forms of exercise, equipment used, exercise time, and the prevention of impacts from exercise.

Health behavior transformation stems from the need to adjust health behaviors on one's own to achieve one's own potential goals. Each participant differed in terms of needs, talent, ability to learn, family support, values, lifestyle, and basic skills. Therefore, the behavior transformation methods and results were specific to each individual.

After gaining knowledge and understanding of SO, and being able to modify health behaviors to alleviate problems associated with the condition, the next step is for the researcher to seek guidelines on maintaining enduring healthy behaviors in daily life.

Cycle 3 Cultivate behavior transformation

The implementation of Cycle 3 was the search for motivation and anchor for health behavior transformation to manage SO sustainably. The input factors in this cycle included the achieving goals in life, which all of the participants agreed were the ability to perform daily activities independently as a way to create value for their lives and bring maximum happiness. The implementation process for the cycle in each week was as follows:

Week 9: Planning

The researcher asked how the participants felt about joining the program. All of the participants had a positive feeling about joining this project.

"It's good to do activities like this, Doctor (researcher). You invited me to gain knowledge to make myself stronger, and I also met other people. I met my friends and got to talk. It was stressful being alone in the house. It's not so stressful to come out and meet and talk to other people. It's fun." G1_03

In planning the execution of activities in Cycle 3, the researcher and participants devised a strategy to enhance awareness regarding the significance of engaging in independent daily activities. They aimed to integrate the knowledge acquired from the activities into their daily routines, ultimately making it a permanent part of their lifestyle. The impetus for modification stemmed from the participants' intrinsic needs, both for personal benefit and for the well-being of those around them. To instill the necessity for behavioral changes, participants were guided to recognize the inherent value in performing daily routines independently, utilizing activities as a medium for self-reflection:

Activity 1: Freedom life

The objective of this activity was to allow the participants to see that, *“The freedom of human beings to perform daily activities on their own is the basis of all happiness in life.”* The general public, including the participants, may have overlooked this issue.

The participants paired up to discuss the issues laid out. The participants were made to pair up with the members with whom they were not close so that they could talk and gain new information initially. The participants talked about general matters to get to know and be familiar with each other. Subsequently, the conversations turned to, *“Happiness in life: Is your life happy right now? Where did that happiness come from?”*

The participants shared their experiences and voiced opinions on life satisfaction, concluding that achieving happiness involves having four essential elements to meet basic bodily needs. This includes having a stable residence, a diet tailored to the body's requirements, appropriate clothing, and access to medical care. Furthermore, experiencing joy is linked to the ability to independently carry out daily activities and not imposing a burden on sons, daughters, or grandchildren. The desire for happiness extends to being able to prepare meals for family members, feeling valued, and offering wisdom to subsequent generations. Participants acknowledged that their own well-being was closely tied to their ability to be self-reliant, recognizing that dependence could lead to personal and familial challenges.

A participant shared experiences of distress from restricting activities and not being able to perform daily activities independently to the group, which resulted in

stress, after an eye surgery when the doctor recommended resting and refraining from strenuous activities or staying in dusty places for one month as follows:

"I was very stressed at the time. I got to know what a person with depression felt like, because I used to be able to do everything by myself. I could go places. But after the eye surgery, I couldn't cook. The smoke would get into my eyes. If I cleaned or swept the house, the dust would get into my eyes. Also, the doctor said not to exert myself. I couldn't do chores or go anywhere. I had to stay put. When my daughter came home from work, she rested. She didn't talk to me. It was very stressful for me." G2_02

Another participant shared experiences with suffering from the perspective of a caregiver who had to care for his wife who was dependent and could not perform daily activities independently as follows:

"Now I have a very happy life because used to take care of my bedridden wife. I had to do everything because she couldn't do anything herself. I had to keep finding food to give her, taking her to shower or use the bathroom, or sometimes when she lost her continence I had to clean up, washing her diapers. In the morning, I prepared food for her and then go to work. I drove around selling ice cream. I had to come home around noon to check if she was alright. I would give her lunch, took care of her and cleaned her before going back out to work. I was always worried when I was working. I did this for 2-3 years. It was exhausting, Doctor (researcher). She passed away 4-5 years ago. It felt so exhausting then, but I had to take care of her." G1_07

The activities reflected the importance and happiness of performing daily activities independently. Taking care of one's health is essential to maintain one's physical strength.

Week 10 and 11: Acting and observing

From the activities of Week 9, the researcher was able to summarize the needs of the participants to encourage them to apply the knowledge in their daily lives, share their success in behavior transformation, and help each other find solutions to behavior transformation or other health problems. In addition, the researcher organized

activities to promote the appropriate diet choices for manage of sarcopenic obesity in older adults.

Activity 1: Make a choice

This activity was a game with the objective of allowing participants to make the appropriate diet choices for manage of SO in older adults and prevent complications from the disease. The participants were divided into two teams to allow them to analyze and consult with team members before answering questions. The researcher prepared pictures of food and wrote two food names for each item for each team to choose which one was more suitable or better for their health conditions, and to justify their decision. Sometimes the food items were not healthy foods or drinks but may have more benefits or fewer disadvantages than the other item presented, such as hot coffee and iced coffee, pumpkin-coconut custard and steamed pandan layer cake, grilled chicken and fried chicken, etc. The atmosphere in the game was enjoyable. The participants were very interested and expressed their opinions. The competitive atmosphere was fun.

After the activity, the participants had a better understanding of food choices, and could analyze the composition of food and cooking methods that effect calories of food. Sometimes participants were unable to choose the type of meals in their daily life, especially healthy food, due to social contests, environment, needs or desires of the participants. Therefore, having knowledge about healthy food or food with fewer disadvantages is important to older adults with SO. This activity reflected that, if the participants had knowledge on how to choose the appropriate diet for their health conditions, they would be able to make appropriate diet choices for their health and create the potential for sustainable self-care.

Activity 2: Recognize knee pain

This activity was organized because the participants often experienced problems with leg pain and knee pain, prompting their interest in understanding the relationship between knee pain and osteoarthritis of the knee, as well as how to address such issues when knee pain arose. The researcher sought reliable sources for videos that imparted knowledge on knee pain and osteoarthritis in a manner that was both engaging and easily comprehensible for the participants. The content is summarized as follows:

Knee pain in older adults can be caused by various factors, including inflammation of the knee joint, gout, rheumatoid arthritis, or osteoarthritis. When knee pain arises, it is essential to provide information to identify its underlying cause. However, in cases of knee pain resulting from osteoarthritis, patients should focus on weight loss and avoid prolonged periods of sitting in positions that strain the knees, such as sitting cross-legged or squatting. Additionally, exercises aimed at strengthening the muscles surrounding the knees are recommended. After osteoarthritis of the knee has occurred and there is knee pain, the pain can be alleviated with exercise. In the video clip, proper exercises and exercises that should be avoided were taught to prevent osteoarthritis of the knee or knee pain.

After watching the video, the researcher summarized the content with the participants again for better understanding, and linked related topics in the video's content with the participants, giving the participants the opportunity to express feelings and exchange personal experiences related to knee pain. Towards the end of the activity, exercises were performed to strengthen the muscles in case of knee pain or to prevent knee pain in the older adults.

After completing the activity, the participants had a better knowledge of knee pain, how to prevent knee pain and how to alleviate knee pain. The participants described this activity as follows:

"If the doctor (researcher) didn't tell me, I wouldn't have known that this exercise was not good (straightening and bending the knees alternately with stretching the legs cause friction in the knee joint, leading to faster deterioration.). I used to do it all the time. I thought to exercise in any position just to move around. Now that I know, I'll stop. Older people have to be careful. We can't exercise in just any position."

G1_05

Activity 3: Miracle of weight

This activity was held as a result of the participants' continued exercise for a period of 7 weeks, most of which were sitting exercises. The researcher learned from the participants that the participants mostly exercised about 10 – 20 minutes daily and did not experience pain during exercise. The participants needed to exert more strength to increase their exercise to strengthen muscles. Therefore, the researcher had

the participants help each other to make sandbags, which were exercise equipment used to restore muscle strength and increase gravity during exercise, resulting in stronger leg muscles. The researcher adapted equipment commonly found in households into the sandbags for exercise. Stones were placed in socks and placed on the ankles to create gravity during exercise. The researcher created stone bags weighing 900, 1,200, and 1,400 grams, which were recommended weights for exercises to strengthen leg muscles in older adults. Furthermore, the participants were allowed to choose stone bag weights to suit their own potential. Moreover, the weight could be increased after exercising enough to experience increased muscle strength. (Chiu et al., 2018)

After inventing the exercise stone bags, the participants exercised together using the stone bags by sitting on a chair, straightening their legs, lifting their legs 180 degrees and placing the stone bags on their ankles. After that, they held their legs in the lifted position for 10 seconds and then relaxed.

After the activity, the participants took the stone bags home as exercise equipment to help with resistance exercises to build leg muscles strengthen that were the suitable weight for each participant. Moreover, the weight could be adjusted as needed.

Activity 4: Thai hamstring stretching device

As some of the participants had difficulty walking, which prevented physical exercises or management by walking or standing, and based on the researcher's visits to the older adults in the community, it was found that Thai hamstring stretching devices were created by the older adults in the community. The hamstrings play a crucial role in executing daily tasks such as walking, running, jumping, and regulating torso movement. Consistent engagement in hamstring muscle exercises can enhance movement efficiency and reduce the risk of falls among older adults. (Boonsom, 2017) The hamstring stretching devices were made from palm fronds, which could be found in the community, was a light wood, and was durable. Next, old carpets from tractors that were no longer in use were cut into strips and fixed to the palm fronds. The device was used by placing a foot on the carpet strip, and then hands were used to pull the frond to stretch the muscles. The researcher supplied exercise apparatus to the participants for experimentation. These devices were designed for stretching the Achilles tendon, thigh muscles, and leg muscles while in seated or

reclined positions. The findings revealed a high level of participant satisfaction with the efficacy of the device for stretching purposes.

Week 12: Reflecting

The researcher, in collaboration with the participants, reviewed outcomes stemming from actions undertaken over the preceding 3 weeks. Measurements encompassing body weight, body composition, and muscle strength were conducted, and assessment results were disseminated individually to facilitate contemplation. Subsequently, the researcher elucidated and conveyed the measurements for each participant. Furthermore, participants who perceived positive changes in weight and body composition were afforded the opportunity to share their experiences regarding the emotions accompanying these changes and the behaviors enacted during the aforementioned period.



Figure 4.12 The activity of Thai hamstring stretching device

G1_04 stated she had the best changes in bodyweight and body composition with the following statement about feelings of changes:

“I feel that it’s not very painful now. I don’t get aches and pains like before. I used to have to do things very slowly. Now, I feel that it’s fast. Going to the bathroom or doing anything is fast now. I feel more active. I can ride a motorcycle for a longer distance now. I can sit after

a long time. Before, I'd have to tell the motorcycle rider to stop after just a short while. I couldn't take it. I didn't have the energy to hang on. It ached. I'm also not uncomfortable in my abdomen now. When I was fat, I can't describe how it feels uncomfortable."

The researcher indicated that a weight loss of 0.3 kilograms in four weeks, which reduced the amount of fat and increased muscle mass, caused the participants to feel more comfortable and lighter because higher muscle mass did not change weight and the change was in a desirable direction that improved health.

G2_06 made the following statement about recent behavioral changes:

"In the morning, I exercise. I don't count how many times but I stop when I get tired. It's probably ten or twenty minutes. At night, I exercise again before bed. I exercised using the positions that the doctor (researcher) taught me. Later, when I exercise by raising my legs, weigh my legs down with rocks. My husband was laughing. He asked me what I was doing."

The participants exchanged experience about exercise at home and general health topics. The participants enjoyed talking and discussing corrective guidelines for symptoms such as swollen legs and constipation by using local knowledge about drinking lime juice or kaffir lime juice and eating Indian senna, Thai copper pod leaves or ivy gourd leaves.

G1_05 gave the following statement about results from weighing and measuring body composition:

"After I joined the project, I feel good. My body is better. If I stayed at home, I wouldn't have known how my body was and I wouldn't have known what to do to make my body better. Coming like this got me advice about exercise. The doctor (researcher) told me which positions are good and which positions are not right for an old person like me. I used to think I can do any exercise. When the doctor (researcher) told me, I knew more. When I exercised, my body was better. It's okay that I lost weight. I know that I'm fitter and more comfortable. I was happy when I get out of the house to meet and speak with other people."

G2_03 discussed her experience with weight loss, the gradual reduction of fat, and the capacity to sustain muscle mass in the following statement:

“I haven’t changed much. I eat two meals and nothing in between. I just ate more vegetables. I’m eating the same amount of meat and eggs. But I exercise every day from never having exercised before. Now, I exercise every morning for 10-15 minutes at a time. I used the rubber the doctor (researcher) gave me.” G2_03

G2_05 had the following opinion about exercise:

“The exercises we do are good for us. No one can help us. When we exercise, we grow stronger.”

The outcome of activities in Cycle, the participants perceive the capacity within themselves to transform their behaviours in pursuit of healthy SO. They had the ability to perform activities beyond activities of daily living with independence in daily life and no dependence on others, causing older adults to have good quality of life.

Cycle 4 Dynamic behavior change

Participatory action research in Cycle 4 summarized knowledge from participation in the project and promoted knowledge sharing in the community to create sustainable behavioral change. Action research spiral in the cycle in each week were as follows:

Week 13: Planning

This activity was the planning of activities in the final cycle. The researcher prepared a questionnaire for each participant to express opinions and reflect personal ideas on the aforementioned issues. The questions were:

1. What of yourself has changed from the beginning of participation in activities?
2. What are your feelings about your changes?
3. What other things do you want changed?

G1_03 stated *“Now, I feel that I’ve changed a lot. I don’t get aches. I sleep well. I’m exercising like the doctor (researcher) said and I try to walk more so I get exercise.”*

G1_06 stated *“I’m not constipated now. I did like the doctor (researcher) said. Exercised so my intestines move. I drink a lot of water and eat a lot of vegetables. It’s easy now. I’m comfortable. And the swelling on my legs has come down. Doctor*

(researcher) said to lie down, keep my legs elevated on a pillow, and drink a lot of water.”

G2_06 stated “I feel that I’m healthier. Once I exercised, I don’t really take nap during the day these days. In the morning, I wake up and exercised with the rubber to sweat a bit. When my grandchild goes to school, I do the house work. I weeded the grass next to the house. I’m better than before. I don’t get really tired or black out like before. I also exercise another time before I sleep before going to take a shower. I sleep well. The next time I wake would be in the morning. There’s not much change with eating because I’m a cook. I stay with the food but I eat more meat and eggs.

The researcher exchanged experience after joined in the activity. The researcher felt personal changes concerning relaxation and flexibility. The researcher constantly searched for knowledge, techniques, and methods for use in activities while remaining committed to the objective of seeing health behavior transformation among the participants in a more positive direction.

G1_03 stated “Coming to do activities with the doctor (researcher) is good. I got knowledge about self-care for good health. If the doctor (researcher) hadn’t invited me, I wouldn’t have known what muscles are.”

G1_04 stated “The doctor (researcher) taught me so I’ll be independent. Sometimes, my son has their own errands and businesses. They have their families. They have young children and have to care for them. They can’t always stay to help me. If they don’t help me, I’m able to take myself to the bathroom. I can get around alone without being dependent on them so they won’t have to worry about me.”

G1_06 stated “I tried to do like all that the doctor (researcher) said. But I couldn’t do everything she said. Sometimes, I can’t eat meat. I know that it’s good for me, though. I’m trying. I can do something a little and more with something else.”

G2_08 stated “In the morning, I ate rice and fried gourds. Normally, I’d add one egg. Now, I add two and eat another boiled egg. I used to eat less of other things with rice and now I eat more of protein with rice.”

The participants reflected personal behavioral changes, outcomes from behavioral modification, and planned reviews of knowledge and practice guidelines in addition to sharing knowledge from participation in the project with other older adults in the community with obesity in order to make older adults in the community healthier.

When the participants wanted equipment received from the project for other older adults not in the project, the researcher was willing to supply equipment.

Concerning dietary intake and exercise behavior transformation, the participants perceived personal behavioral changes which affected muscle strength and physical capabilities. However, the participants sometimes consumed high-calorie food or beverages such as cold milk tea. Every participant intended to improve behaviors.

After the activity, the participants traveled to the mosque to mix Thai sweet made of rice as part of a merit-making activity in Islam. Thai sweet made of rice mixing took place once per year in the two months after Eid ul Fitr. Thai sweet made of rice has sweet and salty types. The main ingredients were black beans, red beans, green beans, sesame seeds, boiled rice, pumpkin, sweet potatoes, and coconut milk. Salty Thai sweet made of rice was added with chopped garlic, chopped red onions, chopped ginger, chopped galangal, and chicken. Sweet Thai sweet made of rice was added with bananas and sugar. The origins of Thai sweet made of rice mixing were from when flooding occurred in the past. Villagers would gather and share leftover food, which became a tradition. The participants acquainted the researcher with other members of the community and articulated the project's benefits, while also offering insights into behavioral modifications to address issues related to SO. The researcher disseminated knowledge to community members, eliciting significant interest



Figure 4.13 Religion activity

Weeks 14 and 15: Acting and observing

Activities in Weeks 14 and 15 were jointly planned by the researcher and the participants, who jointly summarized and reviewed knowledge from participation in activities since Week 1 and talked about experiences from sharing knowledge with other older adults in the community.

Activity 1: Traffic lights

This activity tested and summarized knowledge about appropriate foods for older adults with SO. The researcher prepared images of foods including savory foods, dessert, and beverages for the participants to play the Traffic light game as follows:

Green light foods should be consumed in high quantities due to benefit for health, high protein, and low calories. Examples of green light foods are steamed fish, tofu and cabbage soup, spicy and sour soup with mixed vegetables, mixed vegetable soup, roasted fish chili paste, boiled vegetables, roasted fish, minced catfish, steamed eggs, lemongrass and screw pine water, steamed chicken with herbs, chicken boiled in fish sauce, sukiyaki, boiled fish and dip, fish boiled with ginger, and spicy and sour soup with beef, etc.

Yellow light foods should be controlled because consumption at high amounts may cause negative effects to health such as white rice, corn, curry, fried rabbitfish, steamed pumpkins, pumpkin egg custard, pad Thai, massaman curry, green beans boiled in sugar, grass jelly in syrup, roasted bananas, crispy bread, and stir-fried rice, etc.

Red light foods should be avoided because of negative health effects and high calories. Red light food should be avoided or consumed only in small amounts such as steamed pandan layer cake, rice balls in coconut cream, fried bananas, fish sauce with chili, yams marinated in coconut milk, crispy dumplings, Thai custard cake, cold tea, Roti, etc.

During activities, the participants analyzed and discussed the suitability of each food item by analyzing ingredients and preparation methods. Most of the participants were found to have appropriately analyzed benefits of appropriate foods for older adults with SO. From this activity, the participants can be summarized as

having knowledge suitable food for older adults with SO and the ability to analyze and synthesize knowledge for use in daily life.

Concerning sharing knowledge from activities with other older adults in the community, G1_03 made the following statement about sharing knowledge with neighbors:

“People around my house saw me walking better. They asked me what I did. I told them that I came to do activities with the doctor (researcher). They wanted she to invite them, too. So, I taught them the same way that the doctor (researcher) taught me. I showed them. I told them to eat a lot of fish if they want to be healthy and to exercise every day like the doctor (researcher) said.”

G2_06 made the following statement about sharing knowledge with her husband:

“Before, when my husband gets aches when he goes out to work in the fields, he would come back in the evening and complain about how his leg was hot. I brought the stretching rubber band for him to try out. He did the exercises and he works in the field easily now. He doesn't complain about aches any more. The heat in his legs was less hot. He works easily now.”

Activity 2: Good memories, good emotions, happy life

This activity was a brain exercise to delay decay and increase performance efficiency of the brain by using the Stroop test. This is a game for memory rehabilitation in adults and older adults to prevent Alzheimer's disease by calling out the colors seen. The participants switched being the player and the checker to see if the player was right. Most of the participants were found to have said what the participants' read and not the color seen. The atmosphere at the game was fun and full of laughter.

The participants had the following statement about the activity held today:

“I had a lot of fun today, doctor (researcher). I haven't laughed this much in a long time. Playing this game made me feel that we really have to train our brains. If we don't use it or practice, it really slows down. It made me feel like I want to train my brain every day.” G1_05

The participants wanted activity sheets for brain exercises at home with family members.

“Can I take this sheet home? I’ll play it with my husband. I’ll have my grandson/granddaughter judge. I’ll play it until I get every one right. It’s fun.” G1_04

The participants exchanged general knowledge about health such as guidelines on drinking water in daily life, swelling symptoms, and guidelines on avoiding beverages with sugar for diabetic patients, etc.

In this activity, the participants had clear emotions, did activities together, and laughed, which was mental health recovery, relaxation from stress, and a brain exercise for memory rehabilitation.

Because older adults in the community who did not participate in the project saw physical changes and the ability of older adults in the project to perform activities and older adults in the community were interested in exercises used in the project, the participants made stretching rubber for exercising after the project and shared with relatives or neighbors.

The participants discussed their experiences of disseminating knowledge and sharing equipment from the project with their relatives, as follows:

“My relative is very large. He does nothing day after day, only eats and sleeps. His son buy him whatever he wants to eat and does everything for him without him needing to move to do anything. I told him that he needed to move, walk, and exercise or he would have problems if he is unable to walk. I made the stretching rubber for him and had my nephew make the stretching stick for him. I taught him to exercise. I’ll go to see him next week to see how he’s doing.” G1_04

All participants expressed a desire for the project not to conclude and expressed interest in further activities, as evidenced by the following statements:

“Is it really just once more on Wednesday, doctor (researcher)? We won’t get to see each other again. So, on Wednesday, at the appointed time, I’ll hurry to finish things up and wait for the doctor (researcher) to come and pick me up. I get to go meet people and friends. I get to go talk about people with the same problems as me. The doctor

(researcher) kept teaching me and explaining. There's no one here to talk to me at home every day. I only get to make noises to chase chickens and cats away. I don't get to talk to people at all." G1_03

"I thought I was health before but I feel a lot stronger after doing activities with the doctor (researcher) here. The project is good at everything. It wouldn't be good for it to end early. I want to keep doing this." G1_02

Week 16: Reflecting

On this day, the final assessment of body weight and body composition took place before concluding the project. Subsequently, the researcher interpreted the results of the weighing and measurements for each participant. All participants expressed satisfaction with their body weight, body composition, physical measurements, and the observed physical changes. The participants expressed opinions toward noticeable physical changes in members.

"In the past, when G1_06 walks up a car, she needed help climbing up to the car until she gets all tired. Once she gets up, she would breathe hard and took a long time to recover. Now, she can get up comfortably without getting tired when she sits on a car. She looks a lot more agile now." G1_03

A registered nurse at the Sub-district Health Promoting Hospital who saw the participants in weekly activities observed the participants' changes and stated:

"Every patient who joined the project looks better to me. They walk like they're fit. For example, G1_01 used to walk with a cane. Now, she walks independently without a cane. Everyone else also looked good. They're all good at walking up stairs."

The participants reflected feelings from participating in the project's activities throughout the period of 16 weeks and were directed to review the following topics:

1. Did participation in activities throughout the project let you achieve objectives outlined from the first week of participation in the project?
2. How has participation in the project caused behavioral modification?

3. How has participation in the project caused you to feel changes or effects on your body?
4. Recommendations for preparing healthcare guidelines for older adults with SO.

The participants reflected outcomes from participation in activities. All participants achieved objectives outlined when the participants first joined the project and significantly exceeded outlined goals.

“When I first joined the project, I thought the doctor (researcher) was just going to say for me to this or do that. I thought it’d be difficult. I didn’t think that I could do it. When the doctor (researcher) told me to keep going, the doctor (researcher) gradually told and taught me without forcing or scolding me. I knew that the doctor (researcher) told me to do it to make me better. It was good for me. Following the doctor (researcher)’s order really improved things. I didn’t think that I’d be able to walk without a cane. I thought I was going to have to spend the rest of my life with a cane. I can walk on my own now. I’m alright to walk without a cane. I’m strong. I’m not afraid of falling anymore.”

G1_01

Participation in the project in this study provided every participant with knowledge about SO including risk factors, effects from the disease, problem-solving, and complication prevention guidelines. The participants exchanged knowledge and experience about behavioral modification as follows:

“I exercise every day without missing it. Once or twice a day like the doctor (researcher) taught. As for eating, I’ve changed a lot. I now eat an egg every day. Sometimes, I’d eat another white egg. I try to eat a lot of fish. It’s good for me.” G2_08

“I think I have to take care of myself when it comes to eating. The younger ones can’t eat like me. I’m old. They’re still young. Now, I have to make my choices. Eat less of whatever is bad. Before, when my daughter made bale fruit syrup, I’d eat ‘till my sugar was high. I know to eat only a little now when she makes it. I have to take care of myself. It’s not possible to just have anyone tell me and work everything out as I want.” G2_01

“The Thai hamstring stretching device you (researcher) gave me is really good, doctor (researcher). Me and my husband like it very much. When we exercise, we feel our leg muscles and stretched our tendons. Our legs feel lighter now. After exercising frequently every day, we don’t have leg pain or aches anymore.” G2_06

The participants exchanged the following experience and feelings about physical and emotional changes from participation in this study:

“Before, I can’t squat at all. If I did that, I’d fall on my back. Now, I can get up or sit in any position. I feel a lot livelier.” G2_03

“My husband told that, he doesn’t feel a pain at his clavicles anymore. He used to always complain about the pain when he come back from work. After exercising with the Thai hamstring stretching device and rubber resistance equipment that the doctor (researcher) gave me, he doesn’t hurt anymore. I exercise before sleeping by taking a line of rubber.” G2_06

As for additional recommendations from the participants in preparing a care guideline for older adults with SO, the participants expressed the following opinions:

“I like all of the activities organized. I don’t think there’s a need to make changes. The doctor (researcher) did everything well. The bad thing is the doctor (researcher) leaving.” G1_02

“I think the activities the doctor (researcher) had us do are already right. We’re old. We can’t exercise a lot like other people. I don’t like it when they want us to dance. We’re not at a dancing age. There will be difficulties if we fall.” G2_05

“Doing it like the doctor (researcher) showed is good, comfortable, and doesn’t take a lot of thought. When you (researcher) did let us know that it’s good for us if we do it right and well. It can’t be done by anyone else.” G2_03

The outcomes from activities in Cycle 4 was blissful life which the participants had positive thoughts or feelings about life and satisfaction in life.

In Phase 2 of the project, 15 participants were involved. In instances where participants had prior commitments preventing their engagement on the scheduled date, alternate arrangements were facilitated to accommodate all individuals. Participants who were unable to partake in activities cited pressing obligations, such as attending a medical appointment for eye surgery, experiencing discomforting symptoms of illness, or escorting a relative to a medical appointment. In such cases, where rescheduling was not feasible, the researcher undertook follow-up visits to apprise and encapsulate the activities, ensuring that all participants possessed equivalent knowledge and comprehension. The activities transpired seamlessly, providing comprehensive insights to every participant. The synopsis of Phase 2 activities encompasses the following organizational areas:

Activity topics: The researcher's main topics in activities were promote health literacy and behavioral modification in the area of dietary intake and physical activity for manage SO in older adults. Preliminary data was received from in-depth interviews and focus group interviews. Subtopics of activities in each week were from joint planning with the participants. The aforementioned method caused topics of activities to be truly suitable for the participants' contexts and needs, resulting in positive attitude towards activities and health behavior transformation.

Selection of appropriate resources and instructors for activity topics: The researcher selected educational media, equipment, and expert instructors to organize appropriate activities with the most benefit for the participants. The researcher searched for information, invited expert instructors or asked for the opinions of experienced individuals to prepare activities.

Atmosphere in activities: During participation in this project, some of the participants were considerate of the researcher's invitation and joined the project. Initially, the atmosphere of activities was formal. However, when the participants joined activities continually, the participants gained understanding about the participant-centered activity model and the participants participated in proposing activities. In addition, the activity model was arranged to be appropriate for the participants according to data from Phase 1 of the research, which caused the participants to relax in activities and participate more in activities. In addition, when behaviors were modified according to jointly proposed guidelines, the participants found clear physical changes and other

changes to physical and emotional capabilities. Furthermore, participation in activities with older adults who had similar health problems caused the participants to be happy, enthusiastic about participation in activities, and caused the participants to want to host activities continually in order to monitor changes in weight, fat mass, muscle mass, and muscle strength.

Roles of participation in the research: Initially, most of the participants in the project understood that the research was experimental research that required following guidelines planned by the researcher and most of the participants did not understand the participatory research guidelines in which the participants participated in planning activities. In addition, the participants were older adults without much opportunity to formally express opinions in activities. Initial activity of participation in the project, most of the participants did not express opinions or proposals in activities according to the following statement: *“I don’t know what to do. If the doctor (researcher) wants me to do anything or say anything to me, just say it.”* However, continual participation enabled the participants to understand research participant roles, express opinions, and offer recommendations that create an atmosphere for more effective exchanges of knowledge. For example, *“The doctor (researcher) should find games for us to play. It’s fun and enjoyable.”*, or *“I want the stretching rubber that the doctor (researcher) brought out for us to use and exercise. I think it’s good to use and can be taken home to exercise alone.”*

Participants view towards the researcher: The participants acknowledged the researcher as a nursing professor in a university who conducted research in the community. The participants were in awe of the researcher. However, after continual participation in activities and seeing the researcher as part of the community when the participants met and spoke with the researcher frequently at the Sub-district Health Promoting Hospital and at home. When activities, including religious activities, were held in the community, the participants’ views of the researcher changed and the participants saw good wishes and intentions for older adults in the community to be healthy and become part of the energy driving the participants’ health behavior transformation.

Health behavior transformation strategies: Most of the participants received health behavior transformation information as care related to chronic diseases, particularly

about weight control, and found practices to be difficult with weight changes not meeting expectations or being unsatisfactory, causing older adults to perform behaviors inconsistently. Moreover, the participants saw themselves as older adults and believed physical problems to be age-related. However, after the researcher participated in the program, the participants learned of personal health conditions related to sarcopenic obesity, which led to gradual health behavior transformations in weekly activities. The participants had the same opinion that activities held for 90-120 minutes per activity, one day per week, to be appropriate and caused behavioral modification to be included in daily lifestyles with sustainability of modifications.

Power in behavioral modification from group activities: Every participant modified health behaviors and achieved goals partly due to group activities with friends who exchange experiences of success and development opportunities. Furthermore, the participants received psychosocial support, spoke about general topics, and had the opportunity to vent and console one another as good mental health promotion according to the following statement from the participants: *“The doctor (researcher) scheduled an appointment for next Wednesday at 9 o’clock. We came at about eight so we can talk first.”*

The researcher’s self-improvement: The researcher continually improved herself throughout the research project by applying theories appropriately for community contexts and modifying activity processes to be suitable for the participants, allowing the researcher to access problems of older adults in the community in many views with sincere good wishes from the participants.



Figure 4.14 The happiness participants

4.5 The development of a family and community-based care model for sarcopenic obesity in older adults

In developing the family and community-based care model for older adults with SO in this study, the researcher applied baseline data received from participants concerning the perception of SO, the factors related to SO, effects of SO on the health status and care needs, necessary and environmental resources for managing SO in older adults, from the perspectives of the older adults with SO and related stakeholders in the community. In addition to using the healthcare development process in PAR methodology throughout the process. Participants played a role in every step of the cycle including planning, joining to take action, observing effects on participants in the program, and reflecting outcomes in each cycle. The researcher facilitated the study by working in a cycle with 4 cycles. Each cycle consisted of the following data inputs, processes, and outcomes:

4.5.1 Input data were baseline data received by the researcher from in-depth interviews with individual older adults with SO in the community and focus groups interviews with older adults who had SO and all stakeholders that relevant in the community consisting of family members of SO older adults, community leader, Sub-district Health Promoting Hospital nurses, and village health volunteers. Baseline data were used to create a preliminary care model. Input factors were used to plan activities, creating outcomes used in continual development in the next cycle until the final outcome of healthy SO among older adults.

The perception of health refers to the cognitive processes and understanding of individuals in interpreting or assessing their own health, encompassing both aspects of good health and illness based on the physical condition of the body. Perceiving one's health status leads to understanding, thought processes, and fosters awareness of health conditions. The awareness of certain health conditions prompts individuals to adopt behaviors conducive to maintaining good health. Findings derived from in-depth interviews indicated that older adults within the community who exhibited SO were either unaware of or unfamiliar with the condition of SO revealed

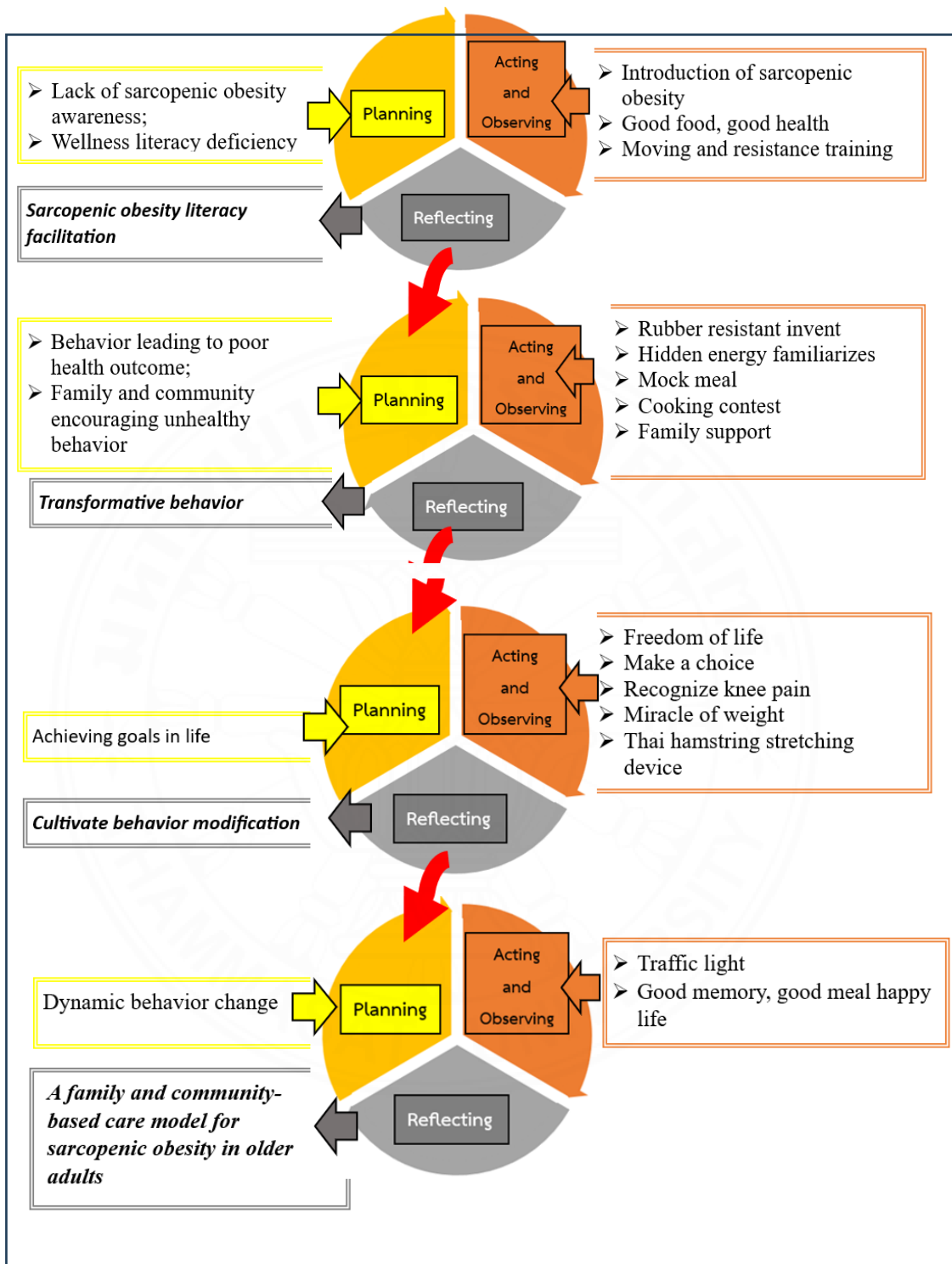


Figure 4.15 The developing process of a family and community-based care model for sarcopenic obesity in older adults

that older adults with SO in the community had never heard of or were not familiar with SO before. Sarcopenic obesity induces physical manifestations, including knee aches, leg pain, back pain, discomfort during walking or engaging in activities, compromised balance, diminished energy for leg movement or mobility, and fatigue during walking or movement. Participants perceived these symptoms as commonplace manifestations of old age. Therefore, the participants treated symptoms by taking pain medications or using ointments to relieve aches without going to see a doctor for treatment, in addition to avoiding activities which caused the participants to use less energy, have less muscle function, and more negative effects on SO. Consequently, there was a lack of awareness of health status related to SO. Impaired awareness of SO resulted in a lack of awareness about the disease. This underscores the importance of awareness in the development of a care model in this context.

In addition, most of the participants had non-communicable diseases which were associated with or were effects from SO. However, the participants were not aware of connections between the aforementioned diseases. The participants perceived and recognized non-communicable diseases with knowledge of complication correction and prevention guidelines. However, the participants were unable to adapt corrective and preventive guidelines as continual healthcare behaviors in daily life. Enhancing literacy on SO enabled participants to discern and identify health issues, while also facilitating the analysis of correlations between health problems and health behaviors as underlying causes, thereby stimulating them to seek management guidelines for SO and exert greater control over non-communicable diseases.

The health behaviors contributing to SO included excessive energy intake, inadequate protein consumption, low levels of physical activity, and a lack of resistance exercise. Participants engaged in these behaviors over an extended period without awareness of their detrimental effects, resulting in a lack of motivation to modify them.

Family members were found to have played an important role in the care of the participants' health by procuring or preparing food for the participants and being involved in health promotion or care during illness. Therefore, families played an important role in supporting the participants' health behavior transformation in this study. In the area of community participation in behavioral transformation, support was

found to have remained lacking in the areas of equipment, facilities, and activities to support behavioral transformation among older adults.

Life goals served as a source of motivation for older adults to adapt behaviors for optimal personal gain. According to findings from in-depth interviews, each participant expressed a desire to maintain autonomy in activities of daily living without relying on others. Reductions in body fat and enhancement of muscle strength emerged as contributing factors enabling older adults to independently engage in daily activities, thereby facilitating their participation in social interactions, which constitutes a dimension of holistic health.

4.5.2 Process: The process of carrying out activities was the application of data from input factors merged to evidence-based knowledge in order to plan operations and enter the process of carrying out activities to create outcomes according to goals. Each step of the process was as follows:

4.5.2.1 Cycle 1 had the following working principles:

(1) Specify the problems: Measured bodyweight, body composition, and muscle strength to show numerical data that can be clearly communicated to create personal health perception.

(2) Coherence knowledge and problems: Concentrate on delivering information by linking theories or evidence-based practices to the participants' data, aiming to convey the sense that the mentioned data closely relates to the participants. This approach is designed to foster an awareness of personal health and empower participants to implement the acquired data effectively.

(3) Use two-way communication: Activities were held as demonstrations and practices to allow the participants to participate and remain interested in activities at all times by using clearly visible images or examples that can be felt as media for providing data in order to enable the participants to understand data easily along with enabling the participants to memorize data for use in practice.

(4) Expert instructors: The instructors in activities had expertise in the content in order to help the participants receive accurate and appropriate information along with using the aforementioned information in daily life appropriately according to each person's capabilities.

In this cycle, disseminating information regarding SO to participants and enhancing awareness regarding its potential ramifications. This includes outlining guidelines for modifying behavior to address associated issues.

4.5.2.2 Cycle 2 had the following working principles:

(1) Monitor physical changes: Measured bodyweight, body composition, and muscle strength to reflect consistency with behavioral changes.

(2) Invent exercise equipment: The participants invented individual rubber resistance, which were exercise devices tailored to individual requirements, fostering motivation for strength training. Furthermore, each participant had access to personal exercise equipment during group exercise sessions, facilitating exercise review, heightened energy expenditure, muscle strength development, and motivation enhancement for physical activities.

(3) Group activities: A group process was employed to facilitate the exchange of learning and experiences, stimulate behavioral adaptations, and cultivate positive community interactions. This approach also aimed to encourage participants to actively contribute by dialogue, expressing, and analyzing their opinions during activities, enabling them to apply their perspectives in real-life situations.

(4) Everyday food model: Present illustrations of foods that are both familiar and regularly consumed by participants, allowing for the practical application of the model in their daily lives.

(5) Family cooperation: Allow families to support the participants' behavioral transformation by providing information of diseases and activities implemented by the project.

In this cycle, the researcher created the new expressive perspectives of SO and management guideline to the participants. All activity gradually transforms the participants behaviors to SO transformation lifestyle.

4.5.2.3 Cycle 3 had the following working principles:

(1) Monitor physical change: Measured bodyweight, body composition, and muscle strength to reflect consistency with behavioral changes.

(2) Real experience learning: Facilitate participants in reflecting on emotions and feelings while exchanging knowledge and experiences related to life satisfaction. This process endeavors to underscore the importance of the

ability to participate in daily activities, a result of behavioral transformation in managing SO. Furthermore, it facilitates the sharing of perspectives and experiences pertaining to a wide array of factors, encompassing both behavioral and physical transformations.

(3) Critical thinking and problem solving: Use the interactions, dynamics, and procedures that occur within a group setting to exchange opinions and enable participants to select suitable foods for health conditions by using games as a base for activities and awarding prizes to create competition and motivation for behavioral transformation in addition to increasing transformative learning and memory.

(4) Holistic care: Emphasize the significance of addressing various health issues to cultivate optimal well-being in all body systems.

(5) Innovation in the community: Find innovations in the community for use in exercises to increase muscle strength, balancing skills, and prevent falls among older adults.

In this cycle, the participants transform health behaviors to be a part of daily life and cultivated culture of healthy SO lifestyle.

4.5.2.4 Cycle 4 had the following working principles:

(1) Monitor physical change: Measured bodyweight, body composition, and muscle strength to reflect consistency with behavioral changes.

(2) Reflecting the knowledge: Review knowledge received from the program and practice data appraisal skills.

(3) Mental health promotion: Organize recreational activities to exercise the brain and practice memorizing.

(4) Sarcopenic obesity literacy model: The participants disseminated knowledge to the community by using themselves as a model for health behavior change to reflect improved physical capacity.

In this cycle, all process to created healthy SO were verify of a family and community-based care model for SO in older adults.

4.5.3 Output: The output is the result of integrating input factors into the process, yielding effects aligned with predefined objectives. The resulting output of the family and community-based care model for older adults with SO, as identified in this

study, manifests as a state of healthy SO in older adults. In this state, older adults with SO display no discernible physical, emotional, or psychosocial consequences from the condition. Additionally, they retain the ability to independently perform daily activities and maintain autonomy within familial and societal contexts. This is attained through the adoption of appropriate healthcare behaviors and an accurate personal perception of health, comprising four primary components:

4.5.3.1 Health awareness and sarcopenic obesity literacy: The participants have acquired information related to SO, including non-communicable disease. They possess knowledge and understanding of these conditions, demonstrating awareness of diseases. They are capable of analyzing and assessing the received information, adapting it appropriately to their health status and personal context.

4.5.3.2 Sarcopenic obesity modified lifestyle: Good attitude in performing health behaviors and ability to continually perform health-behaviors including:

(1) **Sarcopenic obesity healthy diet**, with sufficient and suitable quantities of nutrients that create good health among older adults with SO, enabling exchanges food within the same group to create energy and nutrient balance.

(2) **Appropriate physical activity and exercise**, in terms of exercise pattern, equipment used, exercise duration, and ability to prevent side effects from exercise.

4.5.3.3 Beyond activities of daily living: Older adults can lead an independent life in their daily activities, leading to a high quality of life.

4.5.3.4 Blissful life: Older adults were able to join social activities as intended without barriers from physical limitations while having positive thoughts or feelings in life including satisfaction in life.

4.6 Discussion of finding

This study had the objective to develop a family and community-based care model for SO in older adults through PAR. This study explored the issues of perception about SO among older adults, factors related to incidence of SO in older adults, effects of SO on health and care need for SO among older adults, and appropriate

resources and environments for management of SO among older adults. Family and community support processes were employed, utilizing all available data to formulate and develop a family and community-based care model for older adults with SO through action research spiral. The findings on issues related to the main participants, who were older adults with SO, were as follows:

Gender: The majority of participants were female, comprising 85% of the total. Upon reviewing treatment records from the Sub-district Health Promotion Hospital and data collected during community visits, it was observed that the prevalence of obesity among elderly males was comparatively lower than that among females. This aligns with the findings of the 6th Thai Population Health Survey conducted through physical examinations in 2019-2020, revealing a higher prevalence of obesity among elderly females compared to males (45.1% and 29.9%, respectively) (Aekapalakorn et al., 2020). Furthermore, from the community's population numbers, the number of females older adults was found to be higher than males (55.9%) and most of the males older adults' lifestyles still involved working in rice fields or performing outdoor activities such as riding bicycles to purchase items at a market while females older adults lived at home and performed light housework, spending most of the time in each day in a sedentary manner, causing males older adults to be less likely to have SO than females older adults.

Religion: The majority of participants, constituting 93.33%, identified as Muslim, reflecting the predominant religious composition in the region, where the number of mosques (5) outnumbered the temples (1). Nevertheless, the community's population exhibited uniform characteristics in terms of lifestyle, occupation, dietary patterns, and family attributes. Religion was determined to exert no discernible impact on the prevalence of SO within this community. This finding is consistent with the research conducted by Makeng (2017), which concluded that the prevalence of non-communicable diseases among the Muslim population did not exhibit significant divergence from that observed in other religious groups.

Income: A majority of the participants, specifically 50%, reported income at 1-1,000 baht per month. Their primary source of income derived from government pensions designated for the elderly. A significant portion of the participants had offspring, including sons, daughters, and grandchildren, responsible for procuring

cooking materials and preparing meals. There was an absence of data indicating any reported insufficiency or constraints related to the quantity or variety of food attributable to economic challenges among the participants.

Chronic diseases: Each participant exhibited chronic diseases associated with factors linked to SO. This aligns with findings detailing complications associated with SO, indicating a higher likelihood of non-communicable diseases in individuals with SO compared to those without. Moreover, the incidence of complications was notably elevated in individuals affected by obesity alone or those experiencing sarcopenia independently (Khadra et al., 2020).

Discussion of the findings according to the objectives is as follows:

4.6.1 Studies of perception about sarcopenic obesity among older adults

To investigate the perception of SO among older adults in this study, in-depth interviews were conducted with older adults with SO. Based on the research findings, participants were previously unfamiliar with SO, resulting in a lack of knowledge regarding this medical condition. Sarcopenic obesity (SO) refers to a condition in which an individual concurrently experiences obesity and sarcopenia. Obesity is a widely recognized condition among both laypersons and the study participants. However, knowledge about sarcopenia was found to not be widely known and understood in ordinary people. Therefore, the participants never knew that symptoms such as fatigue when walking long distance, lack of energy in legs, and inability to lift legs, or aches were effects from SO and the participants did not know the management methods for solving the aforementioned problems.

Health perception encompasses an individual's comprehension of personal health, derived from their knowledge and experiential understanding of health, decisions made, and interpretations thereof, culminating in their current perception of personal health. It stands as a determining factor in shaping an individual's health behaviors (Collins et al., 2019). Older adults, experiencing physical, emotional, and social changes inherent to aging, undergo shifts in their assessments of personal health. Research suggests that initiating health behavior changes in older adults necessitates cultivating perceptions regarding diseases and health, along with their potential

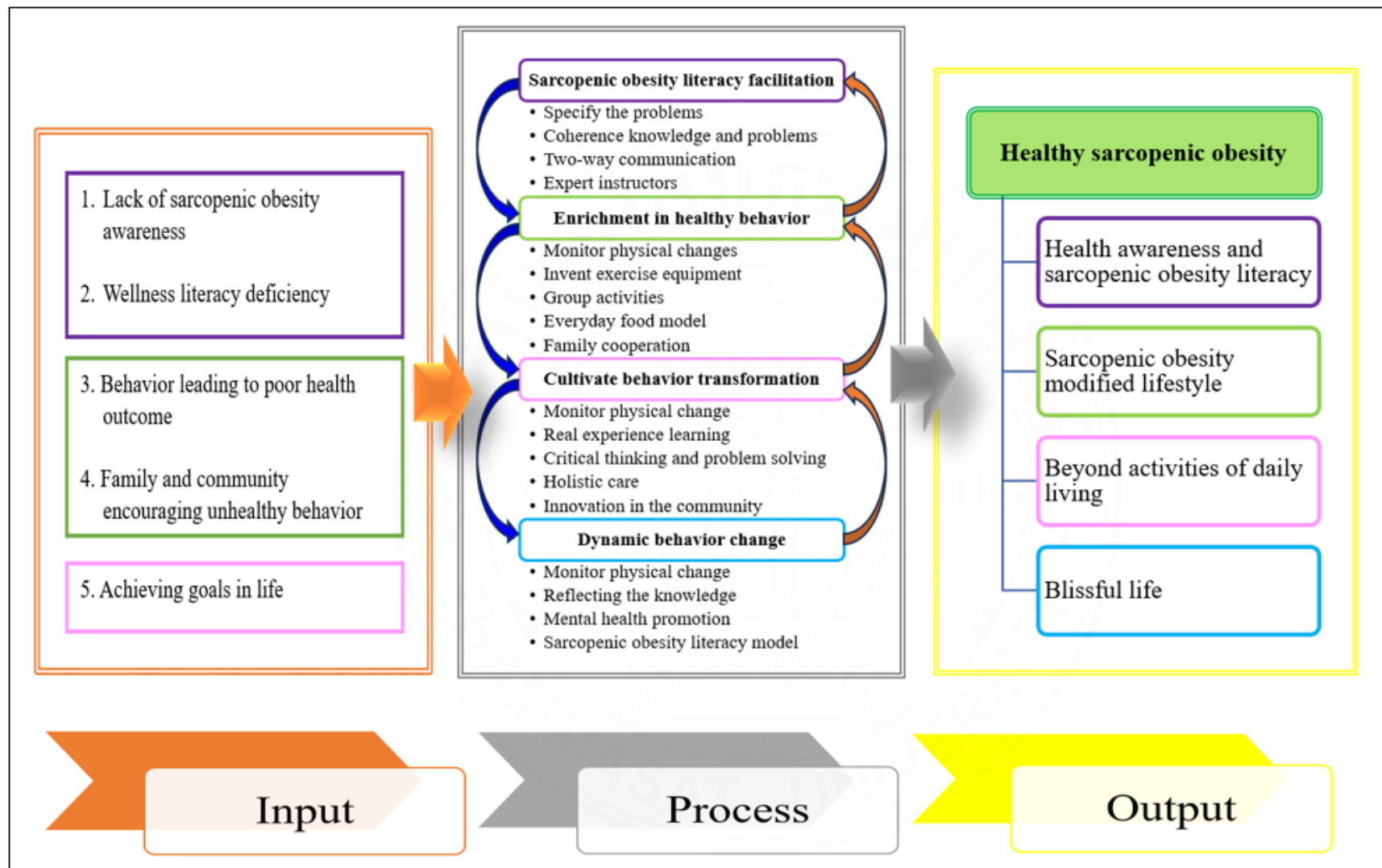


Figure 4.16 A family and community based care model for sarcopenic obesity in older adult

impacts, thereby prompting information-seeking behaviors as guidance for disease management and the adoption of correct and suitable health behavior transformations (Irwan et al., 2016).

Building perception of health including SO and guidelines on developing health literacy among older adults was the first action program had the following skill-building processes consistent with the World Health Organization's literacy building (Kanj, 2009):

4.6.1.1 To access health data

Health data was provided by experts, who also provided information about health and methods in searching for and using health information along with recommending channels for receiving health consultation from healthcare personnel.

4.6.1.2 Understanding of health information

Knowledge about current health issues was provided by using numerical data as references in order to create understanding and easier perception of health conditions related to the disease. Images were used to create clear communication, discussion of health conditions, connections between factors, theoretical effects, and promotion of regular observation of physical changes.

4.6.1.3 Appropriate information appraisal

This study allowed the participants to practice logical analysis skills to see components, processes, and steps with effects on health conditions for adaptation in modifying dietary and exercise behaviors. In addition, this study enabled the participants to select accurate information from media suitable for personal health conditions.

4.6.1.4 Application of properly analyzed data to manage health.

Moreover, this aligns with the strategy for enhancing health literacy among elderly individuals as outlined in the health literacy conceptual framework established by the Department of Health, Ministry of Public Health in 2021. This framework encompasses facilitating access to health information, fostering the development of skills and knowledge, enhancing communication proficiency, refining decision-making capabilities, and cultivating the aptitude to convey health information effectively. The overarching objective is to instigate behavioral transformations in older

adults, enabling them to engage in self-care practices. It is essential to transform older adults with the competence and expertise necessary to access health information, gain a comprehensive understanding of appropriate self-care practices, and enable them to disseminate accurate health information to others (Office of Risk Communication and Health Behavior Development, 2021). The perceptions of health and health-related objectives vary among elderly individuals. A considerable number of older adults commonly grapple with non-communicable diseases.

Therefore, it is crucial to instill in older adults the awareness that good health encompasses not only the absence of illness but also the adept management of diseases to prevent both acute and chronic complications. This awareness empowers older adults to lead active lives, engaging in activities independently while seeking assistance when necessary. The promotion of self-care practices plays a pivotal role in mitigating the impact of age-related changes, fostering the ability to recognize and respond to personal abnormal symptoms. Moreover, adjusting healthcare behaviors is imperative for mitigating health risks and promoting the holistic well-being of older adults (Intolo, 2020). Similar to the challenges encountered in setting health behavior transformation goals for managing SO, setting goals for achieving normal weight, body fat, muscle mass, and muscle strength in older adults is arduous and time-consuming, potentially leading to failures in behavioral transformation efforts. This study had the goal to create good health among older adults with SO, meaning that older adults with SO who have muscle strength and better physical ability can perform activities in daily living independently.

4.6.2 Factors related to SO among older adults in the community

Data on factors related to SO among older adults in the community were obtained from in-depth interviews with older adults who had SO. The obtained data were examined and additional opinions including recommendations from stakeholders in the community were requested by using the focus group interviews. The participants were found to have the following health behaviors which were risk factors of SO:

4.6.2.1 Consumption of foods with excessive energy requirement

The majority of participants perceived themselves as not having consumed substantial amounts of food and attributed obesity to a natural

consequence of aging. However, upon analyzing data obtained from in-depth interviews, it was observed that participants had, in fact, consumed high-energy foods, such as sweets or rice with curry, which contained elevated oil content. Some older adults also consumed large quantities of fruit. These dietary practices led to an excessive intake of energy, surpassing the body's actual requirements. Given the reduced physical activity and diminished metabolism associated with aging, older adults have a lower energy demand. Consequently, maintaining the same quantity or energy intake may result in an increase in body weight and body fat (Volkert et al., 2022).

Older adults in the community had food security with good in sufficient quantities for the body's needs and appropriate quality. Older adults were able to access and prepare food independently. Older adults had food stability and were able to access sufficient food at all times. However, older adults had inappropriate use of food for health. One cause of older adults' nutritional problems was from inappropriate consumption habits and eating preferred foods repeatedly, which was the food consumption model in most older adults (Maiteeb, 2021).

4.6.2.2 Inadequate protein intake relative to the body's requirements.

Because the participants never received knowledge about the importance of protein consumption for health and muscle mass, the participants had no awareness about protein consumption. Most of the food consumed by the participants was chili paste, boiled vegetables, or curry. In some meals, the participants did not eat protein at all. The aforementioned dietary behaviors caused protein intake to be insufficient for the requirement. The data was consistent with a meta-analysis which studied prevalence of insufficient protein intake for the body's needs among older adults in European countries, the United States, and Canada, which was found to be at 65-76% (Hengeveld et al., 2020). According to a study in Thailand on factors correlated with sarcopenia among older adults, older adults with low muscle mass were found to have lower protein consumption than the body's needs at 84.2% (Chaithongkrua et al., 2021).

4.6.2.3 Low physical activity and lack of muscle-strengthening exercises.

Most of the participants lived while sitting and lying because the participants did not work outside the house and only did minor housework. Some of the participants were unable to walk independently, had to use a cane or walking support equipment, and were able to walk for a short distance in some cases, causing the participants to have low physical activity. Furthermore, most of the exercises performed by the participants every day were swinging arms, swinging legs, raising arms, and raising legs, which were done for only 10-20 times per day without any resistance exercise that strengthens muscles.

Insufficient physical activity and increased sedentary behaviors were factors of non-communicable diseases such as cardiovascular disease, diabetes mellitus, cancer, hypertension, obesity and overweight, osteoporosis, depression, and anxiety. According to a survey of the population's level of physical activity in the past ten years, one out of three Thai people was found to have insufficient physical activity. Upon categorizing physical activity data by age group, it was revealed that only 60% of individuals within the school-age, adolescent, and older adult demographics engaged in adequate physical activity. Concurrently, the daily duration devoted to sedentary behaviors among Thais approached nearly 14 hours, with a propensity for further escalation. Additionally, within the Thai population aged 18 years and older, a considerable proportion (33.8%) exhibited low levels of physical activity. Notably, older adults comprised the subgroup with the highest prevalence of low and very low physical activity levels, accounting for 99.5% of this demographic (Liangruenrom et al., 2017).

The factors associated with the incidence of SO in this study align with the recognized modifiable factors of SO, which include excessive energy intake, inadequate protein consumption, low physical activity, and a lack of resistance exercise (Ji et al., 2022).

4.6.3 Effects of SO on health and older adults' care needs for SO

4.6.3.1 Effects of sarcopenic obesity

Data concerning effects from SO were obtained from in-depth interviews conducted among older adults with SO. The data obtained were

examined and the participants were asked for more opinions including recommendations from stakeholders in the community through the focus group interviews. According to data from the study, most of the participants were found to have physical effects from SO consisting of knee pain, leg pain, back pain, aches when walking or performing activities, poor balance, lack of energy for lifting legs or moving, feelings of fatigue when walking or moving the body, lack of agility in activities, and no prior knowledge that the aforementioned problems were effects from SO. The participants thought symptoms occurred due to older age or heavy work performed while young.

The aforementioned effects caused by SO were part of frailty frequently encountered in older adults. Frailty can be assessed from the following five symptoms: unintentional weight loss or weight loss of more than three kilograms or five percent of body weight in one year without known causes, exhaustion, muscle weakness, low walking speed, and low physical activity (Fried et al., 2001). According to a study of frailty among older adults in communities in Bangkok, frailty was found at 64.28% (Jaidee & Sasat, 2017). Frailty serves as a primary contributor to adverse outcomes, including falls, disability, heightened care requirements or dependency, diminished quality of life, and ultimately, mortality. The participants saw effects from SO in line with old knowledge about frailty among older adults as an age-related decline with physical deterioration seen in all of older adult as older adults grow older in a natural aging process throughout the lifespan. In addition, older adults believed that, at the end of life, every older adult inevitably has to cope with frailty without the ability to prevent or manage frailty (Ongmekiat, 2018). According to current knowledge, frailty was found to be a condition that can be prevented and rehabilitated. Assessments should be carried out to screen and diagnose frailty among older adults. In addition, health promotion and prevention should be carried out among older adults who are not frail or are at risk of frailty in order to maintain good health. Older adults who begin to be frail or are at high risk of frailty need care to delay progressive deterioration and restore functions through behavioral and lifestyle modification (Travers et al., 2019). Guidelines for rehabilitating from sarcopenic obesity were consistent with guidelines on recovery from frailty.

4.6.3.2 Sarcopenic obesity care needs among older adults

The participants had the following needs concerning SO related care:

(1) Knowledge: The need for knowledge about the disease, risk factors, and effects from the disease in order to create health perception and awareness about this disease led to awareness of health conditions and correctional guidelines.

(2) Problem-solving guidelines: Older adults wanted to know problem-solving or management guidelines including guidelines on behavioral transformation. Due to learning limitations in old age, information concerning behavioral transformation to manage problems should be applied to older adults properly.

(3) Support: Older adults needed support in transforming health behaviors from healthcare personnel, family, and communities.

Action regarding older adults' need for knowledge about the disease, problem-solving guidelines, and management guidelines was taken by creating SO literacy among the participants. In the area of social support from family, family health behaviors were found to be positively correlated with older adults' health promotion behaviors. Families were a source of support in various areas for older adults such as informational support, material and service support such as clothing, exercising shoes, and emotional support by providing love, encouragement or joining in exercises (Namarak et al., 2018). In this study, the researcher provided information about the research project which the participants were participating in for family members, who were primary care givers, or persons related to older adults' health care in order to create behavior transformation support from families. According to information from the participants, families were found to be able to partially help with behavioral transformation such as by not encouraging older adults to consumed hitg dense energy diet. In the area of food preparation, food preparation in families did not change significantly because most families had multiple family members living together, causing food needs to be diverse. Families prepared ordinary food with desserts, fruits, and no food preparation specifically for older adults. However, older adults used the principle of selecting food for consumption gained from participation in the project to *"know yourself and select the right foods for good results."* This indicated older adults

were able to have appropriate food consumption behaviors regardless of social or environmental contexts. In the area of exercise, some of the participants had family members such as a husband or grandchildren to encourage exercise or join in exercising, which created family activities and strengthened family members.

4.6.4 Preparation of suitable resources and environments for management of SO among older adults

4.6.4.1 Personnel preparations

(1) Participants: The researcher invited the participants who were participated and the participants who never participated in this research project to join in the project's activities in Phase 2, which required preparations and ability to join in activities at the appointed place for once a week continually over 16 weeks. Each activity took 90-120 minutes per time and the participants were not required to make any preparations before participating in the project.

(2) The Researcher: The researcher prepared data from in-depth interviews and focus group interviews for use as baseline data in designing this care model. In addition, the researcher prepared theoretical knowledge for use in behavioral transformation and invited or requested consultation from experts in order to obtain accurate and suitable data for activities.

4.6.4.2 Equipment preparation: The researcher prepared content for use in providing information for the participants about SO by making the content to-the-point, concise, use large visible letters, and use images to accompany data provision. Other equipment used in activities was prepared as appropriate and according to the participants' needs without preparations in advance.

4.6.4.3 Facility preparation: The researcher coordinated to request the use of facilities for activities hosted at the conference room of the Sub-district Health Promoting Hospital, which was private with air conditioners and appropriate seating arrangements for each activity.

4.6.4.4 Family cooperation preparation: The participants planned for families to participate in modifying the participants' health behavior transformation by providing information about the project and health behavior transformation directions to allow families to contribute to and support behavior transformation. Most of the participants' family members were found to have to work in rice fields and work

as employees or vendors, causing most of the family members to have no time for activities. In addition, this study had barriers in using communication technology due to unstable internet signals. Therefore, the researcher traveled to provide information for family members in each family after work or on holidays.

4.6.4.5 Community and network support preparation: Because the community had no facilities and equipment to provide care for older adults' health and the community was in the process of restoring plans to improve quality for older adults in the community, this project was specific to only the Sub-district Health Promoting Hospital, which facilitated, participated in, and supported activities.

Preparation of suitable resources and environments for management of SO among older adults in this study was the main role and duty of the researcher who was the assistant in the research and research coordination process in order to facilitate research and achieve objectives, which were consistent with the researcher's role and duties in the participatory action research.

4.6.5 Development of the family and community-based care model for older adults with SO through a PAR

The process of developing the family and community-based care model for older adults with SO through PAR began from studying problems and health needs of the population in the target group. In this step, the researcher studied information concerning health perception and perception about SO along with using data from interviews to make presentations in order to ask for opinions and additional recommendations from focus group interviews among the community's stakeholders consisting of family members, community leader, nurses at the Sub-district Health Promoting Hospital, and village health volunteers. The data received was used to categorize data and analyzed for used as baseline data in preparing a care model for older adults with SO. The care model was developed by using data from analysis of relevant situations in the community as preliminary data to make the prepared model consistent with conditions in the community and effective for use in managing problems along with creating sustainability. This was consistent with development of other care models which used preliminary data in communities to prepare care models such as the development of a service provision model for older adults in Buriram

(Chenphanitsub et al., 2023) or the development of a palliative care model for patients in the healthcare network of Tha Wang Pa, Nan (Suriyathai., 2023).

4.6.5.1 Input

The preliminary data used as input factors for developing the care model for older adults with SO in this study consisted of: (1) Lack of sarcopenic obesity awareness; (2) Wellness literacy deficiency; (3) Behavior leading to poor health outcome; (4) Family and community encouraging unhealthy behavior; and (5) Achieving goals in life. From input data, the main issues related to health literacy including SO were found including problems related to health behaviors which contributed to SO and caused effects on control of non-communicable diseases. The aforementioned input data were from studies in the community, which were able to lead to data preparation to create literacy and find suitable health behavior transformation guidelines for the community in the study.

4.6.5.2 Process

The work to create the care model in this study was carried out with the action research spiral by using an intentional participatory action process for the benefit of the common good with components consisting of confidence building, knowledge of one another, knowledge of the context, reinforcement of internal and external skills and knowledge, group activity, cooperation building, inspiration, acceptance, and good relationships with the group, which created confidence in personal capabilities with analytical thinking skills.

Participatory action research (PAR) guidelines were used to develop the care model for older adults in many dimensions such as driving communities to support older adults to live to the best of older adults' ability. According to the findings, PAR enabled older adults in the community to live to the best of older adults' capabilities in the areas of health, economy, and participation, which enabled older adults to become independent in the long term (Sukolpuk et al., 2020). PAR used to develop a care model for hypertensive patients at risk of stroke. Studies were conducted on perception of health, awareness of healthcare, and care contexts before planning care model development activities created systematic care of patients (Punkeeree, 2023). Furthermore, communities in Phayao conducted PAR to develop a holistic health promotion model with the participation of older adults and the

community, assess and analyze problem situations, needs of older adults in the community, study basic data, quality of life of older adults and caregivers including social, health, and cultural dimensions. Driving mechanisms or work networks were linked in the community and outside the community in order to lead to action and development of community activities that lead to development of a holistic care model for older adults in the community, creating a care model that emphasizes integrated care, which focused on participation from the community and healthcare networks, leading to sustainable solutions for problems and reinforce holistic care (Seangpraw, 2018). Furthermore, there were a study conducted with a PAR methodology to develop knowledge in other areas such as community strength (Asdornnithee et al., 2021), which showed principles of PAR which emphasized stakeholder participation in every step of work and created sustainable solutions for problems.

Activities used health behavior transformation processes according to transformative learning guidelines. Transformative learning is learning through perspective of transformation towards behavioral change for self-understanding and understanding of others through basic components that will create real change, which is learning through experience, reflection, and rational discourse. The transformative learning process created sustainable behavioral change (Boström et al., 2018). Health behavior transformation by this method created internal personal change and helped the person to understand interconnected causes and factors, which was understanding from personal experience, and implemented the aforementioned understanding in practice, which caused the participants to be prepared to listen and change in-depth with continual and sustainable performance of behaviors.

The transformative learning theory was adapted for PAR (Sunar et al., 2023). In this study, transformative learning was used from the step of setting research objectives. The participants possessed outdated perceptions based on prior research conducted on overweight individuals, which suggested that weight loss was a prerequisite for involvement in research projects. However, this study aimed to decrease body fat and enhance muscle strength, relieving participants of any perceived pressure to take part in the study. Furthermore, the activities prepared were jointly planned by the researcher and participants with a relaxed atmosphere in activities. Every person participated in activities equally and used activity processes to gradually

modify concepts and promote analytical thinking. The researcher supplied information and directed the participants to analyze and adapt information for appropriate applied in the participants' context. Moreover, outcomes of behavioral transformation were reflected from the participants' experience and feelings, which were different from old experience in research projects where the participants must follow guidelines planned by the researcher. The aforementioned activity processes created positive attitude towards participation in the research project and health behavior transformation.

The processes in developing the care model for older adults with SO in this study were as follows:

(1) Sarcopenic obesity literacy facilitation: SOLF

This process focused on produce perception and awareness of health conditions, especially SO. The researcher gave information to the participants about statement of SO, risk factors, health impacts, and management strategies. Reflecting the participants' linking of theories to evidence-based outcomes on themselves or fellow participants. The inputs in this cycle were lack of SO awareness and wellness deficiency literacy.

The initiation of the process involved disseminating information to participants, aiming to raise awareness of health issues associated with SO. Numerical data were utilized to facilitate comparisons, allowing participants to discern deviations from normal values clearly. Experts delivered precise and current knowledge to the participants. The emphasis during activities was placed on active participation, incorporating effective learning methodologies and management techniques that linked theoretical knowledge to its impact on participants' health. Diverse activities were implemented, including educational games, learning through examples, demonstrations, practical exercises, simulations, and incentivizing participation through the awarding of prizes. This approach was observed to engender heightened enthusiasm, attentiveness, engagement, and improved retention of information among the participants. Team-based games were employed, where each team engaged in knowledge exchange and information analysis before providing responses to questions. Prior to answering, a signal, such as ringing a bell, was utilized and signs were employed to convey responses. This approach prompted team members to delegate tasks and collaborate effectively, fostering teamwork and enhancing group interaction.

The techniques employed in this study to induce behavioral transformation were in alignment with findings from a meta-analysis on health behavior transformation techniques among older adults. These techniques involved the use of diverse learning methods, with a reduced emphasis on traditional health education methods (Howlett et al., 2019).

The outputs derived from this process include participants' perception about SO and personal health. Participants had knowledge, as well as readiness to modify their behaviors to manage SO. This process was commonly referred to as "*sarcopenic obesity literacy facilitation*"

(2) Enrichment in healthy behavior

In Cycle 2, the project implementation centered on applying the knowledge acquired in Cycle 1 to modify eating and exercise habits, becoming an older person with healthy SO. The inputs for this cycle were behavior leading to poor health outcome and family and community encouraging unhealthy behavior.

Older persons present challenges in behavioral transformation due to the sustained practice of lifestyle behaviors over an extended period. In addition, older adults had limitations in the area of learning, hearing, vision, and physical capabilities, which affected behavioral transformation. Therefore, understanding about the nature of behavioral transformation among older adults was an important beginning point and the work to modify behaviors and create output according to goals in older adults should use motivation, which would yield better results than education, building understanding or providing health education alone (Zubala et al., 2017).

The research process in this step monitored changes in body weight, body composition, and muscle strength that indicate behavioral transformation. In the behavioral transformation process for weight control, changes in weight and body composition are monitored periodically throughout the study (Villareal, 2017). Furthermore, individual exercise equipment was invented. According to data from a study conducted by Yokseng (2021) who studied effects from promoting exercise at home among older adults by using stretching rubber and found exercise with stretching rubber to have strengthened muscles and increased flexibility including endurance in

pulmonary and cardiac functions while reinforcing physical capabilities. This method of exercise was also simple, convenient, cost-effective, and highly safe in older adults.

Group activities reflection in older adults were a major factor in causing behavioral transformation. The participants were older adults with similar health problems, social contexts, and lifestyles. Thus, the participants had similar interest in health conditions and behavioral transformation. Participation in group activities helped older adults to exchange knowledge and experience among group members, which helped with positive behavioral transformation, encouragement, and learning about solutions or management of challenging situations. Furthermore, participation in group activities created intention for older adults to meet with members while also promoting social skills and mental health. The aforementioned data were consistent with the findings, which revealed group activities or social support improved health behavior transformation among older adults (Lindsay Smith et al., 2017).

Knowledge exchange activities required information about each participant to cover every dimension and enabled health behavior analysis for use as a base in designing or planning learning to be consistent with the participants including analysis of factors with effects on health including internal and external factors in order to support or suppress behaviors. Learning activities analyzed important factors influencing health for use in planning and determining behavior transformation methods. Each participant had different health conditions and physical capabilities. For example, some participants were able to walk normally while some participants needed a cane to walk. Therefore, activities should allow the participants to participate in activities without seeing differences while providing information on health behavior transformation by giving main consideration to the participants' capabilities. For example, the exercise positions used were in the sitting position. Activities or games focused on sitting activities without requiring the participants to stand or walk for a long time. In addition, the exercise equipment invention emphasized on having the participants invent exercise stretching rubber with an appropriate resistance for the participants in addition to inventing bags of rock weights at the desired weight within the range found in evidence-based practices to be suitable for older adults and capable of increasing muscle strength. Furthermore, the equipment allowed resistance or weight adjustments when the participants had better physical capabilities. Activities were

organized with consideration given to each person's differences without feeling differences between the participants as a key principle enabling activities to achieve objectives, which were consistent with other factors that use the same technique in activities (Dillon et al., 2018).

Activity facilities were in the conference room of the sub-district health promoting hospital, which was a place believed by the participants to be appropriate for activities. The conference room was an open room. The researcher arranged chairs in a circle, approximately one meter apart. The activity facility was found to not be disrupted from outside, causing the participants to show more interest in activities. This was consistent with reports from a meta-analysis, which stated appropriate environments promote learning and help with behavioral transformation (Kärmeniemi et al., 2018).

The form for recording protein intake prepared by the researcher was for the participants to record types and quantities of protein consumed in each meal and day with units of protein that each participant should have received written on the form. The form was prepared by using images, letters, and color symbols to show differences in each meal. The use of the aforementioned recording form by showing examples to the participants individually was repeated in the next week. However, most of the participants were unable to make records in the form and some participants felt completing the recording form was difficult, causing the participants to not want to participate in activities. This work showed the participants to be unprepared for using the aforementioned recording forms. The aforementioned findings were consistent with a study conducted by Ponsawat (2019) who found older adults with low education to have barriers in seeking news and information or learning and memorizing unfamiliar information. Therefore, the researcher changed to show food samples and provide information about protein diet frequently during activities in order to allow the participants to understand more about the types and quantities of protein needed. However, the participants were unable to clearly determine whether the participants received protein in sufficient quantities for the body's needs in each day. According to this study, clear reports of protein intake by using record forms were found to have created complications for practices among older adults without effects on behavioral transformation.

The researcher changed roles from a care provider to a behavioral transformation supporter and facilitator in order to encourage the participants to fully express personal capabilities and provide knowledge, equipment, and other support in addition to being a medium to link information between the participants, family, and healthcare service units.

The outputs derived from this process participants have the capacity to modify health behaviors to promote healthy sarcopenic obesity, as well as overall well-being. This process is commonly referred to as “*enrichment in healthy behavior*”

(3) Cultivate behavior transformation

The implementation of Cycle 3 was anchoring health behavior transformation to manage SO sustainably. The input factors in this cycle included the achieving goals in life, which all of the participants agreed were the ability to perform daily activities independently as a way to create value for their lives and bring maximum happiness.

Health behaviors were performed by individuals over an extended period of time. Therefore, health behavior transformation was challenging, particularly among older adults. In this study, the researcher applied the technique of indicating positive and negative outcomes from maintaining and transforming behaviors. The researcher used the technique of having persons able to perform activities in daily living and persons unable to perform activities in daily living share experiences from the view of patients and caregivers. This was consistent with a study which conducted a causal model analysis of communication factors with influence over holistic care behaviors among older adults, which found sharing of health experiences to be the act of receiving information in support of normative beliefs, which was a technique for creating attitudes that facilitate health behavior modification (Kachentawa, 2019).

Analytical thinking skills were practiced by organizing group activities to allow members to practice analytical thinking. The researcher showed examples of analyses and directed group members to practice until group members were able to analyze benefits and negative effects of food on the body and health. Furthermore, the researcher provided information and allowed group members

to exchange knowledge about holistic care with a focus on other health conditions which were health issues of interest to the participants in order to create good health in every system of the body.

Searches for innovations in the community which were suitable exercise equipment for older adults to facilitate easier access to exercise equipment, create a feeling of ownership, and provide continual cooperation with use of equipment.

The outputs derived from this process participants have the capacity to sustain health behaviors to promote healthy sarcopenic obesity, and had critical analysis skill This process is commonly referred to as “*cultivate behavior transformation*”

(4) Dynamic behavior change:

Participatory action research in Cycle 4 summarized knowledge from participation in the project and promoted knowledge sharing in the community to create sustainable behavioral change. This process reviewed knowledge and issues from activities in the project in order to allow the participants to have exactly health and SO literacy in addition to promoting mental health as part of holistic care. In addition, this process promoted the use of analytical thinking techniques including knowledge and experience sharing with other older adults in the community. This was consistent with Panich’s learning technique, which stated learning from exchanges, conversations, practice, and teaching others were found to have created memory and learning at 90% (Panich, 2023).

The outputs derived from this process participants have the analytical thinking techniques. This process was commonly referred to as “*dynamic behavior change*”

4.6.5.3 Output

Output from the process of using input factors in activities in the process until the output in the objective was received. This study had the following output from activities:

(1) Health awareness and sarcopenic obesity literacy:

According to input factors, the participants were found to have deficient SO literacy efficiency, causing the participants to lack awareness of the disease and not receive

information for solving problems or recovering. Therefore, the research process promoted SO literacy by providing information about the disease, risk factors, impacts, and management guidelines to the participations, creating perception of personal health according to real conditions, understanding of the disease and personal health conditions, observation of physical changes, ability to perform activities, and physical capabilities, and exchanges of health experience during group activities. In addition, this study monitored by weighing, measuring body composition, and muscle strength to create perception of health conditions and comparison of effects from changes to further improve health behaviors.

(2) Sarcopenic obesity modified lifestyle: According to input factors, the participants were found to have dietary behaviors and physical activity including exercise behaviors which contributed to SO. Families contributed to the participants' health behaviors. Therefore, the health behavior transformation process included SO literacy by using the transformative group learning process and support for family participation in behavioral transformation to create the outcome of positive attitude towards healthcare among the participants, awareness and benefits of behavioral transformation, which were important to successful and sustainable behavioral transformation. The data from this study were consistent with data from a meta-analysis of positive attitude towards health behavior transformation among older adults, which created sustainable transformation (Burnes et al., 2019). Appropriate health behaviors mean and include:

1. Healthy sarcopenic obesity diet: Older adults had the ability to analyze suitable foods for SO management, reduce high energy foods, and increase protein intake.

2. Appropriate physical activity and exercise: The participants performed aerobic exercises such as walking, swinging arms, and resistance exercise by using rubber bands and loaded rock bags including stretching exercises by Thai hamstring stretching device. The participants performed the aforementioned exercises regularly every day, causing the participants to have more physical capabilities and increased muscle strength as evident from weighing and measurements of body composition, muscle strength assessments, and observations of personal change and those of fellow participants.

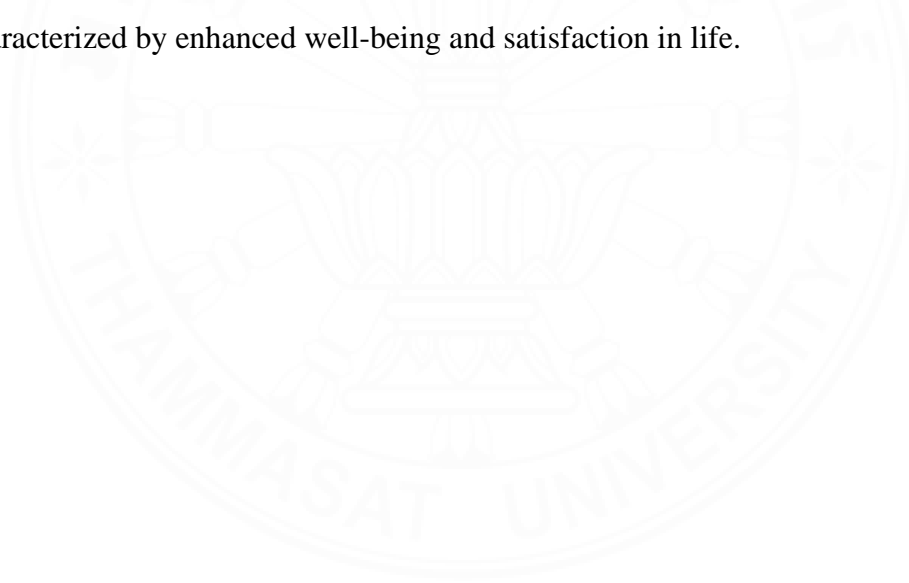
(3) Beyond activities of daily living: According to input factors, the participants were found to have the highest life goal of being able to perform activities in daily living independently. The participants had modified health behaviors to improve health related SO. Therefore, the action process created belief and faith in behavioral transformation, causing the participants to have a need to modify behaviors for sustainable health behavior transformation by exchanging knowledge and experience of independence in activities of daily living. The participants practiced analytical thinking skills until this resulted in an outcome where every participant retains independence in the ability to perform activities in daily living with fewer conditions that are effects from SO such as by walking for longer distances with less pain and fewer aches in the body and limbs, more energy and energy for performing activities.

(4) Blissful life: From input factors and the participants' exchanges of information during dialogue, the process of creating a care model was begun in order to provided information about SO and management guidelines. The participants were able to join social and religious activities as they need. When the participants participated in community activities regularly, the participants shared information about SO literacy in the community when the participants met with community members. Community members also saw biological changes, physical changes, and changes in physical capabilities such as an agile gait, better control of blood pressure, blood glucose, and fat, causing older adults who did not participate in the project to have interest in behavioral transformation. The participants were models and data providers, which was consistent with reports from a meta-analysis that found having a health model and participation in social activities caused older adults to have more physical activity (Lindsay Smith et al., 2017).

The output of this care model was consistent with desired characteristics that will lead to physical, psychological, social, and spiritual happiness among older adults or healthy aging. The World Health Organization defined "healthy aging" as "the process of developing and maintaining the functional ability that enables wellbeing in older age." The ability to perform duties was related to the ability to meet basic needs in daily life, the ability to learn, develop, and make decisions, the ability to perform

activities independently, building and maintaining relationships with others, and the ability to share SO literacy and their transform health behaviors (WHO, 2020).

The family and community-based care model for SO in older adults, as outlined in this study, was developed by utilizing baseline data gathered from the community through in-depth interviews and focus group interviews. Additionally, theoretical frameworks were applied to the contextual needs of community members via the PAR process. Participants were actively engaged in all phases, including planning, action, observation, and reflection. The processes implemented in this study aimed to foster health literacy regarding SO, facilitate health behavior transformation, instill confidence in behavioral change, and develop models for behavioral transformation. These endeavors resulted in the cultivation of positive attitudes toward behavioral change and sustainable health behavior transformation. Consequently, the outcome was improved health among older adults with sarcopenic obesity, characterized by enhanced well-being and satisfaction in life.



CHAPTER 5

CONCLUSION OF THE FINDINGS AND RECOMMENDATIONS

In this study on development of a family and community-based care model for sarcopenic obesity in older adults, the researcher summarized the main content of objectives, research methodology, research findings, discussion of the findings, and recommendations as follows:

5.1 Conclusion of the findings

This study was conducted in a community which was the service area of a Sub-district Health Promoting Hospital in Chumphon Sub-district, Ongkharak District, Nakhon Nayok province. The main participants were older adults with SO and the secondary participants were stakeholders in the community including family members of SO older adults, registered nurse at the Sub-district Health Promoting Hospital, village health volunteers, and community leader. The objective of the research was to develop a family and community-based care model for SO in older adults with participation from families and the community through a PAR. Research methodology was divided into the following two phases:

5.1.1 Phase 1 was a study of health perception among older adults with SO, risk factors, health effects, care need for support in healthcare and behavioral transformation including other resources involved to management of the disease and prevent complications in the view of older adults with SO and stakeholders in the community. Data were collected in in-depth interviews conducted with older adults who had SO in the community and focus group interviews among older adults with SO and stakeholders in the community. The findings in Phase 1 were used to create baseline data to form a guideline in developing the following preliminary family and community-based care model for SO in older adults:

5.1.1.1 Lack of sarcopenic obesity awareness: The participants had no knowledge about SO including factors of the disease, effects from the disease, and management and complication prevention guidelines.

5.1.1.2 Wellness literacy deficiency: The participants who were older adults with SO had a non-communicable disease related to SO. Furthermore, the participants had knowledge on disease management and were unable to perform disease management completely.

5.1.1.3 Behavior leading to poor health outcome: According to the data, the participants who were older adults with SO had dietary behaviors related to causes of SO in that received an excess of energy requirements, consumed insufficient protein, had little physical activity, and did not perform resistance exercise.

5.1.1.5 Family and community encouraging unhealthy behavior: Family members were a major part involved in the incidence of SO among older adults by providing or supporting older adults to consume high energy food and limit activity. Furthermore, community participation in supporting policies including health activity equipment and facilities enabled care for older adults with SO in the community.

5.1.1.6 Achieving goals in life: From collected data on the health of older adults with SO in the community, happiness in every person was found to be caused by possessing all four factors of life and peace of mind. The highest wish of every person in life was to remain able to perform activities in daily living normally with the least dependence on others.

The findings from Phase 1 were used to continue design and development of the family and community-based care model for SO in older adults through the PAR in Phase 2.

5.1.2 Phase 2: In developing the family and community-based care model for SO in older adults in the PAR process, the researcher used data from Phase 1 of the study to prepare a preliminary family and community-based care model for older adults with SO. Afterwards, the researcher followed participatory action research (PAR) processes in a spiral of reflective thinking and action by using data from Phase 1 of the study to plan actions with the participants along with taking action via a group process to exchange knowledge and jointly find behavior transformation guidelines in order to solve problems and observe effects from actions, reflect ideas, and assess results from

past actions. The researcher then used data from assessments to plan actions in the next cycle until sustainable problem-solving guidelines are created.

Actions were in 4 spiral action cycles. Activities in each cycle used 4 weeks. Activities were hosted for one day per week and each activity took 90-120 minutes. Week 1 was for planning. Weeks 2 and 3 were for acting, and observing. Week 4 was for reflecting outcomes. Each cycle had the following objectives and activities:

5.1.2.1 Cycle 1: Sarcopenic obesity literacy facilitation. This process was focused on building literacy and awareness of health conditions, particularly SO, including promotion of knowledge among the participants to know about SO, risk factors, health effects, and management guidelines in order to reflect for the participants to link theory with evident effects on themselves or other project participants.

(1) Activity 1: Good food, good health: This activity was an exchange of knowledge and experience about appropriate food for older adults with SO.

(2) Activity 2: Moving and resistance training: This activity was an exercise to increase the energy consumption and strengthen muscles in older adults with SO.

5.1.2.2 Cycle 2: Enrichment in healthy behavior, emphasized implementation of knowledge from Cycle 1 in dietary and exercise behavior transformation in order for older adults to become older adults with healthy SO. This process is referred to “”

(1) Activity 1: Rubber resistance invent was an invention of stretching rubber for resistance exercise in order to strengthen muscles.

(2) Activity 2: Calories, where are you hiding? involved providing information about energy from sugar in various beverages.

(3) Activity 3: Simulation meal with total food content equal to the amount normally ingested and adjusted to be low energy, high in protein, and fibrous.

(4) Activity 4: Cooking contest is a competition about food made from fish, which was an easily found source of protein in the community suitable for older adults with SO.

(5) Activity 5: Family support is an activity to allow family members to play a role in transforming the participants' behavior.

5.1.2.3 Cycle 3: Cultivate behavior transformation, behavior transformation was a search for the participants' encouragement and faith to transforming health behaviors in order to solve SO problems sustainably.

(1) Activity 1: Freedom life had the objective to show the participants that "human independence in performing activities in daily living was the basis of all happiness in life". The participants dialogue about knowledge and opinions about happiness in life.

(2) Activity 2: Make a choice was a game with the objective of enabling the participants to analyze and select appropriate foods in order to managing with SO and prevent complications from the disease. The participants were allowed to jointly analyze and determine which food items were more suitable or better for health.

(3) Activity 3: Recognize knee pain: Knee pain was a frequently encountered problem among obese older adults. This activity provided information about knowledge concerning knee pain and arthritis including preventive and management guidelines from credible sources of information with interesting and easily understood content.

(4) Activity 4: Miracle of weight was an activity where the participants invented stone bags as exercise equipment for exercise to increase muscle strength, increasing gravity during exercise, and strengthening leg muscle.

(5) Activity 5: The Thai hamstring stretching device was invented by older adults within the community. Participants in the project were given the opportunity to experiment with the device, employing it to stretch the hamstrings, thigh muscles, and leg muscles. Moreover, it can be utilized both in a sitting and prone position.

5.1.2.4 Cycle 4: Dynamic behavior change, summarized knowledge from participation in the project, promoted mental health, and promoted knowledge sharing in the community to create sustainable behavioral change.

(1) Activity 1: Traffic light was a review, analysis exercise, and summary of knowledge about suitable foods for older adults with SO.

(2) Activity 2: Good Memory, good emotions, and happy life was a brain exercise game to delay decay and enhance brain performance efficiency by using the Stoop test, which was a reading of sounds according to colors in order to rehabilitate memory among adults and older adults to prevent Alzheimer by speaking the colors seen.

5.1.3 Finding from the study

This study yielded a family and community-based care model for SO in older adults, which created healthy SO in older adults where older adults with SO did not have physical, emotional, and psychosocial effects from this disease. Older adults remained able to perform activities in daily living and able to live in family and society independently with appropriate healthcare behaviors in addition to having accurate perception of health that reflects reality.

The family and community-based care model for SO in older adults had the following components:

5.1.3.1 Input factors were data from in-depth interviews and focus group interviews held with older adults with SO in the community and stakeholders. This provided data for use in planning operations specific to the community. The data gained provided knowledge that older adults in the community lacked knowledge and understanding about SO, which caused older adults to lack awareness of the disease and have behaviors which contributed to the disease in the areas of dietary intake and activity models including exercise. The aforementioned behaviors were a characteristic specific to this community.

5.1.3.2 Processes consisted of the following four processes:

(1) Sarcopenic obesity literacy facilitation: This process delineates issues to establish a perception of personal health information, linking knowledge and problems to foster an understanding of issues and raise awareness of health. Participants are able to apply data through two-way communication and organize diverse activity models to assist older adults in retaining information for practical application. Moreover, expert instructors were engaged to furnish data during activities, ensuring participants receive accurate and pertinent information suitable for their individual capacities and everyday use.

(2) Enrichment in healthy behavior: This process monitored physical changes by weighting, measuring body composition, and muscle strength reflect consistency with behavioral transformation. Exercise equipment was invented to strengthen muscles. Group activities were organized and group processes were used to exchange knowledge and experience. In addition, an Everyday Food Model was used to better understand content and allow families to support the participants' behavioral transformation.

(3) Cultivate behavior transformation: This process monitored changes by weighting, measuring body composition and muscle strength, using real learning experiences, allowing the participants to reflect emotions and feelings, allowing exchanges of knowledge and experience in activities, and behavioral and physical changes. Practicing analytical thinking skills, used rewards to create competition and motivation for behavioral transformation. Holistic care placed importance on other health problems to create good health conditions in every system of the body. Innovation in the community was used in exercises to increase muscle strength.

(4) Dynamic behavior change: This process monitored changes, weighed, measured body composition and muscle strength, reviewed knowledge from the project, and allowed the participants to practice analytical thinking skills in addition to promoting mental health and organizing recreational activities to exercise the brain, memory, and create a health model to disseminate knowledge to the community by using participants as a model for health behavior transformation reflecting improved physical capabilities.

5.1.3.2 Outcome

The outcome from this healthcare model was healthy SO in older adults, which allowed older adults to have blissful life where, although older adults had SO, older adults were able to live independently, perform activities in daily living independently, and be able to participate in social activities without limitations from physical barriers. In addition, older adults had SO literacy and awareness of personal health, causing older adults to have health awareness, be able to transform behaviors appropriately for health conditions, and be a model in performing behaviors to managing SO along with preventing complications from the disease.

5.2 Recommendations

From the family and community-based care model for SO in older adults developed by using a PAR process in this study, the findings showed health behavior transformation among older adults by using a transformative learning process to have caused older adults to have a positive attitude towards behavior adjustment and be able to modify behaviors with sustainability. This study had the following recommendations for implementation of the family and community-based care model for older adults with SO in nursing and community healthcare services, policy planning, research, and limitations to implementation of the findings:

5.2.1 Recommendations for implementation of the findings in nursing and community health services

5.2.1.1 Participatory action research: This study received baseline data from the participants, who were the population in the community. In the action research spiral process, an emphasis was placed on allowing participants to participate in every step of research, making the findings suitable for use in the care of older adults with SO, who can modify health behaviors by feeling ownership and good attitude towards behavior transformation among the participants.

5.2.1.2 Gender: This care model had more female participants than male participants. Implementation of the findings in communities with different numbers of the male population may require different care models.

5.2.1.3 Activity continuity: Activities should be organized continually to reinforce behavior transformation and monitor behavioral transformation results.

5.2.2 Recommendations in policy-making

5.2.2.1 Expansion of the findings: The findings on this care model should be expanded to older adults with SO under the responsibility of the Sub-district

Health Promoting Hospital in order to create good health for all older adults with SO by promoting SO literacy, awareness of the disease, and promote health behavior transformation in order to managing the disease and prevent complications.

5.2.2.2 Sarcopenic obesity clinics: Clinics that provide care for older adults with SO should be established to create continual care for older adults with this disease and full coverage.

5.2.2.3 Adaptation of the model for apply in non-communicable disease clinic: Health behavior transformation techniques from this study can be used as a guideline or healthcare model among older adults with other non-communicable diseases.

5.2.2.4 Community participation: Roles of community organizations should be increased, such as senior citizen's clubs and Sub-district Administrative Organizations, in order for community organizations to play roles in the healthcare of older adults in the community specific to SO.

5.2.3 Recommendations for future studies

5.2.3.1 Test the care model: The care model for older adults with SO should be tested in applicable.

5.2.3.2 Role models: Conduct a study on the development of health leaders to serve as role for adopting health behavior changes to address the issue of obesity

5.2.4 Limitations in implementation of the findings

This study had limitations in implementation of the findings in other populations or community contexts because the data obtained were within the context of older adults with SO who were living in a community in the service area of a Sub-district Health Promoting Hospital in Chumphon Sub-district, Ongkharak District, Nakhon Nayok Province. When using this care model or expanding results, relevant data in communities should be studied and the healthcare model should be applied in a manner suitable for community contexts.

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APPENDICES

APPENDIX A

Human research ethics approval documents, Thammasat University



คณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยธรรมศาสตร์ สาขาวิทยาศาสตร์

ScF 03_01

ห้อง 110 ชั้น 1 อาคารปิยชาติ มหาวิทยาลัยธรรมศาสตร์ ศูนย์รังสิต ต.คลองหนึ่ง อ.คลองหลวง

จ.ปทุมธานี 12121 โทรศัพท์: 0-2564-4440 ต่อ 7358 E-mail: ecsctu3@tu.ac.th

COA No. 015/2566

ใบรับรองโครงการวิจัย

รหัสโครงการวิจัย : 158/2565
 ชื่อโครงการวิจัย : การพัฒนารูปแบบการดูแลสุขภาพในครอบครัวและชุมชนของผู้สูงอายุที่เป็นโรคอ้วนแบบมวลกล้ามเนื้อพร่อง
 : THE DEVELOPMENT OF A FAMILY AND COMMUNITY BASED CARE MODEL FOR SARCOPENIC OBESITY IN OLDER ADULTS
 ผู้วิจัยหลัก : นางสาวนุชธิดา สมัยสงฆ์
 หน่วยงาน : คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์

คณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยธรรมศาสตร์ สาขาวิทยาศาสตร์ ได้พิจารณา โดยใช้หลักของ Declaration of Helsinki, the Belmont report, CIOMS guidelines และ the International practice (ICH-GCP) อนุมัติให้ดำเนินการศึกษาวิจัยเรื่องดังกล่าวได้

ลงนาม..... *จินดา หวังบุญกุล* ลงนาม..... *เสาวภา เกียรติ*
 (รองศาสตราจารย์ ดร.เภสัชกรหญิง จินดา หวังบุญกุล) (รองศาสตราจารย์ ดร.เสาวภา เกียรติ)
 ประธานคณะกรรมการฯ กรรมการและเลขานุการฯ

วันที่รับรอง: 2 มีนาคม 2566

วันหมดอายุ: 1 มีนาคม 2567


กำหนดส่งรายงานความก้าวหน้า: 2 กุมภาพันธ์ 2567

เอกสารที่คณะกรรมการรับรอง

- 1) โครงการวิจัย
- 2) ประวัติผู้วิจัย
- 3) ข้อมูลสำหรับประชากร/กลุ่มตัวอย่างหรือผู้มีส่วนร่วมในการวิจัยและใบยินยอมของประชากร/กลุ่มตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย
- 4) แบบสอบถามข้อมูลส่วนบุคคล
- 5) แบบประเมินผู้สูงอายุตามกลุ่มศักยภาพตามความสามารถในการประกอบกิจวัตรประจำวัน
- 6) แบบทดสอบสมรรถภาพสมองไทย
- 7) แบบประเมินเพื่อคัดกรองภาวะมวลกล้ามเนื้อน้อยชนิด SARC-F
- 8) แนวคำถามสำหรับการสัมภาษณ์เชิงลึก และแนวคำถามการสนทนากลุ่ม

APPENDIX B

Permission letter for collecting data



ที่ อว ๖๗.๓๘๘/คช. ๒๕๖๐

คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์
 ตำบลคลองหนึ่ง อำเภอคลองหลวง
 จังหวัดปทุมธานี ๑๒๑๒๒๑

๑๖ มีนาคม ๒๕๖๖

เรื่อง ขออนุญาตให้นักศึกษาดำเนินการเก็บข้อมูลการวิจัย


เรียน ผู้อำนวยการโรงพยาบาลส่งเสริมสุขภาพตำบลบ้านท่าบ่อ ตำบลชุมพล อำเภอองครักษ์ จังหวัดนครนายก
 สิ่งที่ส่งมาด้วย โครงการวิจัยและเครื่องมือที่ใช้ในการวิจัยที่ผ่านการรับรองจาก คณะกรรมการพิจารณาจริยธรรม
 การวิจัยในคน สาขาวิทยาศาสตร์ มหาวิทยาลัยธรรมศาสตร์

ด้วย นางสาวนุชธิดา สมัยสงฆ์ นักศึกษาหลักสูตรปริญญาตรีบัณฑิต สาขาวิชาพยาบาลศาสตร์
 (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ กำลังดำเนินการจัดทำวิทยานิพนธ์
 เรื่อง "The Development of a Family and Community Based Care Model for Sarcopenic Obesity in
 Older Adults" ซึ่งเป็นส่วนหนึ่งในการสำเร็จการศึกษาหลักสูตรดังกล่าว โดยมี ผู้ช่วยศาสตราจารย์ ดร.ณชนัน สมประเสริฐ
 เป็นอาจารย์ที่ปรึกษาวิทยานิพนธ์หลัก

ในการนี้ คณะพยาบาลศาสตร์ จึงขออนุญาตให้นางสาวนุชธิดา สมัยสงฆ์ ดำเนินการเก็บข้อมูล
 การวิจัยในผู้สูงอายุที่เป็นโรคอ้วนแบบมวลกล้ามเนื้อพร่อง (Sarcopenic obesity) จำนวน ๒๖-๕๐ คน โดยมีการใช้
 แบบสอบถามข้อมูลส่วนบุคคล แบบประเมินความสามารถในการทำกิจวัตรประจำวัน แบบประเมินสมรรถภาพสมอง
 และมีการชั่งน้ำหนัก วัดปริมาณไขมันในร่างกายและมวลกล้ามเนื้อด้วยเครื่องชั่งน้ำหนักแบบใช้ความดันทานไฟฟ้า
 วัดส่วนสูง วัดรอบเอวและรอบสะโพก ทดสอบความแข็งแรงของกล้ามเนื้อด้วยเครื่องวัดแรงบีบมือ และทดสอบ
 สมรรถภาพร่างกายโดยการทดสอบการยืนและการเดิน เพื่อประเมินผู้ที่มีคุณสมบัติเหมาะสมเพื่อเข้าร่วมโครงการวิจัย
 การเก็บข้อมูลวิจัยทำโดยการสัมภาษณ์เชิงลึก การสนทนากลุ่ม และการทำกิจกรรมกลุ่มวิจัย และเก็บข้อมูลในผู้มีส่วนได้
 ส่วนเสียที่เกี่ยวข้องในชุมชน ได้แก่ สมาชิกในครอบครัว ทีมบุคลากรสุขภาพ อาสาสมัครสาธารณสุข ผู้นำศาสนา
 และผู้นำชุมชน จำนวน ๑๘-๓๐ คน โดยการใช้แบบสอบถามข้อมูลส่วนบุคคล การสนทนากลุ่ม และการทำกิจกรรมกลุ่ม
 วิจัย ทั้งนี้ นักศึกษาผู้วิจัยจะดำเนินการประสานงานเรื่องวันและเวลาในการเก็บรวบรวมข้อมูลการวิจัยอีกครั้งหนึ่ง

จึงเรียนมาเพื่อโปรดพิจารณาอนุมัติด้วย จะเป็นพระคุณยิ่ง

ขอแสดงความนับถือ



(รองศาสตราจารย์ ดร.เนาวรัตน์ นุชธิดา)
 รองคณบดีฝ่ายวิจัยและบัณฑิตศึกษา
 ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์
 มหาวิทยาลัยธรรมศาสตร์

สำนักงานเลขานุการคณะพยาบาลศาสตร์
 โทรศัพท์ ๐๒-๕๘๖-๕๒๓๘๔-๒๐ ต่อ ๗๒๓๑๘
 โทรสาร ๐๒-๕๒๖-๕๒๓๘๑
 หมายเลข : สอบถามข้อมูลเพิ่มเติมกรุณาติดต่อ นางสาวนุชธิดา สมัยสงฆ์ โทรศัพท์มือถือ ๐๙๓๑-๙๘๖๙๕๙๐๓

APPENDIX C

Informed consent form

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ScF 05_02

หนังสือแสดงความยินยอมเข้าร่วมการวิจัยของอาสาสมัครวิจัย

Informed Consent Form

ทำที่.....

วันที่.....เดือน.....พ.ศ.

เลขที่ อาสาสมัครวิจัย.....

ข้าพเจ้า ซึ่งได้ลงนามทำหนังสือนี้ ขอแสดงความยินยอมเข้าร่วมโครงการวิจัย

ชื่อโครงการวิจัย การพัฒนารูปแบบการดูแลสุขภาพในครอบครัวและชุมชนของผู้สูงอายุที่เป็นโรคอ้วนแบบมวลกล้ามเนื้อพร่อง

ชื่อผู้วิจัย นางสาวนุชธิดา สมัยสงฆ์

ที่อยู่ติดต่อ คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ เลขที่ 99 หมู่ 18 อาคารปิยชาติ ชั้น 10 ถนนพหลโยธิน ตำบลคลองหนึ่ง อำเภอคลองหลวง จังหวัดปทุมธานี รหัสไปรษณีย์ 12121

โทรศัพท์ 02-986-9213 ต่อ 7316-8 โทรศัพท์มือถือ 09 1942 9541

ข้าพเจ้า ได้รับทราบรายละเอียดเกี่ยวกับที่มาและวัตถุประสงค์ในการทำวิจัย รายละเอียดขั้นตอนต่าง ๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ ความเสี่ยง/อันตราย การรักษาความลับ และประโยชน์ซึ่งจะเกิดขึ้นจากการวิจัยเรื่องนี้ โดยได้อ่านรายละเอียดในเอกสารชี้แจงอาสาสมัครวิจัยโดยตลอด และได้รับคำอธิบายจากผู้วิจัยจนเข้าใจเป็นอย่างดีแล้ว

ข้าพเจ้าจึงสมัครใจเข้าร่วมในโครงการวิจัยนี้ ตามที่ระบุไว้ในเอกสารชี้แจงอาสาสมัครวิจัย โดยข้าพเจ้ามีสิทธิถอนตัวออกจากการวิจัยเมื่อใดก็ได้ตามความประสงค์ ในกรณีที่ผู้วิจัยขอทราบเหตุผล ข้าพเจ้ายังคงสิทธิที่จะแจ้งหรือไม่แจ้งเหตุผลแก่ผู้วิจัยก็ได้ ซึ่งการถอนตัวออกจากการวิจัยนั้นจะไม่มีผลกระทบในทางใด ๆ ต่อข้าพเจ้าทั้งสิ้น

ข้าพเจ้าได้รับคำรับรองว่า ผู้วิจัยจะปฏิบัติตามข้าพเจ้าตามข้อมูลที่ระบุไว้ในเอกสารชี้แจงอาสาสมัครวิจัยหากข้าพเจ้าไม่ได้รับการปฏิบัติตรงตามที่ได้ระบุไว้ในเอกสารชี้แจงอาสาสมัครวิจัย ข้าพเจ้าสามารถร้องเรียนได้ที่: คณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยธรรมศาสตร์ สาขาวิทยาศาสตร์ ห้อง 110 ชั้น 1 อาคารปิยชาติ มหาวิทยาลัยธรรมศาสตร์ ศูนย์รังสิต โทรศัพท์ 02-986-9213 ต่อ 7358 อีเมล ECScTU3@ tu.ac.th

ข้าพเจ้าได้ลงลายมือชื่อ(หรือลายนิ้วมือ) ไว้เป็นสำคัญต่อหน้าพยาน ทั้งนี้ข้าพเจ้าได้รับสำเนาเอกสารข้อมูลสำหรับอาสาสมัครวิจัย และสำเนาหนังสือแสดงความยินยอมเข้าร่วมการวิจัยของอาสาสมัครวิจัยไว้แล้ว

ลงชื่อ..... ลงชื่อ (หรือลายนิ้วมือ).....

(.....) (.....)

ผู้วิจัย

อาสาสมัครวิจัย

วันที่...../...../..... วันที่...../...../.....

ลงชื่อ..... ลงชื่อ.....

(.....) (.....)

พยาน

คณะกรรมการจริยธรรมการวิจัยในคน
มหาวิทยาลัยธรรมศาสตร์ สาขาวิทยาศาสตร์

พยาน

วันที่...../...../..... วันที่...../...../.....

อนุมัติ 02 MAR 2023

APPENDIX D**Qualified persons****List of experts inspecting research tools**

1. Assoc. Prof. Dr. Chaniphun Butryee Associate Professor, Institute of Nutrition, Mahidol University
2. Asst. Prof. Dr. Duangduan Rattanamongkolgul Assistant Professor, Faculty of Nursing, Srinakharinwirot University
3. Assoc. Prof. Dr. Puangpaka Kongvattananon Associate Professor, Faculty of Nursing, Thammasat University
4. Assoc. Prof. Dr. Virapun Wirojratana Associate Professor, Faculty of Nursing, Mahidol University
5. Asst. Prof. Dr. Suthee Rattanamongkolgul Assistant Professor, Faculty of Medicine, Srinakharinwirot University

APPENDIX E

Socio-demographic characteristics questionnaire of older adults with sarcopenic obesity

แบบประเมินข้อมูลส่วนบุคคล: ผู้สูงอายุ

คำชี้แจง: เติมคำในช่องว่างหรือทำเครื่องหมาย ✓ ในช่อง หน้าข้อความที่ตรงกับตัวท่าน

ชื่อ-นามสกุล: เบอร์โทรศัพท์ที่ติดต่อได้:

ที่อยู่:

1. เพศ

1. ชาย 2. หญิง

2. อายุ:ปี (อายุเต็มเมื่อวันเกิดที่ผ่านมา)

3. ศาสนา

1. อิสลาม 2. พุทธ 3. คริสต์ 4. อื่นๆ ระบุ.....

4. สถานภาพสมรส

1. โสด 2. คู่ 3. แยกกันอยู่/หย่า 4. หม้าย

5. ระดับการศึกษาสูงสุด

1. ไม่ได้เรียน 2. ประถมศึกษา 3. มัธยมศึกษา/ปวช.
 4. อนุปริญญา/ ปวส. 5. ปริญญาตรี 6. สูงกว่าปริญญาตรี

6. อาชีพปัจจุบัน

ไม่ได้ประกอบอาชีพ อาชีพ..... ตำแหน่ง.....

7. รายได้ส่วนตัว.....บาท/เดือน

8. แหล่งที่มาของรายได้ (ตอบได้มากกว่า 1 ข้อ)

1. เบี้ยยังชีพผู้สูงอายุ 2. เงินบำนาญ 3. ทำงาน 4. บุตรหลาน

9. โรคประจำตัว

1. ไม่มี 2. มี ระบุ.....

10. ผู้ดูแลเมื่อท่านเจ็บป่วย

1. สามี/ภรรยา 2. พี่/น้อง 3. ลูก
 4. หลาน 5. เพื่อนบ้าน 6. อื่นๆ ระบุ.....

APPENDIX F

Socio-demographic characteristics questionnaire of family members

แบบประเมินข้อมูลส่วนบุคคล: สมาชิกในครอบครัว

คำชี้แจง: เติมคำในช่องว่างหรือทำเครื่องหมาย ✓ ในช่อง หน้าข้อความที่ตรงกับตัวท่าน

ชื่อ-นามสกุล:

เบอร์โทรศัพท์ที่ติดต่อได้:

ที่อยู่:

ชื่อผู้สูงอายุ/ความสัมพันธ์กับผู้สูงอายุ.....

1. เพศ

1. ชาย

2. หญิง

2. อายุปี (อายุเต็มเมื่อวันเกิดที่ผ่านมา)

3. ศาสนา

1. อิสลาม

2. พุทธ

3. คริสต์

4. อื่นๆ ระบุ.....

4. สถานภาพสมรส

1. โสด

2. คู่

3. แยกกันอยู่/หย่า

4. หม้าย

5. ระดับการศึกษาสูงสุด

1. ไม่ได้เรียน

2. ประถมศึกษา

3. มัธยมศึกษา/ปวช

4. อนุปริญญา/ ปวส.

5. ปริญญาตรี

6. สูงกว่าปริญญาตรี

6. อาชีพ

1. เกษตรกร/ประมง

2. ค้าขาย

3. รับราชการ/รัฐวิสาหกิจ

4. รับจ้าง

5. บริษัทเอกชน

6. ว่างาน

7. อื่นๆ ระบุ.....

7. รายได้ต่อเดือน

ไม่มีรายได้

ต่ำกว่า 5,000 บาท

5,001 - 10,000 บาท

10,001 - 25,000 บาท

25,001-50,000 บาท

มากกว่า 50,000 บาท

APPENDIX G

Sarcopenic obesity record form

แบบบันทึกข้อมูลผู้สูงอายุโรคอ้วนแบบมวลกล้ามเนื้อพร่อง

ชื่อ-นามสกุล:

หัวข้อการประเมิน	ผลการประเมินเกณฑ์ Sarcopenic obesity																								
1. คะแนน SARC-F คะแนน	<input type="checkbox"/> เข้าเกณฑ์ <input type="checkbox"/> ไม่เข้าเกณฑ์																								
2. น้ำหนัก.....กิโลกรัม ส่วนสูง.....เซนติเมตร ดัชนีมวลกาย (Body mass index level: BMI)..... kg/m ² <input type="checkbox"/> ต่ำกว่าเกณฑ์ (BMI <18.5 kg/m ²) <input type="checkbox"/> ปกติ (BMI 18.5 - 22.9 kg/m ²) <input type="checkbox"/> ท้วม (BMI 23.0 - 24.9 kg/m ²) <input type="checkbox"/> อ้วน (BMI ≥ 25.0 kg/m ²)	<input type="checkbox"/> เข้าเกณฑ์ <input type="checkbox"/> ไม่เข้าเกณฑ์																								
3. แรงบีบมือ (Handgrip strength).....กิโลกรัม	<input type="checkbox"/> เข้าเกณฑ์ <input type="checkbox"/> ไม่เข้าเกณฑ์ (เพศชาย < 28 กิโลกรัม เพศหญิง < 18 กิโลกรัม)																								
4. คะแนนความสามารถทางกาย (Short Physical Performance Battery :SPPB).....คะแนน 4.1 การทดสอบการทรงตัว (Standing balance) คะแนน.....	<input type="checkbox"/> เข้าเกณฑ์ <input type="checkbox"/> ไม่เข้าเกณฑ์ (SPPB ≤ 9 คะแนน ถือว่ามี สมรรถภาพทางร่างกายต่ำ)																								
<table border="1"> <thead> <tr> <th>คะแนน</th> <th>ยืนเท้าชิด</th> <th>ยืนต่อเท้าแบบเฉียง</th> <th>ยืนต่อเท้า</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>< 10 วินาที หรือ ไม่สามารถทำได้</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td>≥10 วินาที</td> <td>< 10 วินาที หรือ ไม่ สามารถทำได้</td> <td>-</td> </tr> <tr> <td>2</td> <td></td> <td>≥10 วินาที</td> <td>< 3 วินาที หรือ ไม่ สามารถทำได้</td> </tr> <tr> <td>3</td> <td></td> <td></td> <td>3-9 วินาที</td> </tr> <tr> <td>4</td> <td></td> <td></td> <td>≥10 วินาที</td> </tr> </tbody> </table>	คะแนน	ยืนเท้าชิด	ยืนต่อเท้าแบบเฉียง	ยืนต่อเท้า	0	< 10 วินาที หรือ ไม่สามารถทำได้	-	-	1	≥10 วินาที	< 10 วินาที หรือ ไม่ สามารถทำได้	-	2		≥10 วินาที	< 3 วินาที หรือ ไม่ สามารถทำได้	3			3-9 วินาที	4			≥10 วินาที	
คะแนน	ยืนเท้าชิด	ยืนต่อเท้าแบบเฉียง	ยืนต่อเท้า																						
0	< 10 วินาที หรือ ไม่สามารถทำได้	-	-																						
1	≥10 วินาที	< 10 วินาที หรือ ไม่ สามารถทำได้	-																						
2		≥10 วินาที	< 3 วินาที หรือ ไม่ สามารถทำได้																						
3			3-9 วินาที																						
4			≥10 วินาที																						

หัวข้อการประเมิน	ผลการประเมินเกณฑ์ Sarcopenic obesity																								
<p>4.2 การทดสอบการลุกนั่ง 5 ครั้ง ใช้เวลา..... วินาที คะแนน.....</p> <table border="1"> <thead> <tr> <th>คะแนน</th> <th>เวลาที่ใช้ในการทดสอบ</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ไม่สามารถปฏิบัติได้</td> </tr> <tr> <td>1</td> <td>≥16.7 วินาที</td> </tr> <tr> <td>2</td> <td>13.7-16.6 วินาที</td> </tr> <tr> <td>3</td> <td>11.2-13.6วินาที</td> </tr> <tr> <td>4</td> <td>≤ 11.1 วินาที</td> </tr> </tbody> </table> <p>4.3 การทดสอบความเร็วในการเดิน 6 เมตร ใช้เวลา.....วินาที คะแนน.....</p> <table border="1"> <thead> <tr> <th>คะแนน</th> <th>เวลาที่ใช้ในการทดสอบ</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ไม่สามารถปฏิบัติได้</td> </tr> <tr> <td>1</td> <td>> 8.70 วินาที</td> </tr> <tr> <td>2</td> <td>6.21-8.7 วินาที</td> </tr> <tr> <td>3</td> <td>4.82-6.20 วินาที</td> </tr> <tr> <td>4</td> <td>< 4.82 วินาที</td> </tr> </tbody> </table>	คะแนน	เวลาที่ใช้ในการทดสอบ	0	ไม่สามารถปฏิบัติได้	1	≥16.7 วินาที	2	13.7-16.6 วินาที	3	11.2-13.6วินาที	4	≤ 11.1 วินาที	คะแนน	เวลาที่ใช้ในการทดสอบ	0	ไม่สามารถปฏิบัติได้	1	> 8.70 วินาที	2	6.21-8.7 วินาที	3	4.82-6.20 วินาที	4	< 4.82 วินาที	
คะแนน	เวลาที่ใช้ในการทดสอบ																								
0	ไม่สามารถปฏิบัติได้																								
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3	4.82-6.20 วินาที																								
4	< 4.82 วินาที																								
<p>5. ดัชนีกล้ามเนื้อ (Skeletal Muscle Index (SMI)).....kg/m²</p>	<input type="checkbox"/> เข้าเกณฑ์ <input type="checkbox"/> ไม่เข้าเกณฑ์ (เพศชาย < 7.0 kg/m ² เพศหญิง < 5.7 kg/m ²)																								
<p>สรุปการประเมินเกณฑ์การวินิจฉัยโรคอ้วนแบบกล้ามเนื้อพร่อง</p> <table> <tbody> <tr> <td>1. คะแนน SARC-F</td> <td><input type="checkbox"/> เข้าเกณฑ์</td> <td><input type="checkbox"/> ไม่เข้าเกณฑ์</td> </tr> <tr> <td>2. ดัชนีมวลกาย (BMI)</td> <td><input type="checkbox"/> เข้าเกณฑ์</td> <td><input type="checkbox"/> ไม่เข้าเกณฑ์</td> </tr> <tr> <td>3. แรงบีบมือ (Handgrip strength)</td> <td><input type="checkbox"/> เข้าเกณฑ์</td> <td><input type="checkbox"/> ไม่เข้าเกณฑ์</td> </tr> <tr> <td>4. คะแนนความสามารถทางกาย (SPPB)</td> <td><input type="checkbox"/> เข้าเกณฑ์</td> <td><input type="checkbox"/> ไม่เข้าเกณฑ์</td> </tr> <tr> <td>5. ดัชนีกล้ามเนื้อ (SMI)</td> <td><input type="checkbox"/> เข้าเกณฑ์</td> <td><input type="checkbox"/> ไม่เข้าเกณฑ์</td> </tr> </tbody> </table> <p>ผู้สูงอายุรายนี้</p> <p><input type="checkbox"/> ไม่มีโรคอ้วนแบบกล้ามเนื้อพร่อง (ไม่เข้าเกณฑ์ข้อ 1 + 2 + 3 + 4)</p> <p><input type="checkbox"/> เป็นโรคอ้วนแบบมวลกล้ามเนื้อ (เข้าเกณฑ์ข้อ 1 + 2 + 3 + 4)</p> <p><input type="checkbox"/> เป็นโรคอ้วนแบบมวลกล้ามเนื้อพร่องแบบรุนแรง (เข้าเกณฑ์ข้อ 1 + 2 + 3 + 4 + 5)</p>		1. คะแนน SARC-F	<input type="checkbox"/> เข้าเกณฑ์	<input type="checkbox"/> ไม่เข้าเกณฑ์	2. ดัชนีมวลกาย (BMI)	<input type="checkbox"/> เข้าเกณฑ์	<input type="checkbox"/> ไม่เข้าเกณฑ์	3. แรงบีบมือ (Handgrip strength)	<input type="checkbox"/> เข้าเกณฑ์	<input type="checkbox"/> ไม่เข้าเกณฑ์	4. คะแนนความสามารถทางกาย (SPPB)	<input type="checkbox"/> เข้าเกณฑ์	<input type="checkbox"/> ไม่เข้าเกณฑ์	5. ดัชนีกล้ามเนื้อ (SMI)	<input type="checkbox"/> เข้าเกณฑ์	<input type="checkbox"/> ไม่เข้าเกณฑ์									
1. คะแนน SARC-F	<input type="checkbox"/> เข้าเกณฑ์	<input type="checkbox"/> ไม่เข้าเกณฑ์																							
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5. ดัชนีกล้ามเนื้อ (SMI)	<input type="checkbox"/> เข้าเกณฑ์	<input type="checkbox"/> ไม่เข้าเกณฑ์																							

6. ปริมาณไขมันในร่างกาย (Body fat mass ;BFM).....กิโลกรัม.....%
7. ปริมาณกล้ามเนื้อในร่างกาย (Skeletal Muscle mass :SMM).....กิโลกรัม
8. เส้นรอบวงเอว (Waist circumference).....เซนติเมตร
9. เส้นรอบวงสะโพก (Hip circumference).....เซนติเมตร



APPENDIX H

SARC-F questionnaires

แบบประเมินเพื่อคัดกรองภาวะมวลกล้ามเนื้อน้อยชนิด SARC-F

ชื่อ-นามสกุล:

คำชี้แจง: ทำเครื่องหมาย ✓ ในช่อง ที่ตรงกับความสามารถในการทำกิจกรรมของท่าน

1. ความแข็งแรงของกล้ามเนื้อ ท่านคิดว่าการยกและถือของที่มีน้ำหนัก 20 กิโลกรัมยากหรือไม่
 - 0 คะแนน ไม่ยาก
 - 1 คะแนน ยากเล็กน้อย
 - 2 คะแนน ยาก
2. การเดิน ท่านรู้สึกว่าการเดินภายในห้องยากหรือไม่
 - 0 คะแนน ไม่ยาก
 - 1 คะแนน ยากเล็กน้อย
 - 2 คะแนน ยาก
3. การลุกจากเก้าอี้ ท่านเคลื่อนย้ายตนเองจากเก้าอี้ไปที่เตียงนอนยากหรือไม่
 - 0 คะแนน ไม่ยาก
 - 1 คะแนน ยากเล็กน้อย
 - 2 คะแนน ยาก
4. การขึ้นบันได ท่านรู้สึกว่าการเดินขึ้นบันไดจำนวน 10 ชั้นยากหรือไม่
 - 0 คะแนน ไม่ยาก
 - 1 คะแนน ยากเล็กน้อย
 - 2 คะแนน ยาก
5. การหกล้ม ท่านเคยมีประวัติหกล้มมากี่ครั้ง
 - 0 คะแนน ไม่เคย
 - 1 คะแนน 0-1 ครั้ง
 - 2 คะแนน >4 ครั้ง

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- SARCF-F 0-3 คะแนน ไม่มีภาวะมวลกล้ามเนื้อน้อย
- SARCF-F 4 คะแนนขึ้นไป มีภาวะมวลกล้ามเนื้อน้อย

APPENDIX I

Barthel Activities of Daily Living: ADL

แบบประเมินคัดกรองผู้สูงอายุตามความสามารถในการประกอบกิจวัตรประจำวัน
โดยแบบประเมินบาร์เธล

ชื่อ-นามสกุล:

คำชี้แจง: ให้ท่านทำเครื่องหมาย ✓ ในช่อง ที่ตรงกับความสามารถในการดำเนินชีวิตประจำวัน
ของท่าน

1. การรับประทานอาหารเมื่อเตรียมสำรับไว้ให้เรียบร้อยเมื่ออยู่ต่อหน้า
 - 0 คะแนน ไม่สามารถตักอาหารเข้าปากได้
 - 1 คะแนน ตักอาหารเองได้ แต่ต้องมีคนช่วยเช่นช่วยใช้ช้อนตักเตรียมไว้ให้ หรือตัดเป็นชิ้นเล็กไว้ให้ล่วงหน้า
 - 2 คะแนน ตักอาหารและช่วยเหลือตัวเองได้เป็นปกติ
2. การล้างหน้า แปรงฟัน หวีผม โกนหนวดในระยะเวลา 24-48 ชม.ที่ผ่านมา
 - 0 คะแนน ต้องการความช่วยเหลือ
 - 1 คะแนน ทำได้เอง (รวมทั้งที่ทำได้เองถ้าเตรียมอุปกรณ์ไว้ให้)
3. การลุกขึ้นจากที่นอนหรือจากเตียงไปยังเก้าอี้
 - 0 คะแนน ไม่สามารถนั่งได้ (นั่งแล้วจะล้มเสมอ) หรือต้องให้คนสองคนช่วยกันยกขึ้น
 - 1 คะแนน ต้องการความช่วยเหลืออย่างมากจึงจะนั่งได้เช่นต้องใช้คนที่แข็งแรงหรือมีทักษะหนึ่งคนหรือใช้คนทั่วไปสองคนพยุง หรือดันขึ้นมาจึงจะนั่งได้
 - 2 คะแนน ต้องการความช่วยเหลือบ้าง เช่นบอกให้ทำตามหรือช่วยพยุงเล็กน้อย หรือต้องมีคนดูแลเพื่อความปลอดภัย
 - 3 คะแนน ทำได้เอง
4. การใช้ห้องสุขา
 - 0 คะแนน ช่วยตัวเองไม่ได้
 - 1 คะแนน ทำเองได้บ้าง (อย่างน้อยทำความสะอาดตัวเองได้หลังจากเสร็จธุระ) แต่ต้องการความช่วยเหลือในบางสิ่ง
 - 2 คะแนน ช่วยเหลือตัวเองได้ดี (ขึ้นนั่งและลงจากโถส้วมเองได้ ทำความสะอาดได้เรียบร้อยหลังจากเสร็จธุระ ถอดใส่เสื้อผ้าได้เรียบร้อย)

5. การเคลื่อนที่ภายในห้องหรือบ้าน
- 0 คะแนน เคลื่อนที่ไปไหนไม่ได้
 - 1 คะแนน ต้องใช้รถเข็นช่วยตัวเองให้เคลื่อนที่ได้เองและจะต้องเข้าออกมุมห้องหรือประตูได้ (ไม่ต้องมีคนเข็นให้)
 - 2 คะแนน เดินหรือเคลื่อนที่โดยมีคนช่วย เช่น พยุงหรือบอกให้ทำตามหรือต้องให้ความสนใจเพื่อความปลอดภัย
 - 3 คะแนน เดินหรือเคลื่อนที่ได้เอง
6. การแต่งตัว สวมใส่หรือถอดเสื้อผ้า
- 0 คะแนน ต้องมีคนสวมใส่ให้ ช่วยตัวเองแทบไม่ได้หรือน้อย
 - 1 คะแนน ช่วยตัวเองได้ประมาณร้อยละ 50 ที่เหลือต้องมีคนช่วย
 - 2 คะแนน ช่วยตัวเองได้ดี (รวมทั้งติดกระดุม รูดซิป หรือใส่เสื้อผ้าที่ดัดแปลงให้เหมาะสม)
7. การขึ้นลงบันได 1 ชั้น
- 0 คะแนน ไม่สามารถทำได้
 - 1 คะแนน ต้องการคนช่วย
 - 2 คะแนน ขึ้นลงได้เอง (ถ้าต้องใช้เครื่องช่วยเดินเช่น Walker จะต้องเอาขึ้นลงได้ด้วย)
8. การอาบน้ำ
- 0 คะแนน ต้องมีคนช่วยหรือทำให้
 - 1 คะแนน อาบน้ำได้เอง
9. การกลั้นการถ่ายอุจจาระใน ระยะ 1 สัปดาห์ที่ผ่านมา
- 0 คะแนน กลั้นไม่ได้หรือต้องการสวนอุจจาระอยู่เสมอ
 - 1 คะแนน กลั้นไม่ได้บางครั้ง (เป็นน้อยกว่า 1 ครั้งต่อสัปดาห์)
 - 2 คะแนน กลั้นได้เป็นปกติ
10. การกลั้นปัสสาวะในระยะ 1 สัปดาห์ที่ผ่านมา
- 0 คะแนน กลั้นไม่ได้หรือใส่สายสวนปัสสาวะ แต่ไม่สามารถดูแลเองได้
 - 1 คะแนน กลั้นไม่ได้บางครั้ง (เป็นน้อยกว่าวันละ 1 ครั้ง)
 - 2 คะแนน กลั้นได้เป็นปกติ

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- 12 คะแนนขึ้นไป ช่วยเหลือตัวเองได้
- 5-11 คะแนน มีภาวะพึ่งพิงปานกลาง
- 0-4 คะแนน มีภาวะพึ่งพิง

APPENDIX J
Thai Mental State Examination (TMSE)

หัวข้อประเมิน	คะแนน
1. ORIENTATION	
วันนี้วันอะไรของสัปดาห์ (จันทร์ อังคาร พุธ พฤหัสฯ ฯลฯ) (1 คะแนน)	
วันนี้วันที่เท่าไร (1 คะแนน)	
เดือนนี้เดือนอะไร (1 คะแนน)	
ขณะนี้ในช่วง (ตอน) ไหนของวัน (เช้า เที่ยง บ่าย เย็น) (1 คะแนน)	
ที่นี้ที่ไหน (บริเวณที่ตรวจ) (1 คะแนน)	
คนที่เห็นในภาพนี้มีอาชีพอะไร (ภาพอยู่ด้านหลัง) (1 คะแนน)	
2. REGISTRATION	
ผู้ทดสอบบอกชื่อของ 3 อย่าง โดยพูดห่างกันครั้งละ 1 วินาที (ต้นไม้ รถยนต์ มือ) เพียงครั้งเดียวแล้วจึงให้ผู้ถูกทดสอบบอกให้ครบ ตามที่ผู้ถูกทดสอบบอกในครั้งแรกให้ 1 คะแนนในแต่ละคำตอบที่ตอบถูก (3 คะแนน) * หมายเหตุหลังจากให้คะแนนแล้วให้บอกซ้ำจนผู้ถูกทดสอบจำได้ทั้ง 3 อย่าง และบอกให้ผู้ถูกทดสอบทราบว่าสักครู่นี้จะกลับมาถามใหม่	
3. ATTENTION ให้บอกวันอาทิตย์-วันเสาร์ย้อนหลัง ให้ครบสัปดาห์ (ให้ตอบซ้ำได้ 1 ครั้ง)	
ศุกร์ (1 คะแนน)	
พฤหัสบดี (1 คะแนน)	
พุธ (1 คะแนน)	
อังคาร (1 คะแนน)	
จันทร์ (1 คะแนน)	
4. CALCULATION ให้คำนวณ 100-7 ไปเรื่อยๆ 3 ครั้ง (ให้ 1 คะแนน) ในแต่ละครั้งที่ตอบถูก ใช้เวลาคิดในแต่ละช่วงคำตอบไม่เกิน 1 นาทีหลังจบคำถาม) ถ้าผู้ถูกทดสอบไม่ตอบคำถามที่ 1 ให้ตั้งเลข 93-7 ลองทำในการคำนวณครั้งต่อไป และ 86-7 ในครั้งสุดท้ายตามลำดับ	
100-7 (1 คะแนน)	
93-7 (1 คะแนน)	
86-7 (1 คะแนน)	

หัวข้อประเมิน	คะแนน
5. LANGUAGE	
ผู้ทดสอบชี้ไปที่นาฬิกาข้อมือ แล้วถามผู้ถูกทดสอบว่าโดยทั่วไป “เราเรียกสิ่งนี้ว่าอะไร” (นาฬิกา) (1 คะแนน)	
ผู้ทดสอบชี้ไปที่เสื้อของตนเอง แล้วถามผู้ถูกทดสอบว่าโดยทั่วไป “เราเรียกสิ่งนี้ว่าอะไร” (เสื้อ, ผ้า) (1 คะแนน)	
ผู้ทดสอบบอกผู้ถูกทดสอบว่า จงฟังประโยคต่อไปนี้ให้ดีแล้วจำไว้จากนั้นให้พูดตาม “ยายพาหลานไปซื้อขนมที่ตลาด” (1 คะแนน)	
จงทำตามคำสั่งต่อไปนี้ (มี 3 ขั้นตอนคำสั่ง) ให้ผู้ทดสอบพูดต่อกันไปให้ครบทั้ง 3 ขั้นตอน <ol style="list-style-type: none"> 1. หยิบกระดาษด้วยมือขวา (1 คะแนน) 2. พับกระดาษเป็นครึ่งแผ่น (1 คะแนน) 3. ส่งกระดาษให้ผู้ตรวจ (1 คะแนน) 	
ให้ผู้ถูกทดสอบอ่านแล้วทำตาม “หลับตา” (ข้อความอยู่ด้านหลัง) (1 คะแนน)	
จงวาดภาพต่อไปนี้ให้เหมือนตัวอย่างมากที่สุดเท่าที่ท่านจะสามารถทำได้ (ภาพอยู่ด้านหลัง และให้ผู้ถูกทดสอบดูตัวอย่างตลอดเวลาที่วาด) (2 คะแนน)	
กล้วยกับส้มเหมือนกันคือเป็นผลไม้ แมวกับสุนัขเหมือนกันคือ (เป็นสัตว์, เป็นสิ่งมีชีวิต) (1 คะแนน)	
6. RECALL: สิ่งของ 3 อย่างที่บอกให้จำเมื่อสักครู่นี้ มีอะไรบ้าง	
ต้นไม้ (1 คะแนน)	
รถยนต์ (1 คะแนน)	
มือ (1 คะแนน)	
รวม	

สรุปผลรวมคะแนน

- ≤ 23 คะแนน มีภาวะสมองเสื่อม
- > 23 คะแนน ไม่มีภาวะสมองเสื่อม



APPENDIX K

In-depth interview guidelines

แนวทางการสัมภาษณ์เชิงลึก

หัวข้อ: การพัฒนารูปแบบการดูแลสุขภาพในครอบครัวและชุมชนของผู้สูงอายุที่เป็นโรคอ้วนแบบมวลกล้ามเนื้อพร่อง

วัน เวลาที่สัมภาษณ์:.....

สถานที่:.....

ผู้สัมภาษณ์:.....

ผู้ให้สัมภาษณ์:.....

แนวคำถาม:

1. ท่านรู้จักโรคอ้วนแบบกล้ามเนื้อพร่องหรือไม่ อย่างไร
2. ท่านรับรู้เกี่ยวกับภาวะสุขภาพของท่านในปัจจุบันว่าเป็นอย่างไร
 - 2.1 ภาวะสุขภาพของท่านในปัจจุบันเป็นอย่างไร
 - 2.1 หากเปรียบเทียบภาวะสุขภาพของท่านในอดีตกับปัจจุบันเป็นอย่างไร มีการเปลี่ยนแปลงอย่างไรบ้าง
 - 2.3 เมื่อเปรียบเทียบภาวะสุขภาพของท่านในปัจจุบันกับผู้สูงอายุอื่นๆ เป็นอย่างไร
3. ท่านมีวิธีการดูแลสุขภาพของตนเองอย่างไร (ถามเชิงลึกไป ให้ ครอบคลุม กาย จิต สังคมทั้งด้านสุขภาพทั่วไปและถามเฉพาะเจาะจงปัจจัยที่เกี่ยวกับโรคอ้วนแบบกล้ามเนื้อพร่อง)
 - 3.1 ท่านมีการดูแลตนเองเพื่อให้มีสุขภาพที่ดีอย่างไรบ้าง
 - 3.2 ท่านมีวิธีการดูแลสุขภาพจิตของตนเองอย่างไรบ้าง/ท่านมีวิธีการผ่อนคลายความเครียดอย่างไร
 - 3.3 ท่านเข้าร่วมกิจกรรมในชุมชน/งานสังสรรค์ต่างๆบ้างหรือไม่ บ่อยเพียงใด
4. ท่านรู้สึกอย่างไรเกี่ยวกับรูปร่างของตนเองในปัจจุบัน และคิดว่าเป็นปัญหาหรือไม่ อย่างไร
5. ใครเป็นผู้จัดเตรียมอาหารให้ท่านรับประทานในแต่ละมื้อ และเป็นอาหารที่จัดเตรียมเองหรือมีที่มาอย่างไร
6. ท่านรับประทานอาหารวันละกี่มื้อ แต่ละมื้อรับประทานอะไร ปริมาณอาหารที่รับประทาน อาหารแต่ละชนิด (ถามความถี่และปริมาณตามหมวดหมู่อาหาร)

7. อาหารที่ท่านรับประทานมีความเพียงพอเหมาะสมกับตัวท่านหรือไม่ทั้งด้านปริมาณและคุณภาพ อย่างไร
8. ท่านรับประทานอาหารผลิตภัณฑ์อาหารเสริมหรือวิตามินบ้างหรือไม่ รับประทานอย่างไร รับประทานมานานเท่าไร บ่อยแค่ไหน
9. ในแต่ละวันท่านทำกิจกรรมอะไรบ้าง (แจกแจงการเคลื่อนไหวในมิติอาชีพ การเดินทาง การทำงานบ้านและกิจกรรมสันทนาการ) กิจกรรมที่เคลื่อนไหวร่างกายมีความเพียงพอเหมาะสมกับตัวท่านหรือไม่ อย่างไร (ยกตัวอย่างกิจกรรมทางกายที่ผู้สูงอายุทำเพื่ออธิบายคำจำกัดความเกี่ยวกับกิจกรรมที่มีการเคลื่อนไหวร่างกาย)
10. ท่านออกกำลังกายบ้างหรือไม่ บ่อยแค่ไหน ออกกำลังกายอย่างไร และมีเหตุผลใดในการออกกำลังกาย การออกกำลังกายในปัจจุบันมีความเพียงพอเหมาะสมกับตัวท่านหรือไม่ อย่างไร
11. ท่านคิดว่าโรคอ้วนแบบกล้ามเนื้อพ่องมีผลอย่างไรต่อท่าน ครอบครัวหรือผู้อื่นหรือไม่ อย่างไร
12. ท่านคาดหวังให้สุขภาพของท่านเป็นอย่างไร ((ถามหยังลึกไป ให้ ครอบคลุม กาย จิต สังคม)
13. ท่านต้องการดูแลตนเองเกี่ยวกับโรคอ้วนแบบกล้ามเนื้อพ่องอย่างไร
14. ท่านตั้งเป้าหมายในการดูแลสุขภาพของตนเองอย่างไรบ้าง และมีวิธีการอย่างไร
15. อะไรทำให้ท่านอยากตั้งเป้าหมายในการดูแลสุขภาพเช่นนั้น และทำไมเลือกวิธีดังกล่าว (ในข้อ 14.)
16. ใครเป็นผู้ที่มีส่วนร่วมในการส่งเสริมสภาวะสุขภาพของผู้สูงอายุในชุมชนบ้าง และมีบทบาทอย่างไร (ทั้งการส่งเสริมสุขภาพทั่วไป และการส่งเสริมสุขภาพเกี่ยวกับโรคอ้วนแบบกล้ามเนื้อพ่อง)
17. ท่านได้รับการสนับสนุนหรือการช่วยเหลือในการดูแลสุขภาพจากสมาชิกในครอบครัวอย่างไรบ้าง (ถามครอบคลุมทั้งด้านกาย จิต สังคม ทั้งด้านสุขภาพทั่วไปและเฉพาะเจาะจงปัจจัยที่เกี่ยวข้องกับโรคอ้วนแบบกล้ามเนื้อพ่อง)
18. ท่านได้รับการสนับสนุนหรือการช่วยเหลือในการดูแลสุขภาพจากสมาชิกในชุมชน หน่วยงานต่างๆ ในชุมชน หรือหน่วยงานภายนอกชุมชนบ้างหรือไม่ อย่างไร (ถามครอบคลุมทั้งด้านกาย จิต สังคม ทั้งด้านสุขภาพทั่วไปและปัจจัยที่เกี่ยวข้องกับโรคอ้วนแบบกล้ามเนื้อพ่อง)
19. การดูแลสุขภาพของผู้สูงอายุในชุมชนเป็นอย่างไร
20. ท่านต้องการให้มีให้มีการสนับสนุนจากครอบครัวและชุมชนเพื่อการดูแลสุขภาพอย่างไร
21. สิ่งแวดล้อมและสิ่งสนับสนุนในชุมชนเพื่อให้เกิดการดูแลสุขภาพมีอะไรบ้าง อะไรคือสิ่งสนับสนุนที่ดี อะไรคือสิ่งที่ยังไม่มีหรือยังไม่ดี และท่านอยากให้ปรับปรุงหรือเพิ่มเติมอะไรบ้าง

APPENDIX L

Focus group interviews guidelines

แนวทางการสนทนากลุ่ม

หัวข้อ: การพัฒนารูปแบบการดูแลสุขภาพในครอบครัวและชุมชนของผู้สูงอายุที่เป็นโรคอ้วนแบบมวลก้ามเนื้อพร่อง

วัน เวลาที่สนทนากลุ่ม:.....

สถานที่:.....

ผู้เข้าร่วมการสนทนากลุ่ม

ชื่อ-สกุลผู้เข้าร่วม	ตำแหน่ง/ความสัมพันธ์กับผู้สูงอายุ
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

ชื่อผู้ช่วยวิจัย:

แนวประเด็นคำถาม:

1. ท่านรับรู้ถึงภาวะสุขภาพของผู้สูงอายุในครอบครัว/ชุมชนของท่านในขณะนี้ว่าเป็นอย่างไร
2. การรับรู้ภาวะสุขภาพของผู้สูงอายุในครอบครัว/ชุมชนสอดคล้องกับความคาดหวังของท่านหรือไม่ อย่างไร
3. ผู้สูงอายุในครอบครัว/ชุมชนมีการปฏิบัติตนด้านสุขภาพอย่างไร
4. การปฏิบัติตัวเพื่อดูแลสุขภาพของผู้สูงอายุในชุมชนมีความเหมาะสมหรือไม่ อย่างไร
5. การปฏิบัติตัวเพื่อดูแลสุขภาพของผู้สูงอายุในชุมชนส่งผลต่อภาวะสุขภาพอย่างไร
6. อาหารที่ผู้สูงอายุในชุมชนรับประทานในแต่ละวัน ทั้งชนิด ปริมาณ คุณภาพ มีความเพียงพอเหมาะสมหรือไม่ อย่างไร (ถามความถี่และปริมาณตามหมวดหมู่อาหาร)
7. ในแต่ละวันผู้สูงอายุทำกิจกรรมอะไร ทำอย่างไร มีความเพียงพอและเหมาะสมหรือไม่ อย่างไร (ยกตัวอย่างกิจกรรมทางกายที่ผู้สูงอายุทำเพื่ออธิบายคำจำกัดความเกี่ยวกับกิจกรรมที่มีการเคลื่อนไหวร่างกาย)
8. การออกกำลังกายที่ผู้สูงอายุในชุมชนทำในแต่ละวัน ทั้งรูปแบบ เวลา มีความเพียงพอและเหมาะสมหรือไม่ อย่างไร
9. โรคอ้วนแบบกล้ามเนื้อพร่องมีผลต่อผู้สูงอายุในชุมชนอย่างไร
10. ที่ผ่านมารอบครัวและชุมชนได้มีส่วนช่วยสนับสนุนและส่งเสริมการออกกำลังกาย การรับประทานอาหารที่เหมาะสมแก่ผู้สูงอายุในชุมชนหรือไม่ อย่างไร
11. ใครเป็นผู้ที่มีส่วนร่วมในการส่งเสริมสถานะสุขภาพของผู้สูงอายุในชุมชนบ้าง และมีบทบาทอย่างไร (ระบุตัวตนที่ชัดเจนพร้อมทั้งบทบาทของแต่ละบุคคล)
12. แหล่งทรัพยากรในครอบครัวและชุมชนที่ช่วยสนับสนุนการดูแลสุขภาพของผู้สูงอายุมีอะไรบ้าง มีความเพียงพอเหมาะสมหรือไม่ อย่างไร
13. ท่านคาดหวังให้ผู้สูงอายุในครอบครัว/ชุมชนมีภาวะสุขภาพเป็นอย่างไร และความคาดหวังนี้มีความหมายอย่างไรต่อท่าน ครอบครัวและชุมชน
14. ในฐานะที่ท่านเป็นส่วนหนึ่งของครอบครัว/ชุมชน ท่านจะมีส่วนช่วยในการส่งเสริมสุขภาพผู้สูงอายุในชุมชน เพื่อให้มีไขมันในร่างกายลดลง มีปริมาณมวลกล้ามเนื้อและความแข็งแรงของกล้ามเนื้อเพิ่มขึ้นได้อย่างไร

APPENDIX M

Example the codes that build the categories

Categories	Sub-Categories	Codes
Lack of sarcopenic obesity awareness	SO information	perception
		shape
		effect
Wellness literacy deficiency	Health conscious	knowledge
		turning point
	Self-care	health care
		compliance
Behavior leading to poor health outcome	Eating behaviors	appropriate
		chewing
		fat
		food
		fruit
		meat
		protein
		rice
		supplement
		sweet
	fat	
	Physical activity	activity
		exercise
Family and community encouraging unhealthy behavior	Wellness resource	community
		environment
		facility
	Family concern	family
		need
		religion
Achieving goals in life	Goals of life	expectation
	Psycho-social	social
		psycho

Example of the verbatims in ‘protein’ code

“เนื้อนี้ธรรมดาไม่ค่อยอยากจะซื้อกิน มันคล้ายๆว่าเวลากินเนื้ออะไรไปมันขับถ่ายไม่ค่อยสะดวก” 001

“เนื้อไก่โต๊ะก็ไม่กินแล้ว ไม่ชอบ เนื้อปลาพอกินนิดๆ ไก่นี้ไม่เอาแล้วน้อยที ไปไหนเค้ามีไก่ก็กินแต่น้ำ ไม่ไหว ปลานี้ทอดเองก็ทำให้กรอบ ค่อยๆเคี้ยวไป ไม่กินก็ไม่เป็นไรแล้วปลาช่อนแกงส้มนิดๆก็พอกินได้บ้าง กินได้หน่อยนึง ไม่เยอะ” 005

“นมกิน ลูกเค้าซื้อมา ดิน่างาดำ กล่องเล็กๆ เค้าบอกให้กินก่อนนอนสักกล่องนึง บางวันก็ลืม สองวันกินที สามวันกินที” 005

“ชายเค้าซื้อมาให้ผมดิน่างาดำ แอร์เค้ากินแต่โต๊ะไม่ค่อยได้กิน ไม่ค่อยอยากกิน กินก็เบื่อ นานๆจะกินซะที” 006

“เนื้อนี้ไม่ค่อยได้กินเพราะย่อยยาก โดยมากโต๊ะจะกินปลา ปลาทุปลาชนิดซื้อมาแช่ตู้เย็นไว้เรื่อยๆ กินปลาดีกว่า อย่างปลาทูเนี่ยกินครั้งละครึ่งตัวก็ไม่ถึง กินกับข้าวน้อย ไข่ก็ไม่ชอบกินนะ นานๆทีก็กินได้ ไก่ก็ไม่ชอบกิน กินแล้วคอยจะปวดขา นมนี้กินนานๆที อยากกินก็กินสักทีพวกนมแลคตาชอย นมไทย เดนมาร์ค อาทิพย์นี่กินสักสองครั้งได้ กล่องก็ไม่โตหรอก” 007

“เนื้อโต๊ะไม่เอาเลย ปีหนึ่งไม่ได้ซื้อสักหน กินแล้วมันไม่ย่อย ไก่ก็ต้มไก่ก็กินแต่น้ำ ๆ ไม่ค่อยกินเนื้อไก่ กลัวจะเป็นเฝ้าแล้วก็เคี้ยวไม่ไหว ฟันมันไม่ดี” 008

“เนื้อสับโต๊ะกินได้แต่ไม่ชอบรู้สึกเหมือนกินแล้วมันจะไม่ย่อย ไก่กินได้เพราะเป็นไก่ซื้อมันจะไม่เหนียว แต่ไก่ก็กินไม่บ่อย โต๊ะจะชอบกินปลา” 009

“พวกเนื้อลูกสาวจะซื้อมาเดือนละสองโล ก็จะมาสับผัดกะเพราให้หลานกิน โต๊ะกับแอร์ไม่ค่อยได้กินหรอก” 009

“กับข้าวก็กินไม่ค่อยเยอะหรอก ส่วนใหญ่จะกินเป็นพวกต้มต้มปลาช่อนต้มปลานิลอะไรพวกนั้น กินครั้งละชิ้น บางทีก็กินซีกหนึ่ง” 010

“ไก่นี้ผมไม่กินเลย เนื้อวันนี้เดือนนี้จะเจอสักครั้งนึง เนื้อปลานี้ผมก็ไม่ค่อยกินนะมันเหม็นสาบยังงี้ก็ไม่รู้” 011

“นมนี้เดี๋ยวนี้ไม่ได้กินทุกวันแล้ว แต่ก่อนกินทุกวัน แต่รู้สึกว่ายวันเลยหยุดกิน” 014

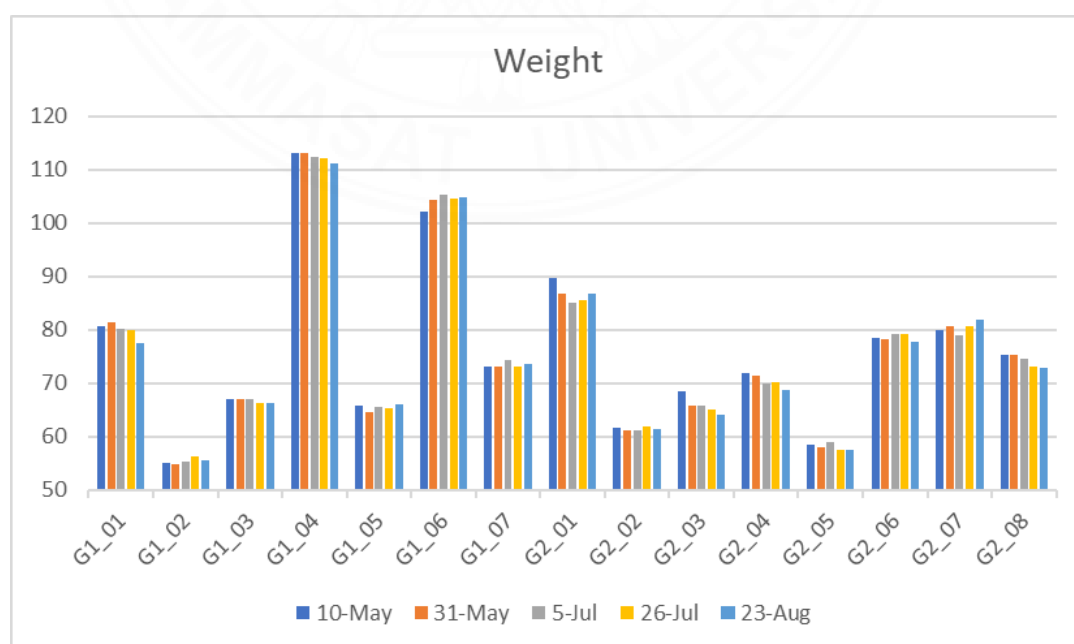
“ถ้าไม่มีอะไรกินก็กินไข่เน่แหละ แต่เราไม่ได้กินบ่อยหรอก” 014

“พวกเนื้อนี้กินแต่กินน้อยไม่ค่อยอยากกิน” 014

APPENDIX N

Body weight record of participants during the study

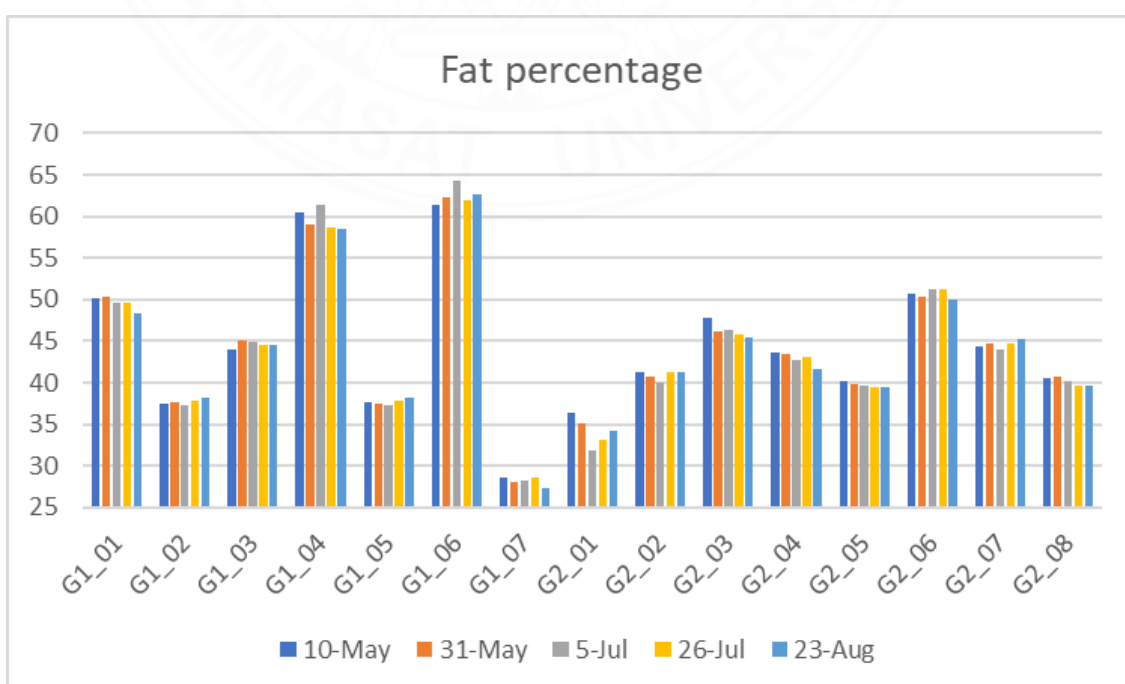
No.	Participants	10-May	31-May	5-Jul	26-Jul	23-Aug
1	G1_01	80.8	81.3	80.2	80	77.6
2	G1_02	55	54.9	55.2	56.3	55.6
3	G1_03	67	67.1	67	66.2	66.3
4	G1_04	113.2	113.1	112.4	112.1	111.2
5	G1_05	65.7	64.7	65.6	65.4	66.1
6	G1_06	102.1	104.3	105.3	104.7	104.8
7	G1_07	73.1	73.1	74.4	73.1	73.5
8	G2_01	89.8	86.8	85.2	85.5	86.9
9	G2_02	61.7	61.2	61.1	61.9	61.4
10	G2_03	68.5	65.7	65.8	65	64.2
11	G2_04	71.8	71.5	70	70.2	68.7
12	G2_05	58.5	58	58.9	57.5	57.4
13	G2_06	78.6	78.2	79.3	79.3	77.8
14	G2_07	80	80.8	79.1	80.8	81.8
15	G2_08	75.2	75.3	74.7	73.2	72.9



APPENDIX O

Body fat percentage record of participants during the study

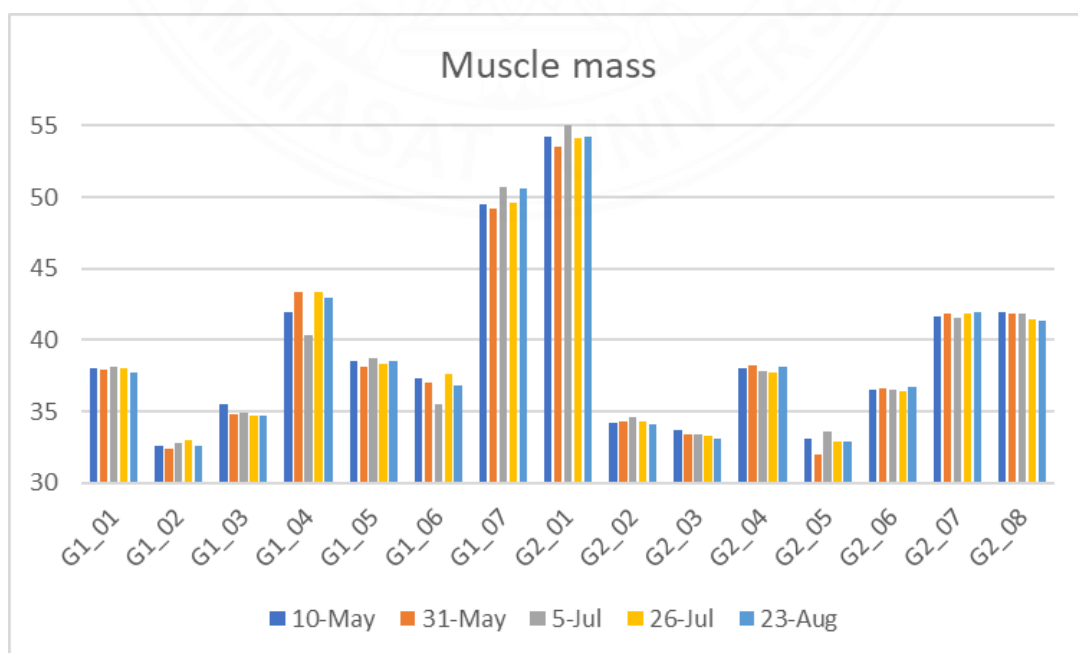
No.	Participants	10-May	31-May	5-Jul	26-Jul	23-Aug
1	G1_01	50.1	50.4	49.6	49.6	48.4
2	G1_02	37.4	37.6	37.2	37.9	38.1
3	G1_03	43.9	45	44.9	44.5	44.5
4	G1_04	60.5	59.1	61.3	58.7	58.5
5	G1_05	37.7	37.5	37.3	37.9	38.1
6	G1_06	61.3	62.3	64.3	61.9	62.7
7	G1_07	28.6	28	28.2	28.5	27.4
8	G2_01	36.4	35.1	31.9	33.2	34.2
9	G2_02	41.3	40.7	40	41.3	41.2
10	G2_03	47.8	46.2	46.3	45.8	45.5
11	G2_04	43.7	43.5	42.7	43	41.6
12	G2_05	40.1	39.9	39.7	39.4	39.4
13	G2_06	50.7	50.4	51.2	51.3	50
14	G2_07	44.4	44.8	44	44.8	45.2
15	G2_08	40.6	40.7	40.2	39.6	39.6



APPENDIX P

Muscle mass record of participants during the study

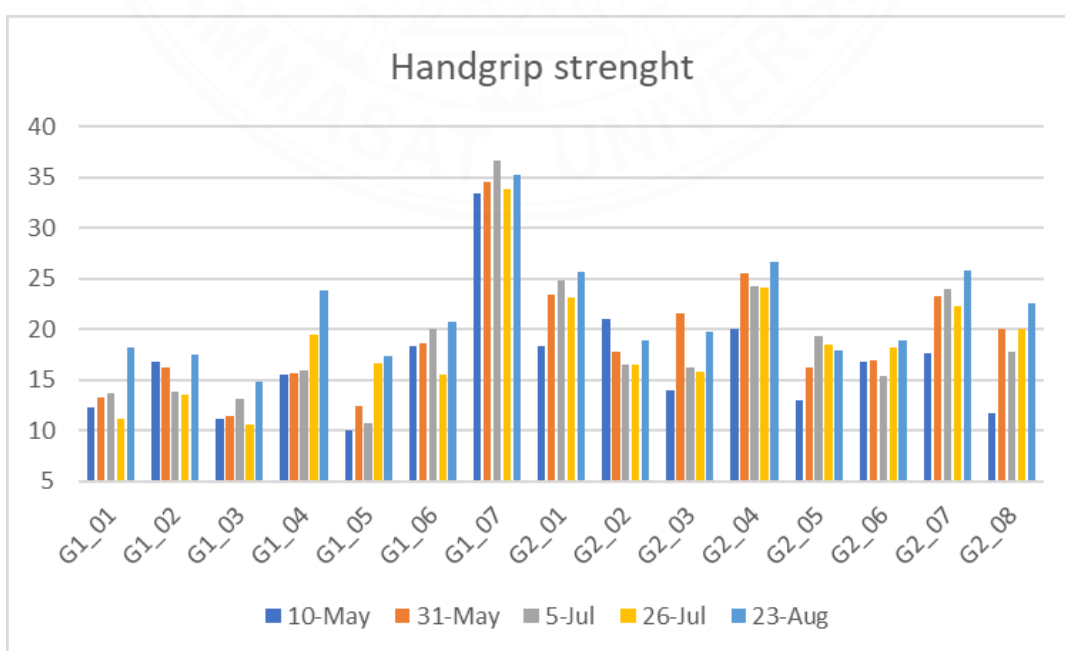
No.	Participants	10-May	31-May	5-Jul	26-Jul	23-Aug
1	G1_01	38	37.9	38.1	38	37.7
2	G1_02	32.6	32.4	32.8	33	32.6
3	G1_03	35.5	34.8	34.9	34.7	34.7
4	G1_04	42	43.4	40.3	43.4	43
5	G1_05	38.5	38.1	38.7	38.3	38.5
6	G1_06	37.3	37	35.5	37.6	36.8
7	G1_07	49.5	49.2	50.7	49.6	50.6
8	G2_01	54.2	53.5	55	54.1	54.2
9	G2_02	34.2	34.3	34.6	34.3	34.1
10	G2_03	33.7	33.4	33.4	33.3	33.1
11	G2_04	38	38.2	37.8	37.7	38.1
12	G2_05	33.1	32	33.6	32.9	32.9
13	G2_06	36.5	36.6	36.5	36.4	36.7
14	G2_07	41.7	41.9	41.6	41.9	42
15	G2_08	42	41.9	41.9	41.5	41.4



APPENDIX Q

Handgrip strength record of participants during the study

No.	Participants	10-May	31-May	5-Jul	26-Jul	23-Aug
1	G1_01	12.3	13.3	13.7	11.1	18.2
2	G1_02	16.8	16.2	13.8	13.5	17.5
3	G1_03	11.2	11.4	13.2	10.6	14.8
4	G1_04	15.6	15.7	16	19.5	23.9
5	G1_05	10.1	12.5	10.7	16.6	17.3
6	G1_06	18.3	18.6	20	15.5	20.7
7	G1_07	33.5	34.6	36.7	33.9	35.2
8	G2_01	18.3	23.5	24.9	23.2	25.7
9	G2_02	21.1	17.8	16.5	16.5	18.9
10	G2_03	14	21.6	16.3	15.8	19.8
11	G2_04	20	25.5	24.3	24.1	26.7
12	G2_05	13	16.3	19.4	18.5	18
13	G2_06	16.8	16.9	15.4	18.2	18.9
14	G2_07	17.6	23.3	24	22.3	25.8
15	G2_08	11.7	20	17.8	20	22.6



BIOGRAPHY

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- **Samaisong, N.** (2020). Dietary management for prevention and reduction risk of non-communicable diseases. *Songklanagarind Journal of Nursing*, 40(4), 122-130.
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