Factors Associated with Motivational Stages of Change for Weight Management among Older Informal Workers in Southern Thailand

Sarunya Maneerattanasak[1], *Chamnong Thanapop*[1], *Sasithorn Thanapop*[1]

ABSTRACT

Stages of change represent individual motivation to implement lifestyle changes and contribute to the development of more effective intervention strategies. This cross-sectional study aimed to assess the stages and processes of change for weight management and to determine factors associated with being in active stages of change for the management of weight by dieting and/or exercising among older informal workers. The study collected information regarding sociodemographic factors, lifestyle, anthropometrics, health characteristics, and the stages and processes of change for weight management from 233 informal workers aged 45-70 years. Binary logistic regression analysis was used to identify the factors associated with being in active stages of change. Of the total sample, 67.0% were overweight/obese (body mass index [BMI] ≥23 kg/m^2), and 84.1% had central obesity (waist-to-height ratio [WHtR] ≥0.5). The proportions of the participants assessed as being in inactive and active stages of change were 49.8% and 50.2%, respectively. Processes of change scores were significantly higher among individuals in active stages of change, indicating that participants in active stages of change were using more processes to manage their weight than participants in inactive stages. After adjusting for age and sex, the odds of having central obesity (AOR=3.29; 95% CI: 1.42-7.63) and the presence of diabetes (AOR=2.54; 95% CI: 1.15-5.62) were positively associated with being in active stages of change, while an inverse association was observed for smoking (AOR=0.24; 95% CI: 0.09-0.67). These findings can assist in tailoring weight management interventions and targeting subjects for participation in such interventions.

Keywords: Stage of change, Overweight, Obesity, Informal workers, Older workers

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Corespondence: Sarunya Maneerattanasak. School of Public Health, Walailak University, Nakhon Si Thammarat, 80160, THAILAND. E-mail: sarunya.man@gmail.com; sarunya.ma@wu.ac.th. Tel. 66935364664

[1] School of Public Health, Walailak University, THAILAND

Introduction

Currently, the demographics of Thailand are trending towards an increasingly aged workforce. The number of older workers, generally defined as those aged 45 and older[1,2], increased from 39.4% in 2012[3] to 45.1% in 2018[4]. Most older workers are engaged in informal employment, mostly in the agricultural sector[4]. Typically, informal workers do not work at an employer's premises and lack social protection coverage[5]. Overall, these employees face high physical work demands (e.g., heavy lifting, repetitive motion), high job control (e.g., not being able to decide how to perform work-related tasks) and health-related inequality in terms of access to affordable, quality health care[6,7]. These conditions increase the vulnerability of informal workers to poor health, illness and occupational injury.

Moreover, the prevalence of overweight and obesity in the older population has become a major public health issue in Thailand. The prevalence of overweight and obesity (BMI $\geq$25 kg/m^2) among Thai elderly individuals aged 60–69 years increased from 35.6% in 2008[8] to 41.4% in 2014[9]. Overweight and obesity are known risk factors for coronary heart disease[10], hypertension[11], diabetes[12], and certain cancers[13]. It has also been recognized that being overweight affects fitness for work as a result of reduced flexibility and increased work-related injury risks[14]. However, overweight and obesity are preventable if appropriate interventions are implemented. Nevertheless, little emphasis has been placed on the older population with overweight and obesity, and there are unique factors and challenges that must be understood in regard to weight management[15].

There has been growing interest in applying the trans-theoretical model (TTM)[16,17] to both the treatment[18] and prevention[19,20] of overweight and obesity by promoting weight management. TTM includes two interrelated dimensions: the stages of change (SOCs) and the processes of change (POCs) for the adequate assessment of behavioral modification. The SOCs assess an individual's temporal motivation to change unhealthy living habits, which range from precontemplation (no intention to change behavior), contemplation (recognition of the need for change), preparation (intending to change in the next month), action (change implemented for up to six months), and maintenance (change maintained for more than six months)[21]. Individuals in the first three stages (inactive stages) lack sufficient intention to change their behavior, while individuals in the last two stages (active stages) have invested some effort to modify problem behaviors[18] and may be more likely to benefit from action-oriented behavioral interventions[22]. In addition, POCs represent overt and covert activities and experiences

in which individuals engage when they try to modify problem behaviors[23]. A previous randomized controlled trial in Thailand showed that an individualized nutrition counseling program matched with an individual's SOC was associated with weight loss and reduced energy intake[24]. Verification of SOCs for weight management and their association with demographic and lifestyle factors is essential for designing interventions that are tailored towards an individual's motivation to implement lifestyle changes. In light of this consideration, many studies have been conducted and have found that age[25], sex[25], BMI[18,26], central obesity[27], and diabetes[28] are associated with SOCs for weight management by dieting and/or exercising. Older informal workers will soon enter their elderly years. However, until now, there have been no welfare benefits to provide them with treatment for work-related accidents, diseases, and injuries; unemployment and retirement insurance; or workers' compensation[6]. Effective health promotion interventions are therefore needed in this population. Identifying factors related to individual motivation for weight management provides information that allows interventions to be appropriately and effectively targeted, but such data among older informal workers are lacking in Thailand. Thus, this study aimed to determine the stages and processes of change for weight management and to examine whether socio-demographic and lifestyle factors, anthropometric measures, and the presence of chronic diseases among the participants were associated with being in active stages of weight management. This study intended to provide information useful for tailoring preventive public health interventions focusing on overweight and obesity that affect the rapidly growing proportion of older workers in Thailand.

Materials and Methods

Study design and participants

This cross-sectional study was conducted by randomly selecting participants in 13 villages in two districts (Mueang and Tha Sala) in Nakhon Si Thammarat Province, which is located in southern Thailand. At present, the province has the highest level of informal employment in the southern region, with approximately 533,000 informal workers[29]. All participants in this study were recruited by a multistage probability sampling technique during February and August 2019. A list of villages and their households was prepared based on the Thai population and housing census 2017[30] that formed the sampling frame. In each district, villages were selected at random, with probabilities proportional to size. Within each village, individuals aged 45-70 years who were working in a paid job or who were self-employed were randomly

selected from the local government registers of household lists. Following the statistical procedure[31], the sample size estimation was 309 people based on the older population size of 112,117, the expected prevalence of older workers was 28%[30], the acceptable error margin was 5%, and the confidence level was 95%. Interviews were conducted, and all anthropometric measurements were performed using standardized methods by two full-time research assistants who were graduates from health science programs. After data collection was performed, 19 participants who were classified as underweight (BMI<18.5 kg/m^2), 51 participants who engaged in formal work, and 6 participants who missed appointments for the anthropometric measurements were excluded from further analysis.

Anthropometric measurements

Body weight in kilograms was measured (to the nearest 0.1 kg) using calibrated mechanical body scales (RICE LAKE RL-330HHD, Rice Lake Weighing Systems, Wisconsin, USA) with participants wearing light clothing and no shoes. Arm span and waist circumference (WC) were measured using nonelastic measuring tapes (SECA 201, SECA GmbH & Co. KG, Hamburg, Germany) and recorded to the nearest 0.1 cm. WC (in cm) was measured at the umbilical level with the participants in light clothing. Due to stature changes that occur with aging, height was estimated from the length of arm span (in cm), as previously described[32]. BMI was calculated as the ratio of weight by squared height (kg/m^2). According to the Regional Office for the Western Pacific (WPRO) standard, normal weight was defined as a BMI of 18.5-22.9 kg/m^2, and overweight/obesity was defined as a BMI of ≥23.0 kg/m^2 [33]. The waist-to-height ratio (WHtR) was calculated as WC in cm divided by height in cm. For the detection of central obesity, the WHtR cutoff for both men and women was 0.50[34].

Questionnaires

Information on age, sex, marital status, the highest completed level of education, living status (living alone, living with a spouse or with children), employment status and monthly income was collected with a structured questionnaire. Participants were also asked to self-report whether they had ever been told by the doctor that they had any of these chronic medical conditions: hypertension, hyperlipidemia, diabetes and cardiovascular disease. If the participants reported one of these conditions, they were asked whether they had been treated by a physician; only individuals who reported being treated by a physician were considered positive. For smoking status, the participants were classified as current smokers and nonsmokers, including

never-smokers and former smokers (have not smoked in the past 12 months). Regarding alcohol consumption, the participants were stratified into current alcohol consumers and non-consumers, including lifetime abstainers and former drinkers (have not consumed alcohol in the past 12 months).

The SOCs and POCs were assessed by using the S-weight and P-weight questionnaires, respectively[21], that were translated to the Thai language. The Thai versions of the questionnaires were approved by three experts in nutrition, and the validity test was based on an index of item-objective congruence score ≥0.67 for all items. The S-weight questionnaire consists of five mutually exclusive items that aim to allocate participants to one of the five SOCs proposed by the TTM[16]. Individuals were categorized into two major groups: 1) "inactive," which included individuals in the precontemplation, contemplation, and preparation stages who have not taken actions to manage their weight, although they may differ as to the cognitive perception of the benefits of change; and 2) "active," which included individuals in the action and maintenance stages who had made efforts to manage their weight by dieting and/or exercising, differing only in relation to the period for which they adopted the behavior[18].

The P-weight questionnaire consists of 32 items aimed at assessing four POCs in weight management[21]: i) emotional re-evaluation (EmR; emotional reactions to being overweight and what will happen if they can manage their weight); ii) weight consequences evaluation (WCE; the individual's awareness of an existing weight problem and consequences of being overweight); iii) supporting relationship (SR; relationships including care, trust, encouragement and support from family and friends for healthy behavior change); and iv) weight management actions (WMAs; specific actions that individuals engage in when trying to promote weight management). The answers were given on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Scores for each of the four processes were calculated by summing the scores obtained from items belonging to the same subscale. To make scores from different subscales comparable, these scores were transformed into a scale from 0 to 100 (a minimum score of 0 reflects no use of a given POC, and a maximum score of 100 reflects the full use of that process).

Statistical analyses

Data management and analyses were performed using Epi-info™ version 7.1.5, 2015 (Centers for Disease Control and Prevention, Atlanta, Georgia) and R software version 3.5.1[35]. Univariate analysis was used to describe the frequencies and proportions of the variables.

In bivariable analyses, the X^2 statistic was used to examine the unadjusted relationship between several factors and the act of being in active stages of change for concurrent weight management, and the Mann-Whitney *U* test was conducted to identify the median differences in the POCs between the inactive and active groups. A logistic regression model was developed by including factors of interest in the model that were at or below a *P*-value of 0.20 and backward elimination was used to eliminate factors at or above a *P*-value of 0.05. Age and sex were included as confounding factors.

Ethics statement

This study protocol followed the principles of the Declaration of Helsinki and was approved by the Human Research Ethics Committee of Walailak University (WUEC-18-146-01; dated 28/12/2018). Written informed consent was obtained from the participants after explanation of the study purpose and procedure.

Results

The 233 Thai older workers who were engaged in informal employment had the following characteristics: mean age ± standard deviation of 56.74±7.45 years; predominantly women (72.1%; *n*=168), a primary education level (67.0%; *n*=156), and a monthly income of less than 5,000 Thai baht (42.1%; *n*=98). Data on BMI and WHtR indicated that the prevalence rates of overweight/obese and central obesity were 67.0% (*n*=156) and 84.1% (*n*=196), respectively (Table 1).

Regarding the SOCs, most individuals were in the precontemplation stage (48.1%; *n*=112), followed by the action (26.2%; *n*=61), maintenance (24.0%; *n*=56) and contemplation (1.7%; *n*=4) stages. None of the participants were in the preparation stage. The sociodemographic and lifestyle factors, anthropometric measures, and chronic disease status of the participants in the early stages of change (inactive: precontemplation and contemplation) were compared with those of the participants in the later stages (active: action and maintenance stages) (Table 1). Significant differences in sex (p=0.002), age group (p<0.001), chronic medical conditions (hypertension (p=0.014), hyperlipidemia (p=0.012) and diabetes (p=0.008), smoking status (p<0.001) and central obesity (p=0.001) were found between participants in inactive and active stages.

Table 1 Characteristics of study participants based on the inactive and active stages for weight management

Characteristics	Total (n=233) n (%)	Active (n=117) n (%)	Inactive (n=116) n (%)	p[a]
Sex				
Male	65 (27.9)	22 (33.8)	43 (66.2)	0.002
Female	168 (72.1)	95 (56.5)	73 (43.5)	
Age (years)				
45-59	137 (58.8)	69 (50.4)	68 (49.6)	0.956
60-70	96 (20.6)	48 (50.0)	48 (50.0)	
Marital status				
Single	17 (7.3)	6 (35.3)	11 (64.7)	0.422
Currently married	173 (74.2)	88 (50.9)	85 (49.1)	
Widowed/separated	43 (18.5)	23 (53.5)	20 (46.5)	
Education				
Only read and write	5 (2.1)	3 (60.0)	2 (40.0)	0.422
Primary	156 (67.0)	76 (48.7)	80 (51.3)	
Secondary	51 (21.9)	24 (47.1)	27 (52.9)	
Higher	21 (9.0)	14 (66.7)	7 (33.3)	
Occupation				
Agricultural worker	79 (33.9)	41 (51.9)	38 (48.1)	0.491
Self-employed worker	80 (34.3)	43 (53.7)	37 (46.3)	
Employed worker	74 (31.8)	33 (44.6)	41 (55.4)	
Monthly income (Thai baht)				
<5,000	98 (42.1)	48 (49.0)	50 (51.0)	0.876
5,000 to <15,000	82 (35.2)	44 (53.7)	38 (46.3)	
15,000 to <25,000	31 (13.3)	15 (48.4)	16 (51.6)	
≥25,000	22 (9.4)	10 (45.5)	12 (54.5)	
Living status				
Alone	22 (9.4)	10 (45.5)	12 (54.5)	0.891
With offspring only	33 (14.2)	17 (51.5)	16 (48.5)	
With spouse/partner only	178 (76.4)	90 (50.6)	88 (49.4)	

[a] *p*-values were obtained by Pearson's chi-squared test. WHtR, waist to height ratio

Table 1 Characteristics of study participants based on the inactive and active stages for weight management (cont.)

Characteristics	Total (n=233) n (%)	Active (n=117) n (%)	Inactive (n=116) n (%)	p[a]
Self-reported history of diseases (% yes)				
Hypertension	45 (19.3)	30 (66.7)	15 (33.3)	0.014
Hyperlipidemia	50 (21.5)	33 (66.0)	17 (34.0)	0.012
Diabetes	37 (15.9)	26 (70.3)	11 (29.7)	0.008
Cardiovascular disease	8 (3.4)	6 (75.0)	2 (25.0)	0.154
Smoking status				
Nonsmoker	200 (85.8)	111 (55.5)	89 (44.5)	<0.001
Smoker	33 (14.2)	6 (18.2)	27 (81.8)	
Alcohol consumption				
Non-consumer	189 (81.1)	99 (52.4)	90 (47.6)	0.170
Alcohol consumer	44 (18.9)	18 (40.9)	26 (59.1)	
BMI (kg/m^2)				
Normal weight (18.5-22.9)	77 (33.0)	33 (42.9)	44 (57.1)	0.115
Overweight/obese (≥23)	156 (67.0)	84 (53.8)	72 (46.2)	
WHtR				
Normal WHtR (<0.5)	37 (15.9)	9 (24.3)	28 (75.7)	0.001
Central obesity (≥0.5)	196 (84.1)	108 (55.1)	88 (44.9)	

[a]*p*-values were obtained by Pearson's chi-squared test. WHtR, waist to height ratio

The four processes of change scores across the SOCs for weight management are shown in Table 2. The participants in the active stage had higher scores in all four processes, EmR, WCE, SR and WMA, than those in the inactive stages, with statistically significant differences (P<0.05). Factors associated with being in active stages of change for weight management in the final logistic model after adjusting for age and sex are shown in Table 3. The findings revealed that being in an active stage of change was significantly and positively associated with central obesity identified by WHtR (AOR=3.29, 95% CI=1.42-7.63) and the presence of diabetes (AOR=2.54, 95% CI=1.15-5.62) and negatively associated with smoking habit (AOR=0.24, 95% CI=1.15-5.62).

Table 2 Scores in the four processes of change based on the inactive and active stages for weight management

Process of change	Active (n=117)	Inactive (n=116)	*p*[a]
Emotional re-evaluation			
Mean ± SD	85.29 ± 8.87	74.74 ± 15.26	<0.001
Median (Q_1 – Q_3)	87.88 (81.82-87.88)	75.76 (66.67-87.88)	
Weight consequences evaluation			
Mean ± SD	56.04 ± 14.83	48.17 ± 12.60	<0.001
Median (Q_1 – Q_3)	55.60 (44.40-66.70)	44.40 (38.90-55.60)	
Supporting relationships			
Mean ± SD	85.64 ± 23.43	75.52 ± 26.79	0.001
Median (Q_1 – Q_3)	100.00 (86.67-100.00)	86.67 (46.67-100.00)	
Weight management actions			
Mean ± SD	74.44 ± 13.00	64.74 ± 16.57	<0.001
Median (Q_1 – Q_3)	73.33 (66.67-81.67)	61.67 (53.33-73.33)	

[a]*p*-values were obtained by Mann-Whitney *U* test. SD, standard deviation; Q, quartile

Table 3 Final logistic regression model of variables associated with being in active stages for weight management

Variable	AOR[1] (95% CI)	*p*[a]
Female (Male[ref])	1.43 (0.71–2.87)	0.321
Age 60-70 years (45-59 years[ref])	1.01 (0.58–1.78)	0.960
Central obesity (Normal WHtR[ref])	3.29 (1.42–7.63)	0.006
Diabetes (No diabetes[ref])	2.54 (1.15–5.62)	0.021
Smoker (Non-smoker[ref])	0.24 (0.09–0.67)	0.007

[1]AOR–Odds ratios were adjusted for sex and age. [a]*p*-values by logistic regression analysis

Discussion

This cross-sectional study provides current data on the behavior stages of change for weight management among older informal workers in Nakhon Si Thammarat province in southern Thailand. The results indicated that half of the participants were in the action or maintenance stages of weight management. Moreover, central obesity and being diagnosed with diabetes were directly associated with a greater motivation to manage weight. Individuals who currently smoked cigarettes were less motivated to modify problem behaviors related to the prevention of unwanted weight gain. The results suggest that weight-management interventions should be implemented among informal older workers with central obesity and diabetes and those who identify as nonsmokers to achieve healthy weight goals and to promote healthy lifestyles.

According to the factors associated with being in active stages of change, we believe that individuals with central obesity and diabetes and nonsmokers are likely to be alarmed into taking action and more motivated to manage their weight. This finding reflects an individual's perceived susceptibility to threats associated with being overweight/obese, which is a key component of motivation to engage in health-protective behaviors[36]. The perceptions of risk are directly related to how individuals think, represent, classify, or analyze the several forms of threat that are present in their lives[37]. Risk perceptions tend to be higher when a health threat is seen as uncontrollable or dreaded[38]. This might support the finding that obesity is a key factor associated with motivation for weight management among older people. Moreover, the association between central obesity, defined as an excess accumulation of visceral fat mass, and being in active stages of change for weight management is in line with the findings of a previous study of obese women attending a nutrition clinic[27]. This might be explained by the redistribution of fat with aging from peripheral and subcutaneous sources to a central location leading to increased waist circumference[39], which may increase the risk perception of the threat of being overweight/obese among older adults. Our findings provide support for WHtR's role in physical appearance, which is one of the main reasons individuals seek weight management. It is also known that the WHtR presents a predictive ability for diseases and health problems[34]. The WHtR has shown itself to be more sensitive in the prediction of health risks than other obesity indicators[10,34,40], and its cutoff value is the same regardless of ethnicity, sex and age[34].

In this study, smokers were less motivated to manage their weight than individuals who did not smoke. Correspondingly, previous studies have reported that smokers make fewer healthful dietary choices and have lower levels of physical activity, including leisure activity, compared to nonsmokers and former smokers[41,42]. Given their less healthful practices, weight management may require more extensive lifestyle changes and be more challenging for smokers than for individuals who do not smoke.

The processes of change are independent variables used to move from one stage to another. Grouping the SOCs into inactive and active stages indicated a tendency for the individuals in the active stages to invest more substantial effort in the processes of change than those in the inactive stages. The results of the exploration of the relationship between the processes and stages of change are consistent with other published findings[21,43]. In this study, participants in active stages of change had a higher prevalence of overweight-/obesity-related health problems (e.g., hyperlipidemia, hypertension, diabetes) than those in the other stages. In Thailand, the chronic care model[44] has been widely implemented in primary care as an important strategy for dealing with comprehensive chronic illness care[45]. The primary care unit is a medical setting where a chronic disease is an issue that healthcare providers often discuss with patients. In the unit, patients may feel compelled to report being actively involved in strategies to manage their weight with reference to healthcare providers' recommendations. Hence, they may endorse being in an active stage of change for weight management. Indeed, most public health obesity interventions primarily target individual behaviors, sometimes in combination with improving the physical environment in the community but rarely involving modifications of the work environment[7]. In particular, non-traditional shiftwork and the inflexible schedules of informal workers may limit their ability to adhere to public health recommendations for diet and physical activity. Nevertheless, to date, the effect of working conditions on public health interventions targeting overweight and obesity among older informal workers has been relatively limited; therefore, this lack of effect creates a gap in the understanding of occupational health and preventive interventions.

This study had some limitations. First, a potential confounder is the use of self-reported data, which may be influenced by participant cognition, and we were not able to determine whether the participants responded sincerely and objectively to the questions. Second, as a cross-sectional study, we cannot draw conclusions regarding a causal relationship

between motivational stages and processes of change for weight management. Last, the generalizability of our findings may be limited because of the small sample size. In contrast, the important strength of this study was the quality of the data on the stages and processes of change for weight management and anthropometric parameters that was ensured by using a validated tools, standardized protocol and well-trained field personnel during the data collection and processing stages. The eligibility criteria used in this study further strengthened the quality of the findings.

Conclusion

In summary, the study findings revealed half of participants were in an active stage of weight management, suggesting important opportunities for health professionals to assist the older population in managing their weight. The perception of having central obesity and diabetes appears to be the most important factor associated with being in the active stage of change. It is also important to note that nearly half of participants who identified with an inactive stage of weight management might not be aware of a need to change their current nutrition or physical activity behaviors, suggesting that health professionals need to educate them concerning their extent of personal risk to enable them to make informed health decisions. Weight management is desired in order to improve appearance and health, but a range of barriers and inappropriate support from health professionals may make it harder to achieve and maintain healthy body weights at older ages. There is a need for further studies to identify ways in which health professionals can best support older adults who want help to manage their weight and encourage those who are less concerned about their weight.

Author Contributions

SM: Conceptualization; SM, ST, CT: Data curation and formal analysis; SM, CT: Funding acquisition; SM: Project administration; SM, ST: Methodology; SM: Writing – original draft; SM, ST, CT: Writing – reviewing and editing.

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Conflict of Interest

The authors declare that they have no competing interests.

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