

RESEARCH ARTICLE

Older Adults Living Alone in Thailand: Socioeconomic Inequality and Its Relation to Unmet Health Needs

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Abstract: This study aimed to investigate socioeconomic inequality and its relation to unmet health needs among older adults living alone in Thailand. Descriptive analyses with F-tests and chi-squared tests, and logistic regression analyses were conducted with the national health census 2017 data. The results indicated that older adults living alone, compared to those not living alone, had significantly low socioeconomic conditions and high unmet needs. They were more likely to be lower-income, older, female, lower-educated, unemployed, and chronically-ill people. Particularly for income, the proportion of people with income below the national poverty line among older adults living alone (38.75%) were almost two times and four times larger than those living with only one family (19.39%) and more than one families (10.98%), respectively. Additionally, we found that the residence type “living alone” and income were the most significant determinants for the unmet needs. Based on the results, we recommend that the government reinforce the current pension and community health volunteer programs. Particularly for the pension program, a simulation analysis that we conducted proposed that the current pension allowance (600–1,000 Baht) should be raised up to 3,500 Baht, which could substantially alleviate the unmet needs.

Keywords: older adults living alone, residence type, living arrangement, unmet health needs, socioeconomic inequality

Primarily due to demographic changes (e.g., higher life expectancy and lower fertility rate) and economic development, Thailand has encountered the rapid aging of the population together with changes of residence type (e.g., single-person household). Subsequently, the growing number of older adults living alone is an important social issue in the country (Knodel et al., 2015; Teerawichitchainan et al., 2015; United Nations Population Fund [UNFPA], 2015). According to the National Statistical Office (NSO) of Thailand (2018), the proportion of older adults living alone has been

approximately tripled during the previous 20 years. The proportion was approximately 3.6% in 1994, and it increased to approximately 10.8% in 2017 (NSO, 2018).

Older adults living alone have been perceived as an at-risk population in general. Older adults, mainly due to the aging process, are more likely to suffer not only from physical, cognitive, and sensory declines but also a high risk of chronic illness and injuries (Ambrose et al., 2013; Freedman, 2014; Jaul & Barron, 2017; Rubenstein & Josephson, 2002). For this reason,

they may be significantly in need of various resources (e.g., social care and economic support). Especially for older adults living alone, the need may be even higher because they are deprived of these resources that they can acquire from their families. Such residence type “living alone” may increase depression and social isolation as well as economic deficiency, which would eventually decrease well-being and quality of life (Evans et al., 2019; Ng et al., 2004; Pulkki-Råback et al., 2012; Ramos & Wilmoth, 2003; Stepler, 2016; Wong & Verbrugge, 2009; Yeh & Lo, 2004; Yu et al., 2018).

However, such perception has not always been supported by previous literatures, though a majority of the literatures have supported it. For instance, several previous studies indicated that some of the older adults living alone had a strong preference for their residence type because they appreciated privacy and independence, and the preference varied widely according to both individual- (e.g., socioeconomic status) and society-level socioeconomic and sociocultural factors (e.g., traditional preference for extended family; Gaymu et al., 2012; Klinenberg, 2012; Waite & Hughes, 1999). It implies that among older adults living alone, a distinction between voluntary and involuntary living alone can exist. Thus, their well-being and quality of life should be understood by considering such distinction together with various socioeconomic and sociocultural perspectives at both individual and society levels (Teerawichitchainan et al., 2015; Wen & Ren, 2019).

Nevertheless, in this study, we aimed to compile common findings of social and health inequalities among older adults living alone from previous literatures, though the findings also varied across the literatures. First, older adults living alone were found to include a larger proportion of woman. Because females have a higher life expectancy in general (World Bank, 2020), it would be reasonable to expect that the proportion of women is larger among older adults regardless of residence type. However, when the proportion was specifically compared between older adults living alone and those not living alone, it became even larger among those living alone (Mouodi et al., 2016; Teerawichitchainan et al., 2015; Qian et al., 2018). For instance, the Thai national Health and Welfare Survey 2017, which is the main data for this study, indicated that among all older adults aged 65 years or over, the proportion of males and females was

approximately 44% and 56%. For those living alone, that of males and females was approximately 33% and 67%, respectively (Table 1).

Second, there appeared to be a higher poverty rate among older adults living alone. In some studies, the poverty rate (e.g., income or wealth) among older adults was not significantly different from younger ones and varied according to individual (e.g., employment status and housing ownership) and policy-level factors (e.g., welfare policy and retirement pension; Casey & Yamada, 2002; Congressional Research Service, 2019; Koopman-Boyden & Waldegrave, 2009). Meanwhile, many other studies, particularly analyzing older adults by residence type, found a higher poverty rate (or lower income or economic wealth) among older adults living alone than those not living alone. Additionally, most of the studies showed that among the older adults living alone, the female had even higher poverty rate than male (Burholt & Windle, 2006; Casey & Yamada, 2002; Congressional Research Service, 2019; Emmerson & Muriel, 2008; Weir et al., 2002; Wilmoth & Koso, 2002).

Third, regarding physical health, the association between residence type and physical health status (e.g., functional ability and comorbidity) among older adults has not been well documented, to our knowledge. Nevertheless, the residence type “living alone” has been cited as a major factor for physical health risks (e.g., home injuries) for older adults (Huang & Lin, 2002). Indeed, many previous studies indicated that older adults living alone had a higher incidence of accidents or injuries from a fall than those not living alone (Choi et al., 2014; Close et al., 2005; Elliott et al., 2009; Gill et al., 2005; Kharicha et al., 2007; Todd & Skelton, 2004).

Lastly, in addition to physical health, social or emotional health was found to be lower among older adults living alone. As mentioned previously, many previous studies indicated that older adults living alone faced feelings of loneliness, depression, social isolation, and feeling of economic precariousness and uncertainty more significantly than those not living alone. Some of the studies additionally showed that among the older adults living alone, female had even lower social or emotional health, particularly feeling of economic precariousness and uncertainty (Evans et al., 2019; Ng et al., 2004; Pulkki-Råback et al., 2012; Ramos & Wilmoth, 2003; Stepler, 2016; Wong & Verbrugge, 2009; Yeh & Lo, 2004; Yu et al., 2018).

In addition to these previous studies conducted in international settings, a study conducted in a Thai setting also presented similar findings. For socioeconomic status, like the previous findings, the study indicated that older adults living alone included a larger proportion of female and lower-income people than those not living alone. Additionally, they were more likely to be lower-educated, unemployed, and rural people. For psychological distress and unmet health needs, these were found to be significantly higher among older adults living alone than those not living alone. However, unlike the previous findings, participation in community activities and perceived income (i.e., perceived adequacy of income) were not significantly different between older adults living alone and those not living alone (Teerawichitchainan et al., 2015).

This previous study comprehensively analyzed socioeconomic status and social health issues (e.g., unmet health needs and psychological distress) of older adults living alone. However, because the study's analysis employed a factor-by-factor approach separately (i.e., the study analyzed each factor separately), understanding how the socioeconomic status was associated with the social health issues remains limited, to some degree.

Additionally, other previous studies conducted in the Thai setting, focusing on exploring unmet health needs and relevant factors, indicated that older adults were more likely to encounter higher unmet needs (Kullanit & Taneepanichskul, 2017; Meemon & Paek, 2019; Osornprasop & Sondergaard, 2016; Thammatacharee et al., 2012; Wanwong et al., 2017). Some of the studies specifically cited the unavailability of caretakers, mainly due to their mobility limitations as a major reason for unmet needs. Also, low socioeconomic status (e.g., poorer income), limited public transportation, and long queue in hospitals were substantial barriers to access to health care (Kullanit & Taneepanichskul, 2017; Meemon & Paek, 2019; Osornprasop & Sondergaard, 2016). However, the previous studies were conducted with relatively small-scale samples in particular geographical regions (Osornprasop & Sondergaard, 2016) or conducted with the entire population without clear separation of the older adult population (Kullanit & Taneepanichskul, 2017; Meemon & Paek, 2019). Thus, it may be meaningful to analyze, by using older adults only and large-scale data, whether socioeconomic inequality

exists between older adults living alone and those not living alone and whether the inequality is associated with unmet health needs if it exists. Therefore, incorporating these points with the previous studies, this study aimed to examine socioeconomic inequality and its relation to unmet health needs among older adults living alone in Thailand.

Specifically, this study established three particular study aims as follows: (a) to profile the proportion of older adults living alone and their general socioeconomic conditions, (b) to explore incidence rate of and reasons for unmet health needs of older adults living alone, and (c) to investigate whether the socioeconomic conditions of older adults living alone were related to the incidence of unmet health needs. We divided older adults into three groups according to residence type: older adults living alone, those living with only one family member, and those living with more than one family member. By comparing these three groups, we attempted to achieve the study aims.

Methods

Data and Study Sample

We used the Health and Welfare Survey (HWS) of 2017 as the main data for the study analysis. The HWS, a national health census data collected by a multi-stage random sampling method, represents a nationwide cross-section of all 76 provinces of Thailand with nearly equal-sized samples from each province. The census is conducted on an annual or biannual basis. The HWS comprises a broad-ranging demographic and socioeconomic features of the population at both individual and household levels. Additionally, essential health-related information (e.g., health care utilization and relevant out-of-pocket costs) is included in the data. The Thai NSO is in charge of the census through the data generation (NSO, 2020).

For the study sample, people whose chronological age is 65 or more have been defined as older adults in general (Organisation for Economic Co-operation and Development [OECD], 2019; World Bank, 2020). Thus, we selected people aged 65 years or over as the sample for the study analysis. As previously mentioned, the study sample is divided into three groups according to the type of residence, which are older adults living alone, those living with one family member, and those living with more than one family member.

Variables and Measures

Unmet health needs, the dependent variable for the study analysis, were defined as the circumstances where people have ever needed health care services but did not receive any the previous 12 months. Accordingly, the unmet health needs were measured as a dichotomous variable (yes and no). For independent variables, by considering previous studies and availability in the HWS 2017 data, we selected a total of nine variables for the analysis: the type of residence, poverty, age, gender, education, working status, private vehicle, chronic disease, and living location.

Residence type was used as a categorical variable with three levels: living alone, living with only one family member, and living with more than one family member. For poverty, it was used as a dichotomous variable (yes and no). In 2017, Thailand established the national poverty line of 2,686 Thai baht (THB) per person per month, which is equivalent to approximately US\$88 (Office of the National Economic and Social Development Board, 2017). Accordingly, we classified the sample (i.e., older adults) with equivalent income below or above the national poverty line into the “yes” or “no” group, respectively. The equivalent income, which is standardized income for a single-person household, was calculated by the following formula:
$$\text{Equivalent Income} = \frac{\text{Monthly Total Household Income}}{\sqrt{\text{Total Number of Household Members}}}$$
 (OECD, 2009).

Age was used as a categorical variable with five levels: age 65–69, 70–74, 75–79, 80–84, and 85 or over. Gender was used as a dichotomous variable (male and female). Education was measured as a categorical variable with three levels, which are low, middle, and high. The “low,” “middle,” and “high” corresponded to “below primary school,” “primary school,” and “middle school or above,” respectively. Lastly, the rest of the variables, which are working status (yes and no), private vehicle (yes and no), chronic disease (yes and no), and living location (urban and rural area), were used as dichotomous variables.

Particularly, the variable private vehicle included automotive vehicles (e.g., cars and motorcycles) and bicycles. The “yes” or “no” group was classified by whether people owned any one of the vehicles or not. For chronic disease, the HWS 2017 data identified 42 specific chronic or congenital diseases. People who possessed or did not possess any one of the diseases were classified into the “yes” or “no” group,

respectively. For the living location, we defined municipality as urban areas and non-municipality as rural areas by employing the classification of the NSO.

Statistical Analysis

Descriptive statistical analyses were first performed to summarize the study sample and variables. In the analysis, we additionally conducted chi-squared tests for categorical variables and F-tests for continuous variables to explore the difference in the unmet health needs and socioeconomic situations of older adults across the residence type. Then, inferential statistical analyses were performed to investigate how the socioeconomic situations were related to unmet health needs. Specifically, binomial logistic regression analyses were performed because the dependent variable, unmet health needs, was a dichotomous variable (Pallant, 2007). A total of four binomial regression models were analyzed according to the residence type of older adults. The descriptive statistical analyses were for the study aim 1 and 2, and the inferential statistical analyses were for the study aim 3. All analyses and results in this study were produced using IBM SPSS Statistics version 20.0 software.

Results

Study Aim 1: General Socioeconomic Conditions

Table 1 presents the proportion of older adults living alone and their general socioeconomic conditions. A total of 9,164 individuals out of a total of 65,871 individuals in the HWS 2017 data were identified as people aged 65 or above. It means that approximately 13.91% of the entire Thai population were older adults in 2017. In fact, this proportion is slightly higher than the proportion estimated by the United Nations (12.86% in 2020; United Nations [UN], 2017). It implies that the increase of the older adult population in Thailand is faster than expected.

Among the older adults, approximately 13.43% were identified as people living alone (indicated as “empty-nest single” in the table). Moreover, approximately 31.31% and 55.56% were identified as those living with only one family member (indicated as “empty-nest couple” in the table) and those living with more than one family member (indicated as “not empty-nest” in the table), respectively. Particularly for the older adults living with only one family member,

Table 1*Proportion and Socioeconomic Conditions of Older Adults Living Alone (% , n = 9,164)*

Variables	Overall	Residence Type			χ^2 / F-test p-values
		EN Single (13.43%)	EN Couple (31.01%)	Not EN (55.56%)	
Poverty					
Yes	17.32	38.75	19.39	10.98	<0.01
No	82.68	61.25	80.61	89.02	
(avg. income)	9,159.98	5,461.25	8,036.41	10,681.55	<0.01
Age group					
65-69	35.63	29.81	39.20	35.04	<0.01
70-74	24.31	24.94	24.67	23.96	
75-79	18.38	22.50	17.28	17.99	
80-84	12.29	13.57	11.19	12.59	
85 or above	9.40	9.18	7.67	10.41	
(avg. age)	73.64	74.25	72.97	73.86	<0.01
Gender					
Male	43.51	32.82	47.11	44.08	<0.01
Female	56.49	67.18	52.89	55.92	
Education					
Low	50.87	53.61	50.53	50.40	<0.01
Middle	38.29	36.88	36.35	39.72	
High	10.84	9.50	13.12	9.88	
Working status					
Yes	28.96	24.86	32.97	27.72	<0.01
No	71.04	75.14	67.03	72.28	
Private vehicle					
Yes	48.46	33.31	50.49	50.99	<0.01
No	51.54	66.69	49.51	49.01	
Chronic disease					
Yes	60.67	63.44	59.04	60.91	0.027
No	39.33	36.56	40.96	39.09	
(avg. number)	1.60	1.67	1.59	1.60	0.064
Living location					
Urban	55.38	52.80	55.81	55.77	0.148
Rural	44.62	47.20	44.19	44.23	

Note: EN single, EN couple, and not EN = empty-nest single (living alone), empty-nest couple (living with only one family member), and not empty-nest (living with more than one family members); Education Low, Middle, and High = below primary school, primary school, and middle school or above.

approximately 94% of them were found to live with a spouse, and the other 6% were found to live with a child or a relative. For those living with a spouse, both were found to have similar ages. Specifically, the average age of husbands and spouses were 71.04 and 68.99 years, respectively. For those living with a child or a relative, the average age was 45.68 years (not presented in Table 1).

For socioeconomic conditions, it was found to be lowest among older adults living alone in general, followed by those living with only one family member and those living with more than one family member. Specifically, the results indicated that older adults living alone included a significantly larger proportion of lower-income, older, female, lower-educated, unemployed, and chronically-ill people. The proportion of people who did not have their own private vehicles were significantly higher among older adults living alone than those not living alone.

Particularly for income, the proportion of people with income below the national poverty line (2,686 THB equivalent to approximately US\$88) was

found to be largest among older adults living alone, followed by those living with one family member and those living with more than one family member. The proportion among older adults living alone (38.75%) was almost two times and four times larger than that of those living with only one family member (19.39%) and those living with more than one family member (10.98%), respectively. The average monthly income of older adults living alone was 5,461 THB (approximately US\$180); whereas that of those living with one family member and those living with more than one family member was 8,036 THB (approximately US\$265) and 10,681 THB (approximately US\$352), respectively.

Study Aim 2: Unmet Health Needs

Table 2 presents the incidence rate of and reasons for unmet health needs among older adults living alone. The overall incidence rate of unmet health needs was 2.06%. It means that within the previous 12 months, approximately 2.06% of older adults, regardless of residence type, did not receive any health care services,

Table 2

Incidence of and Reasons for Unmet Health Needs of Older Adults Living Alone (%)

Variables	Overall	Residence Type			χ^2 test p-values
		EN Single	EN Couple	Not EN	
Unmet health needs					
Yes	2.06	3.25	2.25	1.67	<0.01
No	97.94	96.75	97.75	98.33	
Reasons for unmet health needs					
No money for care	3.17	2.50	1.56	4.71	
No money for transportation to the hospital	4.23	5.00	4.69	3.53	
Long queue in the hospital	21.69	25.00	14.06	25.88	
Long distance to the hospital	21.69	25.00	21.88	20.00	
Individual time constraint	9.52	12.50	3.13	12.94	
Perceived low quality of care in the hospital	3.17	2.50	1.56	4.71	
Not know where to go for care	1.06	-	1.56	1.18	
Nobody taking me to the hospital	16.40	20.00	23.44	9.41	
Others	19.05	7.50	28.13	17.65	
Total	100	100	100	100	

Note: EN single, EN couple, and not EN = empty-nest single (living alone), empty-nest couple (living with only one family member), and not empty-nest (living with more than one family members).

though the services were needed. The incidence rate was significantly larger among older adults living alone than that among those not living alone. Specifically, the incidence rate among older adults living alone (3.25%) was almost 1.5 times and 2 times larger than that among those living with only one family member (2.25%) and those living with more than one member (1.67%), respectively.

For reasons for the unmet health needs, we found an interesting pattern. For both older adults living alone and those living with one family member, lack of caretakers was one of the major reasons for unmet health needs. Specifically, 20.00% of those living alone and 23.44% of those living with only one family member cited “nobody taking me to hospital” as a reason for unmet health needs. These percentages are more than doubled, compared to those living with more than one family member (9.41%).

Meanwhile, for older adults living with more than one family member, quality of care in the hospital appeared to be a significant reason for unmet health needs. Approximately 4.71% of them cited “perceived low quality of care in the hospital” as a reason for not utilizing health care services, and the percentage was almost two times and three times larger than that of those living alone (2.50%) and those living with only one family member (1.56%), respectively. Apart from these two reasons (lack of caretakers and perceive low quality), “long queue in the hospital” (21.69%) and “long distance to the hospital” (21.71%) were frequently cited reasons for not utilizing health care services among older adults, regardless of residence type. It is possibly because of the inadequacy of health resources and the low private sector involvement in the public sector, which were also highlighted in previous studies (Meemon & Paek, 2019; Thammatacharee et al., 2012).

In sum, the results indicate that access to health care among older adults depended significantly on the availability of caretakers. Older adults tend to encounter mobility limitations, which subsequently diminish their ability to care for themselves (Meemon & Paek, 2019; Osornprasop & Sondergaard, 2016). Thus, if those living alone do not have any connections and supports from their families or community people on a regular basis, access might be a more significant problem. Meanwhile, for older adults living with more than one family member, probably because their family members might act as caretakers, access to health care

was less influenced by the availability of caretakers. Because they were more likely to be higher-income people as previously indicated in the results of the study aim 1, the quality of health care appeared to be a more substantial consideration for utilizing health care for them.

Interestingly, unlike our expectation, unmet needs by the caretaker unavailability was not significantly different between older adults living alone and those living with one family member. On the one hand, there may be a possibility that one family member might be absent from the household due to economic activity. In this sense, the issue of caretaker unavailability might not be different from that for those living alone. On the other hand, considering the result that most of them (approximately 97%) lived with a spouse with similar age as indicated in the study aim 1, it may imply that older adult spouses may not be effective as a caretaker. In any case, future policy intervention related to the caretaker issue should not be separate between older adults living alone and those with only one family member.

Study Aim 3: Socioeconomic Conditions and Unmet Health Needs

Table 3 presents the results of binomial logistic regression models to examine the association between socioeconomic conditions and unmet health needs among older adults living alone. The table includes four regression models (models 1–4). Model 1 (indicated as “overall” in the table) examines how residence type of older adults was related to unmet health needs. Models 2–4 (indicated as “empty-nest single,” “empty-nest couple,” and “not empty-nest,” respectively) are for examining whether socioeconomic conditions of older adults in each residence type were associated with unmet health needs.

In Model 1, four variables were found to be statistically significant, which are residence type, poverty, gender, and chronic disease. For residence type, older adults living with more than one family member were negatively related to unmet health needs, with the coefficient equal to -0.56. It means that older adults living alone were more likely to experience unmet health needs than those living with more than one family member. However, unmet needs between older adults living alone and those with only one family member were not significantly different.

Table 3*Results of Binomial Logistic Regression Models*

Variables	Overall (Model 1)	EN Single (Model 2)	EN Couple (Model 3)	Not EN (Model 4)
	CE (SE)	CE (SE)	CE (SE)	CE (SE)
Residence type				
EN couple	-0.30 (0.21)			
Not EN	-0.56 (0.20) ^a			
ref: EN single	-			
Poverty				
Yes	0.58 (0.17) ^a	0.66 (0.36) ^c	0.69 (0.29) ^b	0.60 (0.29) ^b
ref: No	-	-	-	-
Age group				
70-74	-0.14 (0.21)	-0.82 (0.50)	0.09 (0.34)	0.00 (0.32)
75-79	0.13 (0.21)	-0.22 (0.43)	0.08 (0.38)	0.33 (0.33)
80-84	-0.03 (0.26)	-0.16 (0.49)	0.31 (0.42)	-0.32 (0.45)
85 or above	0.30 (0.26)	-1.13 (0.79)	0.13 (0.52)	0.77 (0.35) ^b
ref: 65-69	-	-	-	-
Gender				
Female	-0.27 (0.16) ^c	-0.56 (0.35)	0.06 (0.27)	-0.42 (0.24) ^c
ref: Male	-	-	-	-
Education				
Low	0.49 (0.31)	1.45 (1.06)	0.36 (0.47)	0.32 (0.45)
Middle	0.30 (0.31)	1.59 (1.06)	0.16 (0.48)	-0.01 (0.47)
ref: High	-	-	-	-
Working status				
Yes	0.11 (0.18)	0.27 (0.40)	0.41 (0.30)	-0.19 (0.29)
ref: No	-	-	-	-
Private vehicle				
Yes	0.15 (0.16)	0.36 (0.38)	0.02 (0.27)	0.11 (0.24)
ref: No	-	-	-	-
Chronic disease				
Yes	0.51 (0.16) ^a	0.58 (0.37)	0.53 (0.28) ^c	0.45 (0.24) ^b
ref: No	-	-	-	-
Living location				
Rural	0.14 (0.15)	0.13 (0.33)	-0.38 (0.27)	0.52 (0.23) ^b
ref: Urban	-	-	-	-
HL goodness-of-fit				
Chi-square (DF)	4.79 (8)	4.24 (8)	4.15 (8)	10.31 (8)
p-value	0.78	0.83	0.84	0.24

Note: ^a, ^b, and ^c = <0.01, <0.05, and < 0.1; HL = Hosmer-Lemeshow; DF = degree of freedom; CE = coefficient estimate; SE = standard error; EN single, EN couple, and not EN = empty-nest single (living alone), empty-nest couple (living with only one family member), and not empty-nest (living with more than one family members); Education Low, Middle, and High = below primary school, primary school, and middle school or above.

For poverty, it was positively associated with unmet health needs, with the coefficient equal to 0.58. It indicates that older adults who had income below the national poverty line were more likely to encounter unmet needs than those who had it above the poverty line. For gender, the negative coefficient for females (-0.27) means that among older adults, unmet needs were significantly higher among males than females. Lastly, for chronic disease, it was found that older adults with any identified chronic diseases (0.51) were more likely to experience unmet health needs than those without any one.

In Models 2–4, although there was a variation of statistical significance, poverty was consistently significant to unmet health needs. The positive coefficients (0.66, 0.69, and 0.60 in Models 2, 3, and 4, respectively) mean that if older adults have an income lower than the national poverty line, they were more likely to experience unmet needs, regardless of residence type. Additionally, for older adults living with only one family member (model 3), those with any defined chronic diseases had a significantly higher incidence of unmet needs. For the older adults living with more than one family member (model 4)—specifically male aged 85 or above, had any defined chronic disease, and lived in a rural area—were more likely to experience unmet health needs.

Discussion

Mainly due to demographic changes and economic growth, Thailand is undergoing the rapid aging of the population and changes of residence type. Accordingly, the growing number of older adults living alone is an emerging social issue in the country. Thus, this study assessed socioeconomic inequality and its relation to unmet health needs with the 2017 national health census data. Specifically, we attempted to achieve three study aims, which were (1) to profile the proportion of older adults living alone and their socioeconomic conditions, (2) to explore incidence rate of and reasons for unmet health needs of older adults living alone, and (3) to investigate whether the socioeconomic conditions of older adults living alone were related to the incidence of unmet health needs.

For the study aim 1, the study results indicated that approximately 13.91% of the entire population were older adults, and among the older adults, approximately 13.43% were living alone. The percentages were

relatively higher than those estimated by previous studies (Meemon & Paek, 2019; UN, 2017; UNFPA, 2015). It means that the proportion of both older adults and those living alone has increased at a faster rate than expected.

For socioeconomic conditions, like the previous findings (Teerawichitchainan et al., 2015), older adults living alone had significantly lower socioeconomic situations than those not living alone. They were more likely to be lower-income, older, female, lower-educated, unemployed, and chronically-ill people. Particularly for income, the proportion of people with income below the national poverty line among older adults living alone (38.75%) were approximately two times and four times larger than of those living with only one family member (19.39%) and those living with more than one family member (10.98%), respectively.

For the study aim 2, the study results indicated that older adults living alone encountered higher unmet health needs, and the lack of caretakers was the main reason for the unmet needs. Specifically, the incidence rate of the unmet needs among older adults living alone (3.25%) was approximately 1.5 times and 2 times higher than those living with only one family member (2.25%) and those living with more than one family member (1.67%), respectively. Apart from the lack of caretakers, long queues in and long distances to a hospital were frequently cited obstacles of health care utilization not only for older adults living alone but also those not living alone.

For the study aim 3, we found that residence type and income were the most significant determinants for unmet health needs. For residence type, merely “living alone” was a major cause of the unmet needs regardless of socioeconomic conditions. Furthermore, among older adults living alone, if they had lower income (i.e., income below the national poverty line), the unmet needs were found to become even higher. For income, regardless of residence type, those below the national poverty line were more likely to have unmet needs. In other words, the unmet needs were significantly lower among older adults not living alone, but when their income was below the poverty line, the unmet needs became significantly higher.

In sum, older adults living alone, compared to those not living alone, lived in more vulnerable socioeconomic and health situations. They were more likely to suffer from chronic or congenital diseases

and might be in higher need of regular social and care supports. Nevertheless, the residence type “living alone” and the lack of caretakers could be major obstacles to health care utilization. Additionally, a substantial proportion of those living alone (approximately 40%) was below the national poverty line. Such poor income level might not even be sufficient for maintaining a bare subsistence level of living (e.g., food and housing rent). For this reason, additional costs for health care services and even for transportation to a hospital might be a significant burden on and barrier to health care utilization. Particularly, if they were completely disconnected from their families or lived in far peripheral areas where public transportation (e.g., bus or taxi) is not easily accessible, such issues might be even more critical. Similar results and discussion were also presented in some previous studies (Kullanit & Taneepanichskul, 2017; Meemon & Paek, 2019; Osornprasop & Sondergaard, 2016).

Based on the study results, we recommend that the government continue strengthening the current pension and the community health volunteer programs. The government has implemented the Old-Age Allowance (OAA) pension program since 2009, a universal social pension policy for older adults aged 60 years or over. Under the policy, older adults aged 60–69 years receive a monthly allowance of 600 THB (approximately US\$20) unless they receive another salary or pension. Those aged 70–79, 80–89, and 90 years or over receive 700 THB, 800 THB, and 1,000 THB, respectively (approximately US\$23, US\$26, and US\$33, respectively). Although the OAA program offers greater income protection and security for older adults, the adequacy of the actual amount of the pension allowance has been questioned (International Labour Organization, 2017; Rose, 2016).

To estimate an adequate pension allowance, we performed a simulation analysis (Table 4). The simulation result indicated that when the pension allowance was raised to 3,500 THB (approximately US\$112), the income factor (the poverty variable) did not become statistically significant to the unmet health needs. In other words, if the minimum income of older adults is 3,500 THB, the unmet needs would not be significantly different if older adults have income more than the 3,500 THB. This estimated pension allowance is a relatively large amount, thus, the government should gradually increase it in consideration of the economic situation and social consensus. In the short

term, the government should first increase the pension allowance up to the level of the national poverty line (2,686 THB), and ultimately increase it up to the 3,500 THB in the long term. Nevertheless, as the simulation result indicated, the predicted proportion of unmet health needs continued to decrease as the pension threshold increased. It means that the proposed 3,500 THB is a minimum amount, and the government should continue an effort to reduce the gap of the unmet-needs proportions between the group above and below the threshold. Additionally, the simulation we performed was based on univariate analysis; thus, multivariate-analysis-based simulation, together with other significant socioeconomic factors, should be encouraged for more precise estimation.

In addition, the current community health volunteer (CHV, also called the village health volunteer program) program should be strengthened and specialized for older adults, particularly those living alone, in terms of their health care access and utilization. The CHV program, mainly due to the lack of health resources in rural areas and the unbalance of such resources between urban and rural areas, has been implemented to increase access to health care by bridging between people and health care providers in communities. The program’s primary tasks are to provide community people with basic health knowledge and education, essential health services, referrals to healthcare providers, and health surveillance and monitoring in communities. In 2007, approximately 750,000 volunteers were engaged in the program, and each volunteer was in charge of 5–15 households in each community (Kowitt et al., 2015).

As the study results indicated, older adults living alone had higher unmet needs, and the lack of caretakers was its major reason. In this sense, the CHV program should focus more on the role of caretaker for older adults living alone, which is to connect those to health care providers. Emergency van support or transportation arrangement services can be practical policy interventions. Such interventions need to be accompanied by technical supports from and close collaborations of local governments and related authorities in communities. Particularly for those who have a complete disconnection from their families and those who live in isolated areas, the program needs to assist a regular home care support and monitoring services.

Last, the limitations found in this study should be presented for future study. This study found that

significantly higher inequality existed among older adults living alone than those not living alone in most of the socioeconomic variables. However, unlike our expectation, only two variables (residence type and income) were significant to unmet health needs. It may be because this study used secondary data that represent only a cross-sectional snapshot of socioeconomic situations of older adults, which could allow us to obtain only crude measures of the variables. Such crude measures could not detect the subtle variations and associations among the variables.

In addition, unmet health needs used in this study are subjective experiences of an individual, which includes perceived illness experience, whereas socioeconomic variables are relatively objective situations. In fact, several previous studies focusing on the older adult population found a significantly low correlation between objective (e.g., monetary income) and subjective measures (e.g., perceived adequacy of income), and subsequently stressed that such objective measures might not precisely capture the real situations of older adults (Fengler & Jensen, 1981; Hsieh, 2004). The previous studies, as well as this study's methodological issue, suggest that future study should be accompanied by primary data analysis or qualitative data analysis that can consider such subjectivity. Particularly for qualitative data analysis,

in-depth interview and case study, which can allow researchers to explore not only subjectivity but also in-depth understanding of the actual situation of elder people in a long-term context, maybe one of the methodological considerations.

Primary or qualitative data analysis can make it possible to distinguish between voluntary living and involuntary living among older adults living alone, and it may offer a broader understanding of their actual socioeconomic and unmet-needs situations. In addition, due to unavailability in the HWS data, this study did not consider other social-health-related factors such as social or emotional health (e.g., depression and feeling of social exclusion), which were highlighted in previous studies. In fact, there are some other national-level data with such information. However, because these data are collected sporadically from different government agencies separately, it did not allow us to integrate these data with the HWS data. Thus, the integration of these data and the HWS data should be necessary for a more comprehensive assessment.

Lastly, the study results were consistent with previous studies in which socioeconomic inequality existed significantly among older adults living alone compared to those not living alone. Moreover, older adults living alone, due to their mobility limitations

Table 4

Results of Predicted Proportion of Unmet Health Needs by Pension Amount Threshold (%)

Increase of Pension Amount Threshold	Predicted Proportion of Unmet Health Needs		p-value
	Above Threshold	Below Threshold	
500 THB	20.00	2.05	<0.001
1,000 THB	4.65	2.00	0.007
1,500 THB	4.53	1.90	0.006
2,000 THB	4.04	1.84	0.004
2,686 THB	3.53	1.76	0.002
3,000 THB	3.17	1.72	0.005
3,500 THB	2.81	1.78	0.0661
4,000 THB	2.73	1.70	0.0520
4,500 THB	2.58	1.71	0.1304
5,000 THB	2.54	1.64	0.1366

Note: THB = Thai Baht; 2,686 THB = the Thai national poverty line; 3,500 THB = this study's recommended amount of pension allowance.

and the unavailability of caretakers, were found to encounter higher unmet needs than those not living alone, particularly those living with more than one family member (Meemon & Paek, 2019; Osornprasop & Sondergaard, 2016; Teerawichitchainan et al., 2015). Nevertheless, since this study and the previous studies were employed with a different study focus and methodology (e.g., different study population), it must be cautious to directly compare the results across the studies. It suggests that more empirical research should be generated and compared for a more accurate and comprehensive understanding of the social and health issues of older adults living alone.

Conclusion

By the study results, the government should strengthen the current OAA and CHV programs to alleviate socioeconomic inequality and the unmet health needs of older adults living alone. For the OAA program, we found 3,500 THB as an adequate level of the pension allowance, which could significantly alleviate unmet health needs through a simulation. Thus, the government should first increase the pension allowance up to the national poverty line (2,686 THB) in the short term, and ultimately increase it up to the 3,500 THB in the long term. The increase should be gradually done with consideration of the economic situation and social consensus. The CHV program should strengthen its role of caretaker for older adults living alone for better health care access. Emergency van support or transportation arrangement services can be practical policy interventions. For that, collaboration with local governments and related authorities is endorsed.

In conclusion, population aging is a worldwide phenomenon. In these times, people's concern has been changing from "(merely) living long" to "living well." Thailand is also no exception to this. Nevertheless, the current welfare policies and systems for older adults, such as the OAA pension program, are still limited to very basic supports and benefits. Furthermore, such supports and benefits are not even sufficient. In this population aging, a national-level discussion and investigation on how we can redesign the current welfare policy and systems should be an urgent necessity for not only improving the social health vulnerability of older adults but also enhancing their well-being and quality of life.

Declaration of ownership

This report is our original work.

Conflict of interest

None.

Ethical clearance

This study was approved by the institution.

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