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Long-Term Care and Support for Older Persons in Thailand: The Roles of Living Arrangements and Health Checkups

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Abstract

This paper examines the relationship between the living arrangements of older people in Thailand and the probability of their receiving assistance in daily activities from 2011 to 2017. Results from model estimations reveal that an older person living with other household members was more likely to receive assistance than an older person living alone. However, living with grandchild(ren) seems to have a less positive impact than other types of living arrangements. In addition, getting health checkups is shown as an important determinant of the probability of older adults receiving care. These findings provide evidence to support the important roles that health checkups can positively have on the availability of care for those older persons who need assistance with activities of daily living, thus augmenting the provision of long-term care for the elderly in the country.

Keywords: long-term care, living arrangement, household member, health checkup.

1. Introduction

Providing long-term care (LTC) to the elderly is a major challenge for countries around the world, including Thailand. LTC is important for elderly people as it helps them live as freely and safely as possible as they struggle to perform daily activities on their own. Effective LTC not only improves the well-being of the elderly but also frees up family and community resources for other important functions. Given the increasing numbers of elderly people, many countries are facing a challenge in providing extensive and effective long-term care. The challenge becomes even greater for a middle-income country like Thailand, which is facing rapid transformation into becoming an aging society.

In 2016, Thailand managed to put an affordable formal LTC system in place. Its main objective is to support families and communities in looking after the dependent elderly. The system is home-based and relies on a limited budget and personnel to provide LTC services. But even with such limited resources, in 2019–2021[1] the system was able to serve around 150,000–200,000 recipients. However, this LTC system requires additional contributions from related parties, especially family members and people in the community, to make the provision of the LTC services more comprehensive and effective.

To help strengthen the provision of LTC, this study examines the relationship between the living arrangements of the dependent elderly and the probability of elders receiving help with daily living activities in Thailand. Previous studies have shown that living arrangements have important implications on the health and well-being of older persons. Such implications were found to differ according to the type of household structure, individual characteristics such as age, gender, and marital status, and country of residence. For instance, Weissman and Russell (2018) found that older persons living with a spouse/partner were less likely than those living alone or with

[1] See NHSO Annual Report 2019–2021 for more details.

others to report serious psychological distress. Ku et al. (2013) found that it is beneficial for grandparents to provide care for their grandchildren, as such caregiving was shown to be positively associated with improvements in health and mobility improvements for the grandparent caregivers. In contrast, Kolomer (2008) and Hayslip and Kaminski (2005) discovered negative impacts of such grandparental caregiving, such as higher morbidity and mortality, as it increases risks for multiple physical, mental, and emotional problems due to the stresses and strains of care provision. Hu, Leinonen, van Hedel, Myrskylä, and Martikainen (2019) found that middle-aged and older men and women living alone or living with persons other than family members were more likely to be heavy users of hospital care than were those living only with their partners.

The current study aims to provide an empirical examination of the living arrangements within which the needs of dependent older persons are likely to be met. Our focus is on the effects of different types of living arrangements on the probability of elders receiving help with daily living activities. Based on samples from the survey of older persons in Thailand during 2011–2017, eight dummy variables representing co-resident(s) of an elderly person are constructed to capture the effect of the co-resident(s) compared to an elderly person living alone. We argue that the availability of care for the Thai elderly depends on the type of household composition—that is, whether an elderly person is living alone or living with others—and that it *does* matter with whom an older person lives. To our knowledge, there is no study in Thailand that has examined this issue before. This study can provide concrete evidence for some recommendations to improve the LTC provision in the country.

The remainder of the paper is organized as follows: Section 2 presents a summary of the long-term care system in Thailand. Section 3 describes the methodology and the data used in the study. Section 4 provides the estimation results from the econometric model. The study concludes in the final section.

2. Overview of Formal and Informal Long-Term Care in Thailand

It can be said that there was no formal LTC system in Thailand before 2016. The idea of formal LTC services had circulated for a long time, but only since 2009 have we witnessed some concrete progress. During 2009–2010, many national assemblies included the issue in their strategic plans. In 2015, an LTC system was incorporated into a government policy for the first time, and since 2016 a scheme under the management of the National Health Security Office (NHSO) has been supported by the government budget. This NHSO scheme is the main formal LTC system that is accessible to any Thai citizen.

The NHSO scheme aims to support families and communities in looking after the dependent elderly (those homebound and bedridden) to help maintain their standard of living. The Subdistrict Health Promoting Hospitals (SHPHs) and the Local Administrative Organizations (LAOs) are the main players who provide the services, while the other branches of the health network within the local area play supporting roles. This LTC system is home-based.

The main personnel of the system are care managers and (formal) caregivers. The care managers are health personnel who hold at least a baccalaureate degree and have some knowledge and experience in looking after elderly people. Care managers are responsible for reaching out and assessing the welfare of old-aged people in a community and planning and managing individualized care plans for dependent elderly. Care managers also manage the caregivers under the system. Caregivers must have 70 hours of training and should have some experience in taking care of elderly people. These caregivers are the people who provide direct care services to the elderly, including basic physiotherapy, pressure ulcer management, last-hours palliative care, as well as some social services.

In this system, elderly people are assessed once a year and categorized according to their functional and physical capacity using the Barthel Activities of Daily Living (ADL) Index. There are three categories, which are (1) "slight

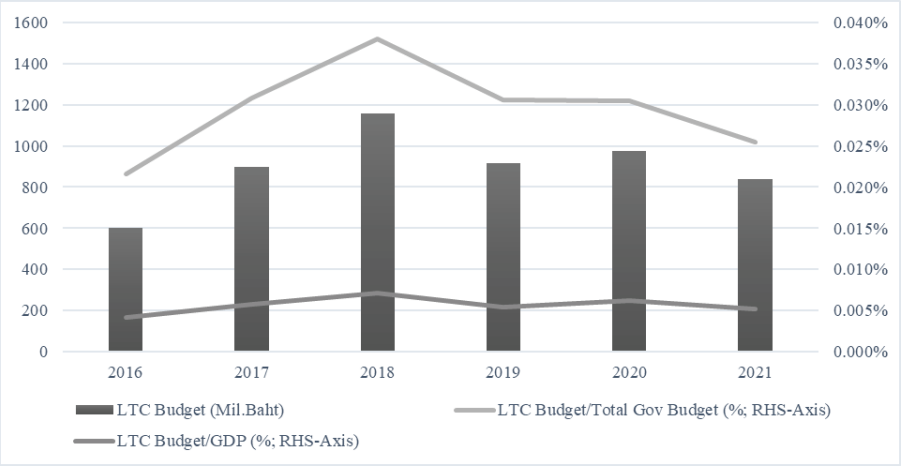
or moderate" dependency (ADL more than 11), (2) "severe" dependency (ADL 5–11), and (3) "total" dependency (ADL 0–4). Each severely and totally dependent elderly person will be provided with a specific care plan.

In each care plan, 2–8 hours of home-based care support a week will be provided, depending on the need. Medical services, including preventive services, physiotherapy, and the provision of rehabilitative and assistive devices are included in the plan. If an elderly person meets the eligibility criteria, social services may be provided, covering assistance with housework, activities of daily living, the provision of assistive devices, and activities outside the house. The caregivers will provide these services under the supervision of the care managers.

Care managers can also work with volunteers and the LAOs or local hospitals in the area to broaden the provision of LTC services to the elderly. Village Health Volunteers especially play an important part in identifying and linking dependent elderly to the LTC system. They also periodically provide various social services to the dependent elderly. Additional support comes from the LAOs, e.g., the Home Care Volunteers for the Elderly or the Center for Improving the Quality of Life for the Elderly. Some LAOs manage their own nursing homes. In addition, SHPHs and other hospitals in the local area can provide more complex medical services for the dependent elderly, if needed.

Since 2020, the system has been re-designed to cover dependent people of all ages, not just the dependent elderly. However, the budget is relatively fixed (Figure 1). In fiscal years 2020 and 2021, the budgets for this LTC system were 975.06 and 838.03 million baht, respectively, which is close to fiscal year 2019 (916.80 million baht). In fiscal year 2021, the budget was 0.026 percent of the total government budget and 0.005 percent of GDP. Note that the budget is calculated from a per-head budget of 6,000 baht (about 170 US dollars) per year. However, the service is actually provided to a higher number of dependent people than the target number. Unsurprisingly, the compensation for the personnel in this system is low. Many of the care managers receive no compensation at all for performing the functions related to this system.

Figure 1: LTC budget and the proportions of the budget relative to total government budget and GDP, 2016–2021



Source: NHSO Annual Reports 2016–2021.

The quality of LTC services varies across local areas in Thailand. In local areas where the LAOs provide the services, the effort expended into the LTC system depends heavily on the resources available and the interest of LAO leaders. In some large LAOs, many resources are spent seeking, assessing, and providing LTC services to dependent people. But in other LAOs, LTC services are given a much lower priority. In those rural areas where the SHPHs provide the services instead of the LAOs, the quality depends heavily on the capacity and interest of the care managers. Capable care managers play an active role in utilizing volunteers and health networks to provide good-quality LTC services. Others play a more passive role and provide minimal services only to the people who happen to know about and can access the system.

Apart from the formal LTC system, dependent elderly are also eligible for other welfare programs. Thailand has a universal old-age allowance of 600–1,000 baht (about 17-28 US dollars) per month, depending on age, as well as universal health coverage through three main schemes: the Civil Ser-

vant Medical Benefit Scheme (for civil servants, active and retired, and their dependents), the Social Security Scheme (for employees of private companies), and the Universal Coverage Scheme (UCS) (for everyone else). The Ministry of Social Development and Human Security provides additional assistance, including shelter, temporary financial aid, and nursing homes, depending on the need. The Government of Thailand is committed to age-friendly and accessible housing, buildings, public spaces, and transportation. However, such facilities are still limited and not yet widespread.

Family members, friends, and neighbors still play the most important role in looking after the dependent elderly in Thailand and are important in linking the dependent elderly to the LTC system. Even for the elderly in a system with the most intensive care plan, there are fewer than 10 hours per week of home visits from formal caregivers. Other public facilities that provide LTC services are also scarce. Some families with monetary capacity may employ personal caregivers, who range from well-trained to untrained. Residential care services for dependent elderly are also available at private nursing homes, private hospitals, and homes for poor elderly supported by charitable organizations. These facilities provide services ranging from basic to complex care. Private care facilities are expensive, however, and the services provided by charitable organizations are limited in number and capacity.

3. Data and Methods

3.1 Model specification

In order to estimate the determinants of receiving personal assistance for older persons, this study uses a logistic regression that is formulized as follows:

$$\log\left(\frac{Prob(y_i=1)}{1-Prob(y_i=1)}\right) = \log\frac{p_i}{1-p_i} = \beta_0 + x_{it}^{/}\beta_1 + z_{it}^{/}\beta_2 + \varepsilon_{it},$$

and

$$Prob\ (y_i = 1) = p_i = \frac{e^{\beta_0 + x_{it}^{/}\beta_1 + z_{it}^{/}\beta_2}}{1 + e^{\beta_0 + x_{it}^{/}\beta_1 + z_{it}^{/}\beta_2}}$$

where the dependent variable (y_i) equals 1 if an older individual i in the year t reports receiving assistance with daily living activities and equals 0 otherwise. β is the vector of unknown parameters to be estimated, and ε is the error term.

As for the set of explanatory variables (x), it includes variables that were previously identified as the determinants of obtaining LTC, including demographic characteristics (gender, age, area of residence), educational attainment, financial status (income), marital status, number of household members, and health dependency (see Marcinkowska & Sowa, 2011). For health dependency or disability, this study characterizes older persons into three groups based on the Barthel Activities of Daily Living (ADLs) scores used in Thailand, which are "slight or moderate" dependency (scores ranging from 12 to 20), denoted as ADL1, "severe" dependency (scores ranging from 5 to 11), denoted as ADL2, and "total" dependency (scores ranging from 0 to 4), denoted as ADL3. Dummy variables for each province and year are added into the regression to capture the effect of unobserved time-invariant provincial-specific characteristics and the effect of the year of the survey conducted.

Since this study focuses on the living arrangements of old persons, whether they were living alone or living with other members in a household can be an important factor in determining the level of help and support. Household composition, in terms of with whom old persons were living in a household, is then added to the regression equation as one of the variables of interest (z). Using the information from the survey of older persons in Thailand, eight dummy variables reflecting household member(s) with whom an old person was living are created. They are (1) living only with a spouse, (2) living only with a spouse and at least one child, (3) living only with a spouse and at least one grandchild, (4) living only with a spouse and at least one paid caregiver, servant, or employee, (5) living only with at least one child, (6) living only

with at least one grandchild, (7) living only with at least one paid caregiver, servant, or employee, and (8) other living arrangements (such as living with relative(s), friend(s), or other household compositions). These eight categories of household composition together with the group of those who live alone are mutually exclusive in nature. If an older person lived only with his/her spouse, then only the "living with a spouse only" dummy variable equals 1.

Getting health checkups (from public or private service providers or both) can be another potential determinant of the probability of receiving help and is thus included as another dummy variable of interest. In addition, the effects of health checkups may depend on the person who lives with an older person in the household. Hence, the interactions between a dummy variable of a person with whom an older person lives and a dummy variable of receiving health checkups are introduced in the model to capture how each member of a household may differently affect the probability of providing care for the older person with whom they live depending on an elderly person's participation in health checkups.

For the methods used to estimate the binary dependent variable, both logit and probit models are estimated. In the probit model estimator, the cumulative distribution function of a random variable is normally assumed to follow the standard normal distribution function. The logit model estimator assumes that the cumulative distribution function is the logistic function. To obtain robust standard errors, the cluster–robust standard errors for clustering by levels of province are used in the estimation, which allows for within-group correlation. Nonetheless, estimation results from both estimators are very similar. Hence, only the results of the logit regression are presented and discussed in this paper.

It is noted that there could be potential endogeneity in the model from reverse causality between receiving daily living assistance and getting health checkups. The best way to control endogeneity is through the instrumental variables (IV) techniques. Hence, this study uses two variables, getting information about benefits for the elderly and level of satisfaction with public

health care services, as the instruments of the getting health checkup variable. However, the result from a Wald test with the maximum likelihood estimator indicates that the null hypothesis of no endogeneity cannot be rejected. Hence, a standard probit/logit regression is preferred and used in this study.

3.2 Data and stylized facts

The estimations are based on samples from the survey of older persons in Thailand in the years 2011, 2014, and 2017. In this study, the data are restricted to only persons aged 60 years or over who reported in the survey a need or desire for assistance with activities of daily living. Thus, older persons who did not report a need/desire are not included in the analysis. Table 1 presents the descriptive statistics of explanatory variables in 2017. Notably, there are clearly some differences in the mean values of variables between the subsample of older persons who were receiving help and those who were not. This issue will be further investigated with the model estimation.

Table 1: Descriptive statistics (the mean values) of explanatory variables of Thai old persons who reported a need/desire for assistance with activities of daily living in 2017

Variable	Total	Who received help	Who did not receive help
Age	76.58	79.11	71.71
Adequacy of income			
More than sufficient	4.00%	3.83%	4.35%
Sufficient	50.89%	52.27%	48.25%
Sometimes sufficient	22.8%	21.17%	25.92%
Insufficient	22.3%	22.73%	21.48%
Area			
Urban	53.83%	56.82%	48.08%
Rural	46.17%	43.18%	51.92%
Sex			
Male	36.81%	35.16%	39.98%
Female	63.19%	64.84%	60.02%

Marital status			
Single	4.87%	4.43%	5.71%
Married	45.53%	40.79%	54.65%
Widowed/Divorced/Separated/etc.	49.61%	54.78%	39.64%
Educational attainment			
None	17.81%	20.81%	12.02%
ECE	66.95%	65.77%	69.22%
Primary	6.67%	5.85%	8.27%
Lower secondary	2.27%	2.17%	2.47%
Upper secondary	2.77%	2.88%	2.56%
Post-secondary non-tertiary	0.79%	0.71%	0.94%
Bachelor	2.33%	1.59%	3.75%
Postgraduate	0.35%	0.18%	0.68%
Other	0.06%	0.04%	0.09%
No. of household members	3.37	3.59	2.93
Health dependency			
Slight or moderate dependency	62.73%	47.23%	91.75%
Severe dependency	22.23%	31.23%	5.37%
Total dependency	15.04%	21.54%	2.88%

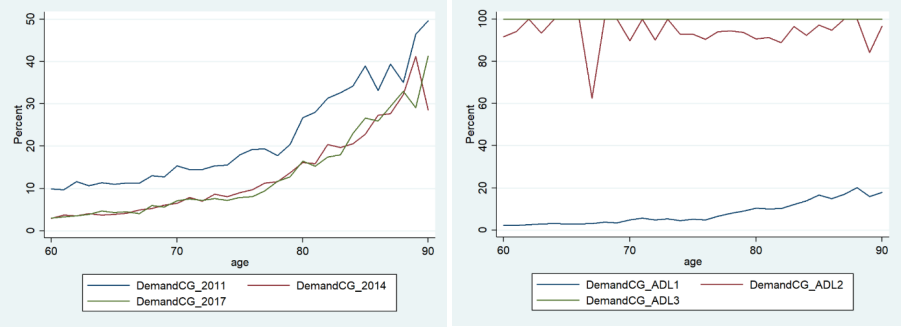
Source: The survey of older persons in Thailand in 2017.

Figure 2(a) shows the percentages of Thai older persons reporting a need/desire for personal assistance with activities of daily living for each year (2011, 2014, 2017). It shows that percentages in demand increase with age; a rapid increase in the percentages is quite remarkable with the oldest-old aged 80 years and over. It is evident that the percentages of older persons in need of help in the survey year 2011 are higher than those in the survey years 2014 and 2017. This could possibly be the effect of the specific year of data collection as well as an indication of the significant decrease in demand as happened in the 2014 survey. However, finding the correct explanation certainly requires further investigation.

The percentages of Thai older persons reporting they needed assistance by the degree of dependency are shown in Figure 2(b). The percentages increase with the dependency level. Almost everyone categorized as being in both severely (ADL2) and totally dependent (ADL3) had a demand for personal assistance whereas those with only a slight or moderate dependency (ADL1) had a lesser need for assistance. Nonetheless, their demand is shown to increase with age.

Figure 2: Percentage of Thai older persons reporting a need/ desire for assistance with daily living

(a) by age in 2011, 2014, and 2017 (b) by age and dependency in 2017

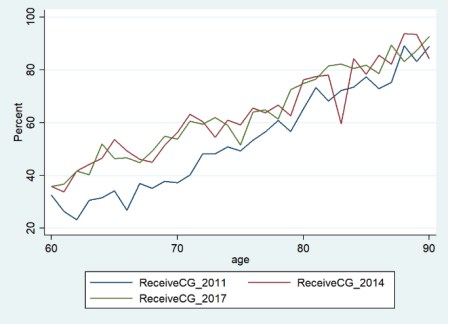


Source: The survey of older persons in Thailand for various years.

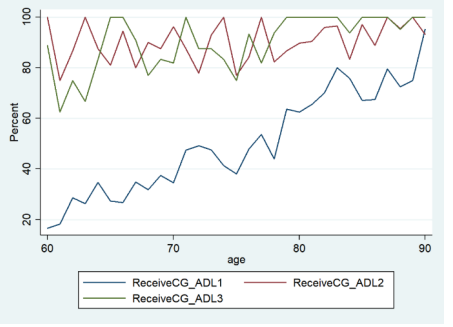
Figure 3 presents the percentages of Thai elderly who received help with activities of daily living. They are shown by age (Figure 3a) as well as by the degree of dependency (Figure 3b). The numbers are very similar and follow the same pattern in the survey years 2014 and 2017. The percentages of older persons receiving assistance are increased with advancing age. In addition, high percentages above 80 percent of those who are categorized as severe and total dependencies (ADL2 and ADL3) received assistance. For those who are slight or moderate dependency (ADL1), the percentage numbers that receive assistance increase steadily from about 60 percent for those aged 80 years to above 90 percent for those aged 90 years.

Figure 3: Percentage of Thai older persons receiving assistance with daily living

(a) by age in 2011, 2014, and 2017



(b) by age and dependency in 2017

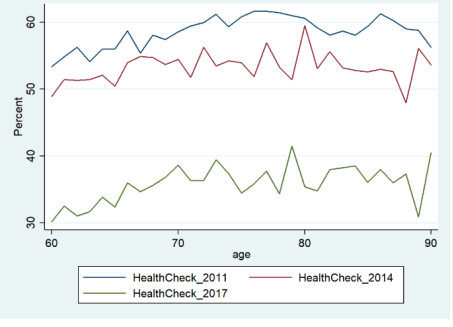


Source: The survey of older persons in Thailand for various years.

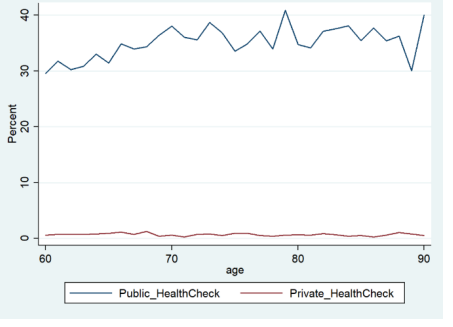
Figure 4 shows the percentages of Thai elderly who received health checkups by age (Figure 4a) and by service provider (Figure 4b). Notably, the percentages of older persons getting health checkup services in the survey year 2017 are at a very low level compared to the numbers in the survey years 2011 and 2014. Less than half of older persons of all ages received health checkups, and most of them received services from public providers.

Figure 4: Percentage of Thai older persons receiving health checkups

(a) by age in 2011, 2014, and 2017



(b) by age and provider in 2017



Source: The survey of older persons in Thailand for various years.

For those older persons who reported a need for assistance, Table 2 shows the percent values of total older persons for the different types of household members with whom they were living in the survey year 2017. It also presents the percent values of older persons in each living arrangement group who were receiving help. This allows for a better assessment of the extent to which living arrangements can play an important role. There was 10.49 percent of the total number of older persons living alone in single-person households. For those older persons who lived with others, 14.72 percent of the total number of older persons were living with their spouse only. 11.92 percent of the older persons were a lone parent living with at least one child only.

The percent values of older persons who were receiving help are somewhat different for each living arrangement group. Only 38.06 percent of those living alone were receiving help. While 80.93 percent of those living with child(ren) only were receiving help. The percentage of those living with spouse and child(ren) only who received help is relatively much lower at 63.88 percent. These differences in living arrangements of older persons could be a key determinant of just which elders tend to be receiving assistance.

In addition, Table 2 showed the percent values of older persons who received health checkups in each living arrangement group and the percent values of older persons who were receiving help in two groups based on whether they received health checkup services. Remarkably, the percent values of older persons who received health checkups are different according to their living arrangement; the percent values of older persons who were receiving help in some groups seem to be slightly different according to the status of health checkups. For instance, the percentage of those living only with child(ren) who received help is surprisingly higher at 83.03 percent if they did not receive health checkups, compared to 76.81 percent if they received health checkups. The difference between the two values is statistically significant at the 10 percent level on a one-tailed test. This finding perhaps indicates the interaction effects between living arrangements and health checkups. To provide a better understanding, estimation results from the empirical model will be presented next.

Table 2: Interaction of living arrangements and health checkups of Thai older persons who reported a need/desire for assistance with activities of daily living in 2017

Type of living arrangements	**Percent of total older persons**	**Percent of those who received health checkups**	**Percent of those who received help**	**Percent of those receiving help in the group of those who did not receive health checkups**	**Percent of those receiving help in the group of those who received health checkups**
Living alone	10.49%	42.78%	38.06%	36.89%	39.61%
Living with a spouse only	14.72%	40.99%	49.50%	49.33%	49.76%
Living with a spouse & child(ren) only	8.74%	37.12%	63.88%	66.49%	59.46%
Living with a spouse & grandchild(ren) only	3.61%	48.39%	46.77%	42.19%	51.67%
Living with a spouse & paid caregiver(s)/ servant(s)/ employee(s) only	0.06%	0.00%	100.00%	100.00%	-
Living with child(ren) only	11.92%	33.74%	80.93%	83.03%*	76.81%
Living with grandchild(ren) only	2.10%	45.83%	43.06%	41.03%	45.45%
Living with paid caregiver(s)/ servant(s)/ employee(s) only	0.35%	33.33%	91.67%	100.00%*	75.00%
Other living arrangements	48.00%	38.66%	75.74%	75.22%	76.57%

Source: The survey of older persons in Thailand in 2017.

Notes: * denotes the mean difference between two groups is statistically significance at the 10% level (a one-tailed t test).

4. Estimation Results

The logit model estimation results and the marginal effects of basic determinants of the probability of receiving assistance with activities of daily living for Thai elderly are reported in Table 3. The data from four samples are used in the estimations, comprising a full sample of all elderly (reported in the first column), the subsample of the young-old aged 60-69 years (reported in the second column), the subsample of the middle-old aged 70-79 years (reported in the third column), and the subsample of the oldest-old aged 80 years or over (reported in the last column). To save space, the estimates for province and year dummies are not reported in the table. The results are discussed below.

The full sample data (equation 1) shows that getting older clearly has positive effects on the probability of older people receiving needed help. The area of residence also shows some effects, as those older persons living in urban areas have a higher probability by about 2.22 percent of receiving help than those living in rural areas. Older persons' educational attainment proves to be another important factor in determining the probability of receiving help. It may seem surprising, however, that having higher education also presents some disadvantages, as this personal characteristic is associated with a lower level of the probability of receiving help. Particularly, older persons with post-graduate education have an 18.1 percent lower probability of receiving help compared to those without education.

As for the household characteristic, older persons living with more people in the same household increased the chances of obtaining personal help. We find that as the number of household members increased by one, the probability of receiving help increased by about 2.90 percent. In terms of dependency status, older persons' health dependency is significantly related to the probability of receiving help. Older persons categorized as being in states of severe and total dependencies were found to have higher probabilities of receiving help than those who were only slightly or moderately dependent by about 37.0 and 40.9 percent, respectively.

The estimation results obtained from the subsamples of the young-old aged 60–69 years (equation 2) and of the middle-old aged 70–79 years (equation 3) are similar to those from the full data. With a few exceptions for those young-old, the area of residence turns out to be an insignificant factor, while being a man increases the probability of receiving help in this age group by 4.01 percent. Finally, for the oldest-old, aged 80 years or above (equation 4), the area of residence and educational attainment are not significantly correlated with the probability of receiving help. However, the gender of an older person is relevant. Women in this age group appear to have a higher probability of receiving help than men by 2.76 percent. This finding is opposite to the correlation found in the case of the young-old age group.

Table 3. Determinants of receiving assistance with activities of daily living for Thai Elderly

- Logit model estimation results -

(Equation no.) Age group	(1) All	(2) 60–69 years old	(3) 70–79 years old	(4) >= 80 years old
Age	0.0776***	0.0578***	0.0547***	0.0873***
	(23.25)	(3.67)	(3.88)	(7.04)
Adequacy of income (dummy var.): *More than sufficient* (Base)				
Sufficient	-0.0234	0.0701	-0.286	0.278
	(-0.11)	(0.17)	(-1.04)	(1.01)
Sometimes sufficient	-0.136	0.0236	-0.453	0.121
	(-0.66)	(0.05)	(-1.72)	(0.42)
Insufficient	-0.0479	0.260	-0.437	0.146
	(-0.23)	(0.58)	(-1.58)	(0.49)
Area (dummy var.): *Urban* (*Rural,* Base)	0.141*	0.0885	0.262**	0.0920
	(2.46)	(1.01)	(2.60)	(0.99)
Sex (dummy var.): *Male* (*Female,* Base)	0.0506	0.248**	0.0576	-0.230*
	(0.97)	(2.73)	(0.68)	(-2.56)

Marital status (dummy var.): *Single* (Base)				
Married	-0.216	-0.233	-0.301	0.140
	(-1.69)	(-1.45)	(-1.45)	(0.39)
Widowed/Divorced/Separated/etc.	0.0425	-0.210	0.0352	0.439
	(0.34)	(-1.05)	(0.16)	(1.33)
Educational attainment (dummy var.): *None* (Base)				
ECE	-0.139	-0.138	-0.188	-0.00711
	(-1.64)	(-0.82)	(-1.76)	(-0.05)
Primary	-0.202	-0.175	-0.229	-0.370
	(-1.52)	(-0.85)	(-0.96)	(-1.79)
Lower secondary	-0.373*	-0.424	-0.413	-0.330
	(-2.34)	(-1.66)	(-1.51)	(-1.15)
Upper secondary	-0.160	-0.343	-0.0395	0.0225
	(-0.97)	(-1.54)	(-0.11)	(0.06)
Post-secondary non-tertiary	-0.336	-0.0693	-0.854	-0.252
	(-1.35)	(-0.20)	(-1.81)	(-0.41)
Bachelor's	-0.504***	-0.706**	-0.543**	0.233
	(-3.39)	(-2.82)	(-2.61)	(0.40)
Postgraduate	-1.169*	-1.582*	-1.331**	.
	(-2.11)	(-1.98)	(-2.87)	.
Other	0.0725	0.480	-0.167	0.463
	(0.13)	(0.56)	(-0.26)	(0.58)
No. of household members	0.185***	0.155***	0.240***	0.149***
	(11.34)	(5.32)	(9.27)	(4.10)
Health dependency (dummy var.): *Slight or moderate dependency* (Base)				
Severe dependency	2.338***	3.070***	2.304***	1.818***
	(15.88)	(13.52)	(10.98)	(9.58)
Total dependency	2.783***	2.758***	2.544***	3.989***
	(13.87)	(9.09)	(11.05)	(8.95)
Constant	-6.237***	-5.089***	-4.524***	-7.290***
	(-17.57)	(-4.62)	(-4.15)	(-6.56)
Observations	11,668	3,780	3,759	4,082

- Marginal effects -

(Equation no.) Age group	(1) All	(2) 60–69 years old	(3) 70–79 years old	(4) >= 80 years old
Age	0.0122***	0.00932***	0.00969***	0.0104***
	(26.07)	(3.64)	(3.97)	(7.39)
Adequacy of income (dummy var.): *More than sufficient* (Base)				
Sufficient	-0.00368	0.0112	-0.0503	0.0343
	(-0.11)	(0.17)	(-1.05)	(0.97)
Sometimes sufficient	-0.0213	0.00375	-0.0800	0.0153
	(-0.66)	(0.05)	(-1.76)	(0.42)
Insufficient	-0.00753	0.0425	-0.0770	0.0184
	(-0.23)	(0.60)	(-1.61)	(0.48)
Area (dummy var.): *Urban* (*Rural, Base*)	0.0222*	0.0143	0.0465**	0.0110
	(2.45)	(1.01)	(2.62)	(0.99)
Sex (dummy var.): *Male* (*Female, Base*)	0.00795	0.0401**	0.0102	-0.0276*
	(0.97)	(2.73)	(0.68)	(-2.55)
Marital status (dummy var.): *Single* (Base)				
Married	-0.0343	-0.0385	-0.0534	0.0185
	(-1.70)	(-1.42)	(-1.46)	(0.39)
Widowed/Divorced/Separated/etc.	0.00672	-0.0348	0.00622	0.0549
	(0.34)	(-1.04)	(0.16)	(1.25)
Educational attainment (dummy var.): *None* (Base)				
ECE	-0.0218	-0.0229	-0.0333	-0.000840
	(-1.64)	(-0.81)	(-1.76)	(-0.05)
Primary	-0.0319	-0.0289	-0.0405	-0.0466
	(-1.51)	(-0.85)	(-0.96)	(-1.74)
Lower secondary	-0.0588*	-0.0680	-0.0733	-0.0413
	(-2.34)	(-1.68)	(-1.51)	(-1.10)
Upper secondary	-0.0252	-0.0556	-0.00698	0.00265
	(-0.97)	(-1.55)	(-0.11)	(0.06)
Post-secondary non-tertiary	-0.0530	-0.0116	-0.150	-0.0310
	(-1.34)	(-0.20)	(-1.87)	(-0.40)

Bachelor's	-0.0796***	-0.109**	-0.0962**	0.0263
	(-3.41)	(-2.94)	(-2.65)	(0.42)
Postgraduate	-0.181*	-0.212*	-0.228**	.
	(-2.20)	(-2.56)	(-3.11)	.
Other	0.0114	0.0844	-0.0295	0.0497
	(0.13)	(0.55)	(-0.26)	(0.64)
No. of household members	0.0290***	0.0249***	0.0425***	0.0178***
	(11.97)	(5.41)	(9.69)	(4.25)
Health dependency (dummy var.):				
Slight or moderate dependency (Base)				
Severe dependency	0.370***	0.560***	0.393***	0.213***
	(23.08)	(21.05)	(16.77)	(14.83)
Total dependency	0.409***	0.521***	0.417***	0.277***
	(24.99)	(12.83)	(18.87)	(40.08)
Observations	11,668	3,780	3,759	4,082

Notes: t-statistics are in parentheses. *, **, and *** denote the significance at the 5%, 1%, and 0.1% levels, respectively. Dependent variable is *Receiving assistance* (= 0 if not receiving; = 1 if receiving) of elderly people who have need for assistance. In all specifications, province dummy variables and year dummy variables are included but not reported in the table.

A discussion is necessary about the set of variables of our interest, household living arrangements of Thai old persons, and health checkups. The estimation results are reported in Tables 4 and 5. In the analyses below, to save space, only the estimated coefficients of variables of interest are presented. In other words, we do not report and discuss the estimation results for the set of basic explanatory variables. The results from the full sample (equation 5) show that older persons living in the same household with spouse only, with spouse and at least one child only, with spouse and at least one grandchild only, or with spouse and at least one paid caregiver, servant, or employee only have a higher probability of receiving help by 13.2, 20.4, 16.2, and 30.0 percent, respectively, compared to those living alone. In contrast, being an old person living with child(ren) only is estimated to increase the probability of receiving help by 23.7 percent, which is higher than living together with spouse and

child(ren). This perhaps reflects misperceptions of society that a spouse is the main person responsible for helping his/her partner and the one most likely to assume the primary caregiver role (Li & Dai, 2019). Consequently, other family members, such as child(ren) in this case, pay less attention to helping an elderly relative who has a spouse to, presumably, care for him or her. In fact, a spouse may not be able to provide good care that can fulfill the needs of a partner, since he/she is likely to be equally old. Hence, a spouse should not be expected or assigned the role of primary caregiver.

The results from the subsamples (equations 6 to 8) also point in the same direction. Living with their child(ren) increased the probability of older persons in all age groups receiving assistance with activities of daily living. Having at least one paid caregiver, servant, or employee living in the household had a significant positive impact on the probability of receiving such assistance for the young-old aged 60–69 years and the middle-old aged 70–79 years. No significant difference in receiving assistance between having a paid caregiver, servant, or employee or not was found for the oldest-old persons aged 80 years or over who live with their spouse.

With regard to grandchildren living in the household, the effect on grandparents is controversial and an ongoing debate. Some studies show various benefits for grandparents who provided grandchild care, such as having an improved psychological status, being buffered against depression and loneliness (Tsai et al., 2013; Chang et al., 2020), having better self-rated health and higher life satisfaction (Ku et al., 2013), and even exhibiting a positive longitudinal association between grandchild care and health for grandmothers (Gessa et al., 2016). On the contrary, other studies have found negative effects on grandparents, such as heavy involvement in childcare accelerating health decline (Chen & Liu, 2012). Grandparents living with grandchildren reported declines in privacy, having time for oneself, and being able to do things for fun and recreation. They also reported increases in physical exhaustion and in being emotionally drained (Jendrek, 1993).

In this study, living with grandchildren is shown to have some positive impacts on the well-being of grandparents in terms of receiving care and assistance with daily living activities compared to those living alone. However, the impacts seem to be less positive than other types of living arrangements found in this study. The positive impacts of living with grandchildren appear to be insignificant in the case of the oldest-old persons who are living with their spouse and in the case of the young-old or middle-old persons who are a lone parent. This finding perhaps indicates potential diversion effects within the household, in which family members (e.g., a spouse) divert time, attention, and resources from grandparents to grandchildren. Eventually, grandparents end up with less support and help with daily living activities.

Next, Thai older persons getting health checkups from professional healthcare providers is revealed to have a positive impact on the probability of receiving assistance. Notably, when the public sector provides the service, the probability of receiving help increases among the young-old aged (equation 10), the middle-old aged (equation 11), and the oldest-old aged (equation 12) by 3.41, 4.86, and 2.66 percent, respectively. The fact that the impact of receiving health checkups from private sector providers is found to be statistically insignificant when the subsamples are used is perhaps due to the very small numbers of older people (less than 2 percent of the older population) reported to avail themselves of services from the private sector. With such a small number of reported observations, the estimation may be unable to capture the full effects of this variable correctly. Nonetheless, evidence exists that getting health checkups from a professional service provider is crucial, as it can directly increase the probability of obtaining help for the elderly.

Table 4. The impact of living arrangements on the probability of receiving assistance with activities of daily living

- Logit model estimation results -

(Equation no.) Age group	(5) All	(6) 60-69 years old	(7) 70-79 years old	(8) >= 80 years old
Living arrangements (dummy var.):				
Living alone (Base)				
Living with a spouse only	0.866***	0.880***	1.079***	0.820**
	(7.05)	(3.75)	(6.10)	(3.13)
Living with a spouse & child(ren) only	1.339***	1.322***	1.502***	1.527***
	(9.16)	(5.04)	(6.18)	(5.02)
Living with a spouse & grandchild(ren) only	1.065***	1.427***	0.697*	0.347
	(7.50)	(5.49)	(2.38)	(0.94)
Living with a spouse & paid caregiver(s) /servant(s) /employee(s) only	1.969***	2.376***	2.062*	1.042
	(3.46)	(5.89)	(1.98)	(0.98)
Living with child(ren) only	1.556***	1.673***	1.771***	1.418***
	(12.91)	(6.09)	(7.87)	(6.68)
Living with grandchild(ren) only	0.587***	0.578	0.0705	1.449***
	(3.69)	(1.35)	(0.24)	(4.23)
Living with paid caregiver(s) /servant(s) / employee(s) only	2.672***	1.822*	.	.
	(5.56)	(1.97)	.	.
Other living arrangements	1.481***	1.506***	1.580***	1.527***
	(11.41)	(5.69)	(7.43)	(7.27)
Observations	11,668	3,780	3,750	4,067

- Marginal effects -

(Equation no.) Age group	(5) All	(6) 60-69 years old	(7) 70-79 years old	(8) >= 80 years old
Living arrangements (dummy var.): *Living alone* (Base)				
Living with a spouse only	0.132***	0.139***	0.183***	0.0951**
	(7.11)	(3.73)	(6.32)	(3.18)
Living with a spouse & child(ren) only	0.204***	0.209***	0.255***	0.177***
	(9.18)	(5.06)	(6.33)	(5.11)
Living with a spouse & grandchild(ren) only	0.162***	0.226***	0.118*	0.0403
	(7.50)	(5.52)	(2.39)	(0.94)
Living with a spouse & paid caregiver(s) / servant(s) /employee(s) only	0.300***	0.375***	0.350*	0.121
	(3.44)	(5.90)	(1.96)	(0.98)
Living with child(ren) only	0.237***	0.264***	0.301***	0.164***
	(13.26)	(6.22)	(8.53)	(6.94)
Living with grandchild(ren) only	0.0896***	0.0913	0.0120	0.168***
	(3.65)	(1.35)	(0.24)	(4.30)
Living with paid caregiver(s) /servant(s) / employee(s) only	0.407***	0.288*	.	.
	(5.58)	(1.96)	.	.
Other living arrangements	0.226***	0.238***	0.269***	0.177***
	(11.39)	(5.76)	(7.77)	(7.55)
Observations	11,668	3,780	3,750	4,067

Notes: t-statistics are in parentheses. *, **, and *** denote the significance at the 5%, 1%, and 0.1% levels, respectively. Dependent variable is *Receiving assistance* (= 0 if not receiving; = 1 if receiving) of elderly people who have need for assistance. In all specifications, basic explanatory variables, province dummy variables, and year dummy variables are included but not reported in the table.

Table 5. The impact of health checkups on the probability of receiving assistance with activities of daily living

- Logit model estimation results -

(Equation no.) Age group	(9) All	(10) 60–69 years old	(11) 70–79 years old	(12) >= 80 years old
Received health checkups within the last 12 months:				
Did not receive (Base)				
Received from public sector	0.220***	0.213*	0.275**	0.221*
	(3.36)	(2.29)	(2.89)	(1.99)
Received from private sector	0.386*	0.449	0.539	0.314
	(2.14)	(1.48)	(1.84)	(0.90)
Observations	11,624	3,763	3,745	4,069

- Marginal effects -

(Equation no.) Age group	(9) All	(10) 60–69 years old	(11) 70–79 years old	(12) >= 80 years old
Received health checkups within the last 12 months:				
Did not receive (Base)				
Received from public sector	0.0344***	0.0341*	0.0486**	0.0266*
	(3.36)	(2.32)	(2.90)	(1.97)
Received from private sector	0.0602*	0.0737	0.0947	0.0371
	(2.17)	(1.42)	(1.87)	(0.95)
Observations	11,624	3,763	3,745	4,069

Notes: t-statistics are in parentheses. *, **, and *** denote the significance at the 5%, 1%, and 0.1% levels, respectively. Dependent variable is *Receiving assistance* (= 0 if not receiving; = 1 if receiving) of elderly people who have need for assistance. In all specifications, basic explanatory variables, province dummy variables, and year dummy variables are included but not reported in the table.

The estimated interaction effects between household members with whom old persons live and getting health checkups are reported in Table 6. In general, several interaction terms have significant coefficients indicating that there are heterogenous effects on the probability of receiving help according to the living arrangements of elderly people as well as the sector that provided the health checkup service. In the case of the young-old and middle-old groups, living with other household members and obtaining health checkups is found to have negative effects in some types of living arrangements. For instance, older persons in the young-old age group (equation 14) who live with their nuclear family members and obtained health checkups from public sector providers are found to have a lower probability of receiving help compared to those who did not receive health checkups. For the middle-old age group (equation 15), older persons who are living with child(ren) only appear to have a lower probability of receiving help if they obtained health checkups from public/private sector providers. This finding implies that some family members perhaps provide slightly less assistance with activities of daily living to older adults when they observe their older household members availing themselves of health checkup services. Finally, estimation results for the oldest-old age group (equation 16) show that the interaction effects are insignificant.

Table 6. Interaction effects between living arrangements and getting health checkups on the probability of receiving assistance

- Logit model estimation results –

(Equation no.) Age group	(13) All	(14) 60-69 years old	(15) 70-79 years old	(16) >= 80 years old
Received health check services within the last 12 months (dummy var.): *Did not receive* (Base)				
Received from public sector	0.5322*** (3.39)	1.1223** (2.85)	0.8443** (3.03)	0.1551 (0.6)

Received from private sector	0.4771	1.4026	0.8601	0.1157
	(1.01)	(1.31)	(1.39)	(0.11)
Living arrangements (dummy var.): *Living alone* (Base)				
Living with a spouse only	1.0084***	1.4481***	1.2017***	1.1076**
	(5.73)	(-2.15)	(4.71)	(2.86)
Interaction with				
- Received from public sector	-0.2797	-0.9895*	-0.2000	-0.4702
	(-1.44)	(2.05)	(-0.66)	(-1.09)
- Received from private sector	-0.3879	-1.5082	1.0348	-1.8483
	(-0.43)	(-0.89)	(0.53)	(-1.05)
Living with a spouse & child(ren) only	1.5409***	1.9680***	1.8577***	1.4034***
	(8.33)	(4.78)	(5.59)	(3.93)
Interaction with				
- Received from public sector	-0.3573	-1.1204*	-0.5473	0.2779
	(-1.45)	(-2.13)	(-1.35)	(0.59)
- Received from private sector	0.2709	-0.8573	0.2501	
	(0.45)	(-0.66)	(0.25)	
Living with a spouse & grandchild (ren) only	1.1262***	1.6303***	1.3155**	0.5946
	(4.82)	(4.07)	(2.76)	(1.15)
Interaction with				
- Received from public sector	-0.1393	-0.3075	-1.0457	-0.4474
	(-0.42)	(-0.6)	(-1.92)	(-0.63)
- Received from private sector	-0.0431	0.0667		
	(-0.03)	(0.04)		
Living with a spouse & paid caregiver(s)/ servant(s)/ employee(s) only	0.8899	0.9334	0.7106	0.1369
	(1.39)	(1.41)	(0.61)	(0.17)
Interaction with				
- Received from public sector				
- Received from private sector				

Living with child(ren) only	1.8346***	2.4014***	2.3027***	1.4177***
	(11.02)	(6.17)	(6.98)	(5.19)
Interaction with				
- Received from public sector	-0.4465	-1.1491*	-0.8082*	0.0131
	(-1.75)	(-2.45)	(-2.02)	(0.03)
- Received from private sector	-1.1227	-2.4844	-2.4284*	0.7711
	(-1.91)	(-1.93)	(-2.19)	(0.6)
Living with grandchild(ren) only	0.8462***	1.6616***	0.5025	1.4842**
	(3.4)	(3.26)	(1.03)	(2.84)
Interaction with				
- Received from public sector	-0.4684	-2.0219**	-0.6517	-0.1047
	(-1.41)	(-2.76)	(-1.02)	(-0.2)
- Received from private sector				
Living with paid caregiver(s)/ servant(s)/ employee(s) only	2.9490***	2.3511		
	(3.46)	(1.74)		
Interaction with				
- Received from public sector	0.2834	-0.6094		
	(0.18)	(-0.27)		
- Received from private sector	-1.3898	-1.4139		
	(-1.12)	(-0.72)		
Other living arrangements	1.6548***	2.0608***	1.9937***	1.3942***
	(10.08)	(5.56)	(6.97)	(5.61)
Interaction with				
- Received from public sector	-0.3153	-0.9356*	-0.6653*	0.2397
	(-1.72)	(-2.19)	(-2.18)	(0.75)
- Received from private sector	0.2404	-0.5306	-0.4227	0.8503
	(0.42)	(-0.47)	(-0.55)	(0.69)
Observations	11,616	3,419	3,732	4,047

Notes: t-statistics are in parentheses. *, **, and *** denote the significance at the 5%, 1%, and 0.1% levels, respectively. Dependent variable is *Receiving assistance* (= 0 if not receiving; = 1 if receiving) of elderly people who have need for assistance. In all specifications basic explanatory variables, province dummy variables, and year dummy variables are included but not reported in the table.

5. Conclusion

This study shows that there are important links between living arrangements and the well-being of older people in Thailand, measured in terms of the probability of receiving assistance with activities of daily living, which is an essential part of long-term care. An older person living with other household members (e.g., a spouse, child, or grandchild or paid caregiver, servant, or employee) was more likely to receive personal help for both formal and informal care than those living alone. Being a lone parent living with child(ren) only has a higher probability of receiving help than those living together with a spouse and child(ren). In addition, living with grandchild(ren) seems to have a less positive impact than other types of living arrangements. The impact appears to be insignificant in the case of the oldest-old persons who are living together with a spouse and in the case of the young-old or middle-old persons who are a lone parent. This could partly reflect the social misperception that usually assigns the primary caregiver role to a spouse even when they are an elderly couple as well as diversion effects within the household in the case of grandchildren co-residing with their grandparents, in which time, attention, and resources are often diverted from grandparents to grandchildren.

Even though Thailand has a formal LTC system, it operates with very limited resources. The system still requires members of the family or other people in the community to play important roles as informal LTC caregivers. Moreover, the accessibility to the formal LTC system at the present time relies heavily on the limited capacity of the system's personnel. A dependent older person who lives alone would have less chance to access the formal LTC system (including regular health checkups) in comparison to one living with his/her child(ren) or even with a spouse. This makes our findings take on more relevance.

The above results point to the recommendation that the government should provide monetary/tax incentives and/or social support for informal LTC caregivers to strengthen the provision of LTC in the country. This is in the

same vein as studies by Sudsawasd, Siriprapanukul, Srakaew, and Thongsuk, (2021) and Potisiri et al. (2016). These incentives and support are not available at all in Thailand at the present time. The incentives would help motivate the informal caregivers, especially children of older parents and paid caregivers, to live with and provide LTC services to the elderly people.

Getting health checkups, especially from public sector providers, is shown to be another important determinant of the well-being of older persons. Health checks give an assessment of older persons' health and risks, provide guidance for caregiver duties, and are found to have positive effects on the probability of elders receiving the care they need. Some negative interaction effects between household members with whom old persons live and getting health checkups are found among adults in the young-old and middle-old age groups, indicating that some family members provide slightly less help to older adults when they observe their older household members availing themselves of health checkup services. Nonetheless, the results of this study still provide evidence to support the important roles that health checkups can positively have on the availability of care for those older persons who need assistance with activities of daily living.

The present formal LTC system in Thailand can help provide regular health checkups for the elderly. This system covers health assessment services for older people in the system at least once a year, and it is universal. Given the importance of regular health checkups to the well-being of the elderly, more resources should be provided to the system. Since it is more costly in linking and providing LTC services to dependent people in remote areas, the LTC budget should be adjusted to provide higher resources to rural areas.

Finally, this study recognized that estimation results from the model can suffer from a potential endogeneity problem, as the explanatory variable, receiving health checkups, is likely endogenous. Even though this study tried to control endogeneity by using the two variables, getting information about benefits for the elderly and level of satisfaction with public health care services, as the instruments, the variables may not satisfy the exclusion restriction.

At this point in time, it is difficult to find a truly exogenous variable (instrument) that is strongly correlated with the endogenous variable. Therefore, this study decides to leave that issue open for future research.

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