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**Author(s):** Chou, Yueh-Ching; Kröger, Teppo; Pu, Cheng-yun

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**Models of long-term care use among older people with disabilities in Taiwan:  
Institutional care, community care, live-in migrant care and family care**

**Abstract** The four main models of long-term care (LTC) for older people in Taiwan are institutional care, community & home-based care, live-in migrant care, and family care. This study aims to examine the factors associated with the four above-mentioned LTC models, using the Andersen model as its framework for analysis. Data were from the 2005 National Taiwanese Health Interview Survey (n=30,680) and in this study 592 over-65-year-old persons who require personal care in daily life were included. The findings showed that the majority of older people with care needs lived with family and were cared only by their family. The second largest group were those older people who were cared by migrant care workers and the third group used institutional care. Only a very small proportion used community/home-based care services. If older people had intensive care needs, they either hired migrant care workers or used institutional care, depending on social and economic backgrounds. Multinomial logistic regression results showed that the way how disabled older people use different LTC models was affected by three components of the Andersen model: their needs (level of ADL and IADL), predisposing factors (age, education) and enabling factors (family networks). Results suggest that there is a need for LTC policies in Taiwan to provide more available and accessible community/home-based care services, particularly for older people with intensive care needs, in order to support their 'ageing in place' and to decrease the use of migrant care workers.

**Keywords** Migrant care. Family care. Institutional care. Community/home-based care. Andersen model.

## **Introduction**

Different from some Western countries, care for frail older people in Taiwan remains a private responsibility and a family obligation, as the country belongs to the familistic East Asian welfare regime (Kröger and Yeandle 2013). Accessibility to financial support and services is limited and depends on professional needs assessments and means-testing. A national survey showed that frail older people in Taiwan were mostly cared for solely by the family (66.4%), secondly by migrant care workers (12.8%) and only a small proportion used formal social services, that is, residential homes (3.4%) or home & community-based care services (0.5%) (Department of Statistics, Ministry of Interior, Taiwan 2010).<sup>1</sup> Thus, Taiwan's care model is characterised by low coverage of home-based services. In the absence of formal services, migrant care has become a major way for family carers to delegate or share their care responsibilities, in order to be able to participate in paid work (Chou, 2013). Still, detailed analysis concerning the factors that are associated with the use of the different care models in Taiwan is lacking.

In Taiwan, the percentage of individuals aged 65 and over is expected to rise to 20.4 per cent by 2026 and 37.0 per cent by 2051 (National Development Council, Taiwan 2012). To meet the increasing need for long-term care (LTC), the government has established various national LTC schemes. However, the budgetary resources available for these schemes have been limited and unstable (Chou and Kröger 2004; Lee et al. 2013). Taiwan plans to start an insurance-based LTC scheme in 2016, following the models of Germany, Japan and South Korea (Campbell et al. 2009), in an effort to improve social welfare and health care among senior citizens (Chiu 2011; Lee et al. 2013).

### **Family care, formal care and live-in migrant care**

Care for lineal family members in Taiwan is a family responsibility and required by the Civil Code (Yeandle and Kröger 2013). Following the Confucian principle of filial piety, older people live with and are cared for by their adult children, particularly the eldest son and his wife. However, the proportion of older people living with their children has dropped from 70% in 1986 to 57% in 2005 (Hsueh 2008).

Since 1995, health and nursing care of older people is provided by the National Health

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<sup>1</sup> Older people who use formal community/home-based, institutional or migrant care may also receive supplementary care from their families but this survey did not analyse this interplay.

Insurance (NHI), covering 99% of Taiwanese people (Bureau of National Health Insurance, Taiwan 2012). In addition, based on the Taiwan Older People Welfare Act, local authorities are obliged to provide formal social services. Co-payment is required for these services, based on the total income of the lineal family and level of disability. Cash subsidies are available through the Social Assistance Act, but only for those whose lineal families are assessed as poor or almost poor. The system includes care allowances for family carers but, in practice, only for carers who are younger than 64, poor, not in a full-time job and whose older relative does not use social services (Wang et al. 2013). As a result of these criteria, only a small proportion of family carers receive a care allowance.

During the 1990s institutional care services from both for-profit and non-profit organizations increased rapidly and currently the number of beds in institutional care goes beyond the needs (Wu and Chuang 2001; Chen et al. 2009). Usually the family purchases institutional care services from the market, with the exception of older veterans and those lacking family or assessed as poor. The cost depends on the provider and the quality of services. Government-regulated institutional care costs between NT\$60,000 (1,500 euro) and NT\$40,000 (1,000 euro) per month. (The average monthly income in Taiwan is about NT\$40,000) (Department of Health, Taipei City Government 2014). For-profit institutional care services can cost as much as 2,000 euro per month.

Since 1992, families with a relative needing regular assistance are eligible to hire a live-in migrant care worker. Unlike as in Italy and other countries where migrant care workers are recruited from the grey market (Le Bihan and Martin 2012), families in Taiwan need to apply for a qualification from the government (Ministry of Labour) and an agent to search for a care worker. Most migrant care workers come from the Philippines, Indonesia, Thailand and Vietnam. The numbers have increased year by year, from only 306 in 1992, to 210,215 in 2013 (Ministry of Labour 2014a), even though the regulations have become increasingly tougher. Today, the older person needs to be assessed by at least two medical doctors and by the LTC Centre of the local authority and receive a value under 20 on the ADL assessment scale (the Barthel scale). Only the severely disabled over age 80 are exempted from this strict procedure (Ministry of Labour 2014b). Receipt of the qualification to hire a migrant carer nullifies eligibility for all formal care services.

Migrant care workers can remain three years at a time in Taiwan, with an option of returning three more times, making a migrant care work career of 12 years maximum. Hiring a live-in migrant

care worker is market-driven, despite its state regulation, as the full cost is paid by families. It is thus not formal or semi-formal care, according to Pfau-Effinger's (2012) definition, as there is no public support involved. Moreover, families hiring a live-in migrant care worker are penalised by the formal system: they need to pay the government for their qualification a monthly sum of 2,000 Taiwanese dollars (around 50 euro) (Ministry of Labour 2014b). Still, hiring a live-in migrant worker is cheaper than institutional care<sup>2</sup>. Although it is illegal for the migrant care worker to do housework that is not related to the older person's care needs (Ministry of Labour, Taiwan 2014b), live-in migrant care workers do most of the housework.

Community/home-based care services have been publicly funded in Taiwan since the 1990s. For example, the first respite care services were developed and funded by the Taipei City Government in 1993 (see Yeandle and Kröger 2013), home nursing care has been included in the National Health Insurance since 1995, and day care and home care services became publicly sponsored in 1998 when the first LTC scheme was established by the central government (Wu et al. 2013). These community/home-based care services are provided by NGOs, contracted by local authorities.

Several studies claim that respite care, home nursing, and day care or home care services are available only for those with relatively minor care needs, as the intensity and flexibility of these services are limited and the family needs to co-pay for the services (Lin and Chiou 2004; Huang et al. 2006; Chen and Wu 2008). For example, the maximum respite care use is limited to 21 days and the family may be subsidized for only 14 days. Day care services for frail older people are still underdeveloped and the number of users has remained low (Lin 2011). Nevertheless, the 'Ten Year Long-Term Care Plan' has recently extended the eligibility for community/home-based care services. For example, since 2008, older people with profound/severe disability are fully subsidized for 90 hours of home care services a month. As a result, the proportion of home care users has increased slightly (2006-2010: +0.5%), but still less than the proportion of families hiring live-in migrant care workers (2006-2010: +3.3%) (Lin 2011; Ministry of Labour 2014a).

### **Research framework: Andersen model**

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<sup>2</sup> A migrant care worker gets a minimum wage NT\$15,840, which is around half the average income of Taiwanese people. If she also works during weekend, she can earn more. Thus, hiring a migrant care worker costs the family around NT\$20,000 (500 euro) per month, including the care worker's health care insurance payments and health examination once a year.

Most previous studies in Taiwan only focus on a single care model or compare two models, for example, institutional care vs. migrant care (Hu et al. 1996) or home care vs. institutional care (Hsieh 2002; Wu et al. 2004), rather than examining the entire range of different LTC models and making comparisons between them. In this study, we used the Andersen model as the framework and older individuals with disabilities as the unit of analysis to examine four models of LTC utilization by older people in Taiwan.

The Andersen model (Andersen 1968, 1995) has been used by several studies on older people's utilization of formal social and health services (e.g. Spence and Atherton 1991; Ozawa and Tseng 1999; Borrayo et al. 2002; Babitsch et al. 2012) or LTC services (Calsyn and Roades 1993; Bradley et al. 2002). It explains the use of health services by predisposing (e. g. age, education level, sex, and race), enabling (e.g. family income, marital status, kinship networks, awareness of services, geographic location, and social support networks) and need components (e.g. level of cognitive impairment, activities of daily life) of the person. In this study, the model is used to structure the analysis of the associations of predisposing, enabling and need characteristics with use of different LTC models among older people.

### **Aims and research question**

The context of the study was Taiwan, a highly urbanised East Asian country in which the needs for LTC among disabled older individuals are increasing dramatically. As Taiwan is among the fastest ageing societies in the world, an understanding on the factors and patterns of LTC use in this country is relevant for other nations that face population ageing and are developing their policies and practices to support 'ageing in place'. This study aims to investigate the possible determinants of the use of particular LTC models by older people who need assistance for daily life activities in Taiwan. The research question was: to what degree are the predisposing, enabling and need factors associated with the use of the four types of LTC?

### **Methods**

#### **Data used and samples**

The study analysed data from the 2005 National Health Interview Survey (NHIS) conducted by the Ministry of Health, designed for investigating health conditions and health and social services use

among Taiwanese citizens. The stratified sampling used was based on a household dataset gathered across all local authorities in Taiwan. Three questionnaires were used to collect data from people aged younger than 12, 12 to 64 and 65 and older respectively. In total, 30,680 citizens completed the interview, including 2,727 persons aged 65 or older, and the response rate was 80.59 per cent. Based on the official definition of disability in Taiwan, measured by Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) scales (Department of Social Affairs, Ministry of Interior), 630 interviewed older persons were classified as disabled (having one or more difficulties in the ADL or the IADL) and formed the sample of the current study. Among the 630 respondents, 402 answered the questionnaires themselves, 228 responded through or with the help of a proxy (carer, spouse or children) and 38 persons were removed from the sample as they did not use any formal services and lived alone and thus could not be placed in any of the four LTC use models.

#### Dependent variables and measures

The dependent variables were the four primary models of LTC used in Taiwan, institutional care, community/home-based care, live-in migrant care worker and care solely by family. In this study, the LTC model was self-reported by the participants based on the questions asked.

*Institutional care:* measured as a positive response to the question ‘In the past one year, have you used a nursing home or any institutions provided by private or public sectors?’

*Community & home-based care:* measured as a positive response to at least one of the following four services provided by the government: In the past year, have you used 1) homecare services, 2) home nursing services, 3) day care or day care services for older people or 4) respite care services?

*Live-in migrant care:* measured as a positive response to both of the following questions ‘In the past year, have you hired a care worker to take care of you when you are not hospitalised?’ and ‘Is your care worker from a foreign country?’

*Family care.* When the participants answered ‘no’ to all of the above questions and lived with family, this was taken to mean that the participants were only cared for by their families and did not use any formal care services or migrant care. Those participants who answered ‘yes’ to the question ‘Do you live alone?’ were excluded from the sample as in this study family care was studied only in connection with co-residence.

## Independent variables and measures

Predisposing, enabling and needs variables, defined according to the Andersen model, made up the fourteen independent variables considered in this study (see Table 1).

*Measurements of predisposing variables.* *Gender* was a nominal variable (coded 0 and 1); *age* and number of years of *education* received by the older person were continuous variables.

*Measurements of enabling variables.* *Marital status* (living with spouse/partner, single/widow/divorced/separated) was a nominal variable. Within the group of users of institutional care, only one participant had a spouse. Thus, the marital status variable was removed from the regression analysis, which did not change the findings of the analysis. *Residence location* (urbanization level of the locality) was coded in 7 ordinal categories (1-7); the higher the score, the higher the level of urbanization (Liu et al. 2006). *Family income*, indicated the total monthly income of all family members in the household per month, coded as seven categorical variables (from <NT\$30,000 - ≥200,000). In the regression analysis, we used a dichotomous indicator with NT\$30,000 as the cutoff, because 59% of the participants had family income less than NT\$30,000. The participant was coded '0' if his/her family income was less than NT\$30,000, and '1' if otherwise. *Family networks* were defined by the frequency of interaction between the participants and their family members (including children, siblings and other relatives). Three questions 'How frequently do you see your children/siblings/other relatives?' were asked individually, and the answers were coded as six ordinal categories of frequency of visits: never (0), every day (5), 2–3 times a week (4), once a week (3), once a month (2), very rarely (1) and having no children/siblings/other relatives (0). The answers to the three questions were summed into the scores of 'family networks' (ranging between 0 and 15). *Social interaction* was assessed by the sum of the replies to two questions: 'How often do you contact your friends (including face to face, by telephone and writing letters)?' and 'How often do you chat with your neighbors or visit each other?' The answers were coded as ordinal variables as follows: every day (5), 2–3 times a week (4), once a week (3), once a month (2), rarely (1), never (0) and no friends/neighbours (0). (range = 0 -10). Higher scores mean a higher level of family networks and social interaction.

*Measurement of need variables.* Level of disability was defined and measured by 6 Activities of Daily Living (ADL) (eating, toileting, bathing, dressing, getting in and out of bed and mobility) and 8 Instrumental Activities of Daily Living (IADL) (cooking, shopping, telephone calling, taking pills, domestic activities, laundry, cleaning and bill managing). The ADL and IADL items were coded as



ordinal variables: not difficult (3), somewhat difficult (2), very difficult (1), completely unable to perform (0). The answers for the two scales were summed into overall scores for ADL (0-18) and IADL (0-24); the higher the score, the higher the level of functioning (i.e. the lower the level of disability). The respondents' *self-rated health* was assessed by the question, 'In general, how do you feel about your current health condition?' The answers were coded as ordinal variables: extremely good (5), very good (4), good (3), fair (2), not good (1).

#### Statistical analysis

The individual older person was the unit of analysis. The dataset was analysed using the Statistical Package for Social Sciences (SPSS), Version 20.0. Table 1 shows the participant characteristics among the user groups of the four LTC models. In order to examine whether there were differences in the characteristics of older people between different types of LTC model used, we used  $\chi^2$  test and non-parametric statistics (Kruskal–Wallis one-way analysis of variance and the Mann Whitney U-test for the post hoc test) for data analysis due to the small sample size.

To examine the association of independent variables (predisposing, enabling, and need characteristics) and dependent variables (the four LTC models), multinomial logistic regression analysis was conducted; with family care serving as a reference group of the dependent variable (Table 2). The level of statistical significance was set at  $p < 0.05$ .

## Results

### Characteristics of the study participants and a comparison of the four groups

According to Table 1, the participants in the analytic sample ( $n=592$ ) were on average 78.1 years old ( $SD = 7.0$ ) and their mean length of education was 3.3 years ( $SD = 4.2$ ). Over half of them were female (60.5%) and without partner or spouse (56.4%). Seventy three per cent of the participants did not use any formal care service or hire a live-in migrant care worker, being cared for only by the family; 12.5% employed a live-in migrant care worker, while 10.3% and 4.6% used institutional care and community/home-based care services respectively. Consistent with the study by Wu and Chen (2006) and the above-mentioned national survey (Ministry of Interior 2010), our study found that the proportion of users of community/home-based care services (e.g. home care, day care, respite care and home nursing care) was less than five per cent.

**Table 1 here**

The comparison between the four groups using different LTC models showed significant differences between the groups in terms of age, having a spouse/partner, residence location, family income, self-reported health, ADL, IADL, family networks and social interaction. The Mann Whitney U-test, post hoc test analysis, showed that those older people who used institutional care were more likely to live in urbanised areas and have lower levels of ADL, IADL, family networks and social interaction than the other three groups. Among all participants, those who used community/home-based services were the youngest. On the other hand, those cared by migrant care workers were the oldest, had the highest family income and the highest level of family networks. In contrast, the participants cared only by the family had the highest levels of health, ADL and IADL (Table 1).

**Associations between the use of LTC models and predisposing, enabling and need factors**

Table 2 presents the results from the multinomial logistic regression. The use of institutional care was related to all three components. For instance, the results show that those who used institutional care, had lower levels of family networks (OR=0.62,  $P < 0.001$ ), ADL (OR=0.81,  $P < 0.000$ ) and IADL functionality (OR=0.89,  $P < 0.05$ ), than those cared only by the family. Those who used community/home-based care services (were also more likely to have lower ADL functionality OR=0.88,  $P < 0.05$ ). The participants receiving migrant care were more likely to be older (OR= 1.06,  $P < 0.05$ ), have higher education (OR = 1.15,  $P < 0.001$ ), higher family networks (OR= 1.14,  $P < 0.05$ ), lower ADL (OR = .94,  $P < 0.05$ ) and IADL functionality (OR = .89,  $P < 0.001$ ) than their counterparts who were cared for only by the family.

**Table 2 here**

**Discussion**

This study explores who uses which model of LTC in Taiwan and which factors explain this. The results reveal that the use of the four LTC models was related in different ways to predisposing, enabling and need factors. Among predisposing factors, age and education were associated with the use of migrant care. Compared with those cared for only by the family, family networks emerged as the only enabling factor significantly associated with institutional care use and migrant care but negatively so.

Bradley et al's (2002) study found that the availability of support is related to the LTC use. Our findings pointed out that, compared with those using family care only, those using institutional care were more likely to have weaker family networks, while those cared by migrant care workers were more likely to have stronger family networks. In addition, different from previous studies (Coulton and Frost 1982; Calsyn and Rodes 1993) that included only ADL as an effective need factor for care service use among older people, this study found that both ADL and IADL were related to the use of the LTC models, of institutional care and migrant care in particular. The results also suggest that the participants using family care were more likely to have had higher IADL functioning compared to those using institutional care or migrant care. Different from previous studies focusing on health care use (Wolinsky and Coe 1984; Dhingra et al. 2010), this study did not find the level of self-reported health to be associated with the use of the four LTC models.

The results also showed that older people with disabilities using the four models did not only come from different socio-economic and demographic backgrounds but also had different levels of care needs. The majority did not use any public or private services and were cared for only by their family; however, they were more likely to have a higher level of health and functioning (ADL and IADL). This suggests that to be cared only by the family might today be an option only for those older people who do not have high care needs. This situation is in contrast with the traditional model of Taiwanese society, characterised by a low female employment rate and a three-generation family structure, where all older people were cared by the family.

Furthermore, once older people have developed high care needs, the way for families to share their care responsibilities is usually not to use community/home-based care services but instead to use institutional care or hire migrant care workers, which echoes Lin's (2011) and Wu *et al.*'s (2004) findings. Our results also suggest that those older people with high level of care needs who use institutional care tend to be single and/or veterans who immigrated to Taiwan in the late 1940s during the civil war in China and have no family in Taiwan (Chen 2001). In contrast, those with intensive care needs cared by migrant care workers have a higher level of education and are from families with strong networks. Older people who use institutional care thus have different individual and family backgrounds from those who are cared for by live-in migrant care workers, which is in line with Chen and Wu's (2008) findings.

Developing community/home-based care services as a way to meet the care needs of older

people with disabilities is a challenge for the LTC system in many societies. In Taiwan, in order to meet growing care needs and decrease unemployment rates, the main policy challenge is to cut down the number of migrant care workers and increase community/home-based care services. Based on the above-mentioned 'Ten Year Long-Term Care Plan', the government in Taiwan has extended the hours of subsidy for the use of community/home-based care services and, at the same time, endorsed stricter regulations for older people who wish to employ live-in migrant care workers (Lee 2008; Ministry of Labour 2014b). Although the number of community/home-based care services has been on the increase, the numbers of families hiring live-in migrant care workers remains rising (Lin 2011; Wu et al. 2013; Ministry of Labour 2014a).

Disappointingly, from the view of government policy, hiring a live-in migrant care worker has become the preferred way to share care responsibilities among families who have strong family networks and who are able to afford the payment of a live-in migrant care worker. Hiring a live-in migrant care worker not only meets the needs of the older person, allowing for ageing in place and staying with children or spouse, but it also solidifies the prevalent family culture, filial piety (Lee et al. 1994). On the other hand, community/home-based care services have not become properly institutionalised in Taiwan and these services are currently not intensive enough to meet frail older people's care needs (Huang et al. 2006). The government policy is clearly not working and, as an unintended consequence, it may increase the gap between different social classes and between those with strong vs. weak individual and family capital (e.g. level of education, level of income, level of family networks).

From the perspective of Taiwan's LTC policy, which aims to promote 'ageing in place', some implications warrant recognition and discussion. First, community/home-based care was not found to be preferred to institutional care and migrant care workers. In general, the development of the LTC system has been slower and less comprehensive in Taiwan than in Japan and South Korea, which have adopted social insurance LTC schemes in 2000 and 2008 (Lu and Cho 2009; Tomita et al. 2010). Our results suggest that policy should focus on making community/home-based care services more flexible, accessible and universal, rather than on blaming families who hire live-in migrant care workers.

The second part of our study used multinomial logistic regression to examine whether the use of LTC models was related to the (predisposing, enabling and need) factors adopted from the Andersen model. First, in accordance with previous studies (Spence and Atherton 1991; Ozawa and Tseng 1999;

Borrayo *et al.* 2002), the analysis showed that the use of LTC models is indeed explained by predisposing, enabling and need factors. Responding to our research question, the results showed that the use of the different models was related differently to the three components.

All the LTC models were significantly related to the need factors; this also confirms that the participants of this study were disabled older people with care needs. In addition, respondents with lower levels of both ADL and IADL were more likely to use institutional care or be cared by migrant care workers, while older people with a lower level in ADL only were more likely to use community/home-based care services. Moreover, the use of migrant care was also determined by predisposing factors, that is, age and education. Aside from the above, our findings showed that the users of institutional care were more likely to have weak family networks, in contrast to the users of migrant care. Family networks are thus a source of social capital for older people, determining whether they can age in place with their family (being cared for by family or migrant care workers) or need to move to an institution.

We should note that the theoretical framework applied here was developed in the United States in the 1960s and our study was conducted in different time and country where care work is a family responsibility. As a result, the use of LTC models might be affected by different factors in Taiwan from those of Andersen's original study. For example, in our study, we did not find factors such as the participants' sex, family income and geographic location to be related to their use of LTC models, while the level of family network and IADL were related. However, this needs to be analysed further by cross-national comparative studies.

### *Limitations*

Some limitations of this study need to be acknowledged. First, the definition of family care was limited to those disabled older people who did not use any formal services or hire live-in migrant care workers and who lived with their families and were cared for only by them. In practice, many older people who use migrant care or formal community/home-based - or even: institutional - care services receive support and care also from their family members but, in this study, this supplementary family support was not analysed or included in the definition of family care. Second, during interviews some participants with hearing or mental difficulties were not able to reply to the questionnaires themselves and their primary carers replied on their behalf, which may have compromised some of the responses.

Third, the small sample size was a limitation, especially the number of participants who used community/home-based care services. Fourth, the Taiwanese definition of disability may overestimate the number of disabled older people (e.g. some older men are not able to cook or do laundry simply because they have never learned these skills). Additionally, some sub-components or related factors of the original Behavioural Model, such as health belief or the supply of community resources, were not incorporated in the current survey data. Therefore, our study was not an exact replication of the Andersen model, but we nonetheless found the model to serve our purpose well.

### **Conclusion and implications**

In this study, we found that most disabled older people did not use any formal services and were cared for only by their family. The next largest groups used live-in migrant care workers or institutional care. A very small proportion used community/home-based care services even though such services have been supported by the government and identified as the primary model of LTC services.

Our study has implications for current LTC policies, which aim to support ‘ageing in place’ and to decrease the number of live-in migrant care workers, and also for future plans to build up an insurance-based LTC system for older people with disabilities in Taiwan. First, how to support unpaid family carers needs to be taken into account in the LTC policy design. Second, in order to increase the use of community/home-based care services, it is vital to make them more universal, accessible and intensive. Extending community/home-based care services is already among the primary goals of LTC policy in Taiwan and these services should be directed to those older people who are disadvantaged concerning their human (e.g. old, frail, low level of education, living alone) and social capital (e.g. family networks).

This study provides only a beginning of an understanding concerning how different life factors of older people are connected to the use of LTC models in Taiwan. Future studies using larger representative samples, conducted in different societies with different welfare regimes, and incorporating more comprehensive sets of predisposing and enabling factors are needed to better understand the effects and interplay of different predisposing and enabling factors on the use of LTC models, and to assist in developing appropriate services and support for older people and their families.

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**Table 1** Characteristics of the study population and comparison of the four groups based on use of LTC models (n = 592)

Variables	All participants (n=592)	1. Institutional care (n = 61)(10.3%)	2. Community/home- based care (n = 27) (4.6%)	3. Migrant care worker (n = 74) (12.5%)	4. Family care (n = 430) (72.6%)	$\chi^2$ (P-value)	Z <sup>b</sup> (P-value)	post hoc test <sup>c</sup>
Age (M/SD) (range)	78.1/7.0 (65–102)	79.1/6.7 (65–94)	76.5/7.7 (65–94)	80.4/6.5 (66–102)	77.0/7.0 (65–98)		18.21***	1 > 4*, 2 < 3*, 3 > 4***
Sex N(%)						2.26		
Male	234(39.5)	29(47.5)	9(33.3)	30(40.5)	166(38.6)			
Female	358(60.5)	32(52.5)	18(66.7)	44(59.5)	264(61.4)			
Education (M/SD) (range)	3.3/4.2 (0–16)	2.9/3.9 (0–16)	2.4/3.6 (0–12)	4.7/5.3 (0–16)	3.1/4.1 (0–16)		5.46	
Marriage N(%)						50.82***		
With spouse/partner	258(43.6)	1(1.6)	13(48.1)	30(40.5)	214(49.8)			
Single	334(56.4)	60(98.4)	14(51.9)	44(59.5)	216(50.2)			
Residence location (urbanization) (M/SD) (range)	4.7/1.7 (1–7)	5.1/1.7 (1–7)	3.9/1.7 (1–7)	4.9/1.8 (1–7)	4.6/1.7 (1–7)		11.99**	1 > 2**, 1 > 4*, 2 < 3**, 2 < 4*
Family monthly income						16.97*		
Below NT\$ 30,000	354(59.8)	36(59.0)	18(66.7)	37(50.0)	263(61.2)			
NT\$30,000~50,000	124(20.9)	16(26.2)	5(18.5)	13(17.6)	90(20.9)			
NT\$50,000~70,000	58(9.8)	4(6.6)	4(14.8)	9(12.2)	41(9.5)			
Beyond NT\$70,000	56(9.5)	5(8.2)	0(0.0)	15(20.3)	36(8.4)			
Self-reported health <sup>a</sup>	1.4/0.7 (1–5)	1.2/0.4 (1–3)	1.2/0.5 (1–3)	1.3/0.6 (1–4)	1.5/0.8 (1–5)		24.23***	1 < 4***, 2 < 4*, 3 < 4**
ADL (M/SD) (range)	12.4/6.7 (0–18)	3.5/5.2 (0–18)	7.6/6.9 (0–18)	8.6/6.6 (0–18)	14.7/5.2 (0–18)		166.46***	1 < 2*, 1 < 3***, 1 < 4***, 2 < 4***, 3 < 4***
IADL(M/SD) (range)	10.3/7.9 (0–24)	2.0/4.2 (0-17)	5.5/6.4 (0-19)	5.0/6.2 (2–22)	12.8/7.2 (0–24)		153.92***	1 < 2**, 1 < 3***, 1 < 4***, 2 < 4***, 3 < 4***
Family networks M/SD (range)	6.5/2.5 (0–15)	4.4/1.9 (0–7)	6.2/2.2 (2–10)	7.2/2.3 (1–15)	6.6/2.6 (0–15)		58.95***	1 < 2***, 1 < 3***, 1 < 4***, 3 < 4*
Social interaction M/SD (range)	3.7/2.9 (0–10)	1.9/2.7 (0–10)	3.4/2.3 (0–9)	3.1/2.7 (0–10)	4.0/2.9 (0–10)		44.81***	1 < 2***, 1 < 3***, 1 < 4***, 3 < 4**

<sup>a</sup> 1 = *bad*, 2 = *fair*, 3 = *good*, 4 = *very good*, 5 = *excellent*; <sup>b</sup> Kruskal–Wallis one-way analysis of variance; <sup>c</sup> Values are significant in the Mann Whitney U-test at  $P < 0.05$

\* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$

**Table 2** Associations between three components and use of LTC models by multinomial logistic regression (n=592)

Independent variable	Model 1—Institutional care (n=61) (ref family carer n=430)			Model 2-Community/home-based care (n=27) (ref family carer n=430)			Model 3—Migrant care worker (n=74) (ref family carer n=430)		
	<i>B</i>	<i>SE B</i>	<i>OR</i>	<i>B</i>	<i>SE B</i>	<i>OR</i>	<i>B</i>	<i>SE B</i>	<i>OR</i>
<b>Predisposing factors:</b>									
Age <sup>a</sup>	0.02	0.03	1.02	-0.03	0.03	0.97	0.05	0.02	<b>1.06*</b>
Sex (female) (ref male)	-0.44	0.43	0.64	0.20	0.51	1.22	0.22	0.34	1.24
Education <sup>a</sup>	-0.03	0.05	0.97	-0.03	0.07	1.00	0.14	0.04	<b>1.15***</b>
<b>Enabling factors:</b>									
Residence location (urbanisation) <sup>a</sup>	0.15	0.12	1.17	-0.24	0.12	0.78	-0.03	0.09	0.97
Family income (≥NT\$30,000) (ref <NT\$30,000)	-0.04	0.38	0.96	-0.22	0.46	0.80	0.12	0.29	1.13
Family networks <sup>a</sup>	-0.47	0.09	<b>0.62***</b>	-0.11	0.09	0.90	0.13	0.06	<b>1.14*</b>
Social interaction <sup>a</sup>	-0.07	0.08	0.93	0.08	0.08	1.08	0.05	0.06	1.05
<b>Need factors:</b>									
Self-reported health <sup>a</sup>	0.51	0.42	1.66	-0.17	0.45	0.85	0.06	0.24	1.07
ADL <sup>a</sup>	-0.21	0.05	<b>0.81***</b>	-0.12	0.05	<b>0.88*</b>	-0.07	0.03	<b>0.94*</b>
IADL <sup>a</sup>	-0.12	0.05	<b>0.89*</b>	-0.07	0.05	0.94	-0.12	0.03	<b>0.89***</b>
Model $\chi^2$	<b>304.70***</b>								
Nagelkerke R <sup>2</sup>	0.49								

OR, odds ratio

<sup>a</sup> Interval or Ordinal variables. A higher score indicates older age, higher level of education, higher level of family network, higher level of social interaction, higher level of urbanisation, higher function in ADL and IADL, and better in health.

\*P < 0.05, \*\*P < 0.01, \*\*\*P < 0.001.