

Labor Migration, Left behind Elderly Living Arrangements and Intra-household Elderly Care in Kanchanaburi DSS, Thailand*

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Existing studies focus mainly on the impact of migration on migrants themselves, less attention has been paid to the effects of migration on the family members 'left behind' by migrants. This paper explores how labor migration effects familial care of the left behind elderly. The analysis is based on panel data of the Kanchanaburi Demographic Surveillance System (KDSS) in Thailand. The study tests two models: a Cox hazard model that focuses on labor migration and change in elderly living arrangements and a logistic regression model that focuses on labor migration and intra-household elderly care. The study found that labor migration triggers transitions in elderly living arrangements from co-residence to living alone, even after controlling for other confounding variables. Secondly, labor migration has several negative effects on intra-household elderly care. The paper raises the concern of the social impact of migration on the elderly in Thai society.

In recent decades, sharp declines in fertility, combined with rising life expectancies, have resulted in increasing rates of population aging in Thailand. Traditionally, the elderly have relied on their children for personal care and financial support and lifelong co-residence with at least one child has been a predominant pattern among older persons. These living arrangements are associated with a weak social security system and strong social norm of filial obligation (Knodel and Ofstedal, 2005). Compared to co-residence with children, living alone is normally considered as a less desirable form of living arrangement, because those living alone are more likely to need outside assistance in the case of illness or disability, are at greater risk of social isolation and are disproportionately likely to be poor (Casey and Yamada, 2002).

In addition to declining fertility and the consequent decline in the number of children available to care for their elderly parents, the level of internal migration in Thailand has risen dramatically since 1985 when a period of sustained economic development began. The pattern of the migration include an increasing share of rural

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to urban migration in overall migration, the large proportion of temporary moves, a growing proportion of females migrants, and migrants overwhelmingly concentrated at young adult ages (Guest et al., 1994; Clausen, 2002; Guest, 2003). Increasing numbers of young adults migrating has created concern about whether out-migration will affect family-based care for the left behind elderly in Thai society. This concern has been expressed in stories in the national press, such as the Bangkok Post (1992) and the Nation (2006). However, there has been little systematic research on this topic. The goal of this paper is to explore how labor migration effects the living arrangements change of the left behind elderly and intra-household elderly care in a context of high out-migration rate. The analysis is based on longitudinal data of the Kanchanaburi Demographic Surveillance System (KDSS), which is funded primarily by the Wellcome Trust, United Kingdom. The data were collected by the Institute for Population and Social Research, Mahidol University.

BACKGROUND

As a result of past fertility and mortality decline, the elderly population in Thailand increased from 1.2 million in 1960 to 6.7 million in 2005. Moreover, the elderly share of the total population also increased. In 1960 only 4.6 percent of the Thai population was elderly people aged 60 and over, but this increased to 10.3 percent in 2005. It is estimated that this will reach 19.8 percent in 2025 (Vapattanawong and Prasartkul, 2006). Such rapid aging in Thai society raises challenges over elderly support and care and social security. Although life expectancy has increased in Thailand, it is not clear if the additional years are healthy ones. There is evidence suggesting that age-specific rates of chronic disease and disabilities are increasing among older persons (Jitapunkul, 2000). In this context, the elderly may require greater assistance and care as they age, and in the absence of institutionalized care, may be forced to rely heavily on their families.

In Thai society, a strong sense of moral obligation that adult children should care for, and respect, elderly parents is a pervasive aspect of its cultural values. The Buddhist-based ideology of “parent repayment” emphasize that children are expected to repay their parents for having borne and raised them. Repaying parents is generally viewed by Thais as a continual obligation that starts when the children are old enough to provide meaningful help and commonly begins long before parents reach old age.

However, the care and support provided by children when their parents are too old to take care of themselves is viewed as the culmination of this process. Underlying the obligation to repay parents are the concepts of 'katanyu katawethi' and 'bunkun', both of which are firmly ingrained in Thai Buddhist culture (Rabibhadana, 1984; Podhisita, 1985).

A central feature of family support in Thailand for elderly members is co-residence (or residing in the same compound) with one or more adult children (Cowgill, 1972; Knodel et al., 2005). A national survey showed that a majority of older persons (65.7 percent) in Thailand co-resided with a child in 2002. However, from 1994 and in 2002, the proportion of older parents and their adult children or children in-law co-residing decreased from 74 to 66 percent, while the percentage of elderly who lived alone increased from 3.6 percent to 6.5 percent. Among those who lived alone, more than half of the elderly reported that they experienced problems, especially those who live in rural areas and the older elderly. Loneliness was the most common problem mentioned, followed by the claim that no one takes care of them when they are sick. About one tenth of elderly living alone reported no assistance for daily living and the least commonly mentioned problem was financial matters. In contrast, only a small minority of elderly who co-resided with their children or others indicated that they had felt negative aspects of living together with others. In Thai society, children (including children-in-law) are the most common source of income for old persons. Also they are the main sources for providing daily living as well as the care when the elderly are frail, become ill or have some functional limitation (Caffrey, 1992; Knodel et al., 2005).

Two theoretical explanations have been offered for understanding the association between migration and familial elderly care. The household theory of migration views migration as a means of spreading risk over household members. This household risk-minimizing strategy can benefit both migrant and non-migrant members (Massey and Espinosa, 1977; Stark and Bloom, 1985; Castles, 1998). Expectations of remittances typically encourage household investments in migration. Moreover, exchanges between migrant and non-migrant family members, whether a flow of remittances or building social networks and information flows, are conducive to the migration of other family members. Based on this perspective, we might assume that migration may disrupt the continuity of traditional parent-child co-residence and raise the risk of elderly living alone. However, we might also expect

that migration would improve the economic status of the elderly, even if they live apart from their children, because of the improved economic status of the household. Mason (1992) developed a model for tracing how the effects of changes in industrialization, urbanization, and migration on the family in Asia are likely to impact on the care of the elderly. He argues that increased migration, normally associated with industrialization and urbanization, might reduce care of the elderly. Because migration involves the physical separation of senior and younger generations, the proportion of multi-generational households is reduced. In this situation, even though left behind elderly may gain remittances, the physical care of the elderly by their children is likely to be especially problematic.

The empirical evidence shows that migration may change household structure and increase the likelihood of the elderly living alone as well as influence elderly care through the following routes. Migration enables young couples to amass enough earnings to be independent; they can build adjacent living quarters thereby attaining their independence while preserving the advantages of extended living arrangements (Kanaiaupuni, 2000, Xiang, 2005). Migration also could cause a substitution effect. Children may increasingly compensate for prolonged periods of separation from parents by providing financial support in lieu of direct personal care, and elderly live alone and receive remittances from children taking the place of traditional forms of parent-child co-residence (Lee et al. 1994, Frankenberg et al., 2002, Frankenberg and Kuhn, 2004, Silverstein et al. 2006). A migration impact survey in Thailand shows that migration impedes services requiring face-to-face contact and assistance that need to be performed frequently such as assistance with household chores, help with most types of household economic activities, or providing meals (Knodel, et al., 2007).

Most of the literature, however, is based on cross-sectional data and hence a potential endogeneity exists because the covariates were obtained contemporaneously with measures of living arrangements. This creates a problem in making a valid causal interpretation. As a result, long-standing issues of temporal ordering remain unresolved, such as whether migration is the primary trigger in elderly living arrangement transition.

This paper explores how labor migration effects change in living arrangements of the left behind elderly and intra-household elderly care from co-residing household members in a context of high out-migration rate. Based on both theoretical and empirical literature, we hypothesize that labor migration increases the risk of elderly

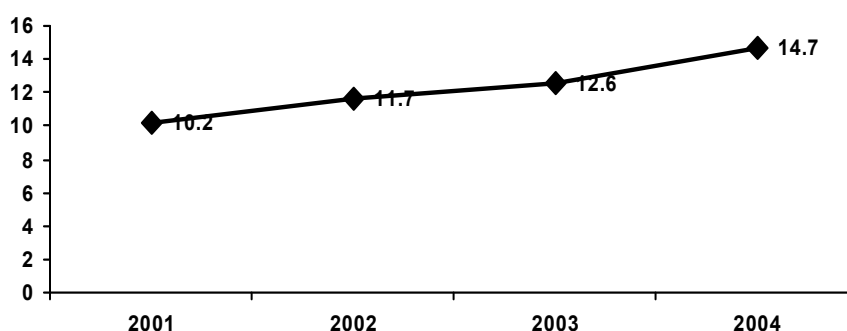
living arrangement change from co-residence to live alone; and that labor migration has a negative effect on intra-household elderly care.

DATA AND METHODS

The analysis is based on longitudinal data of the KDSS. The primary objective of KDSS is to monitor the population change within a field site in Kanchanaburi province. Data has been collected every year, starting from year 2000, from every household and every individual aged 15 and above in the field area. The primary selection units for rural areas are villages and for urban areas are census blocks. Kanchanaburi is the third largest province in the Western region of Thailand and travel between some districts of Kanchanaburi and some provinces in the Central region or Bangkok can be undertaken within a few hours. Most of the population use land for plantation cash-crops, animal husbandry or rice growing.

During the 2000-2004 periods, the total KDSS population was about 50,000 living in 100 rural villages and urban census blocks distributed throughout the province. The elderly share of the population has increased rapidly with the proportion of the population aged 60 and over rising from 9.7 percent to 11.4 percent during the period 2000-2004. Accordingly, the old age dependency ratio increased from 16.1 percent in 2000 to 18.5 percent in 2004. From 2001 to 2004, the migration rate increased from 10.2 to 14.7 per hundred populations (figure 1). Migration is predominately out-migration and mainly involves young adults aged 20-29 years. Most of them move for employment and education reasons and move short distances, either within Kanchanaburi province, or to other provinces in the Central region and Bangkok (Punpuing and Guest, 2005).

Figure 1 Out migration rate (per hundred) 2001-2004 in KDSS



Source: KDSS 2001-2004, IPSR-Mahidol University.

We use the first four rounds of data (collected in 2000, 2001, 2002 and 2003) in the analysis. The analysis utilizes information mainly from the household roster questionnaire, which is used for the annual enumeration of all households in the study field. The data collected includes population, economic, social and health information. The population for the present study consists of a cohort of those aged 60 and above in the first round census (2000) and the elderly individual is used as the unit of analysis. All four rounds of the annual census are combined for the analysis.

Study Design

This study uses a retrospective cohort design. The characteristic of this cohort design is that it begins by identifying a group of people who are initially free of the outcome of interest, but who vary in terms of their degree of exposure to various factors that may cause or prevent the outcome. Subjects are then followed over time to determine whether the outcome of interest occurs. The cohort is identified from past records and followed from the time of those records up to some defined point in the recent past. Study outcomes are recorded after baseline characteristics of subjects have been assessed. In our study, an elderly cohort aged 60 and above, who in 2000 co-resided with at least one of their children or lived with household members other than their spouse only is followed from year 2000 to year 2003. During the follow up period, some of them were exposed to labor migration of their children. The elderly living arrangement transition from co-residence to living alone is observed after year 2000 until 2003. Other confounding factors which may effect elderly living arrangement transition from co-residence to living alone are observed over time. Intra-household elderly care from the co-residing household members, in the aspects of receiving money, receiving food and being taken to the hospital, was measured in year 2003. The advantage of this study design is that the time-order between explanatory variables and outcome variable are clear, which enables us to address the problem of endogeneity in living arrangement change from co-residence to living alone and its covariates.

Study Sample

The population for the present study consists of a cohort of those aged 60 and above in the first round census (2000) and the elderly individual is used as the unit of

analysis. To ensure that all respondents were subject to the risk of living alone, the working sample was derived by excluding respondents who were living in a single person household or living with a spouse only in the round 1 census. Only those elderly who live with at least one child or live with relatives other than his or her spouse are included in the study. The sample size is 3,255 elderly from 2,487 households in round 1. During the next 3 years follow-up, some of the respondents died and some of moved out from the study area and were lost to follow-up. After excluding these persons, 2,320 elderly form the sample for the analysis. The follow-up status of respondents from round 1 to round 4 are shown in table 1.

Table 1 Follow up status of respondents from round 1 to round 4.

Census year	Follow-up status			
	Elderly	Moving away	Dead	Total
Round 1-year 2000	3,255	-	-	-
Round 2-year 2001	2,930	214	111	3,255
Round 3-year 2002	2,603	226	101	2,930
Round 4-year 2003	2,320	176	107	2,603

Source: KDSS 2000-2003, IPSR-Mahidol University.

In addition to changes in living arrangements, all respondents were subject to the risks of dying and moving out from the study areas. We compare characteristics of respondents, death, and moving out cases, using multinomial logistic regression. Results shows that several demographic, socio-economic, and health variables at baseline are significantly associated with these competing risks, particularly the health effects in living arrangement in conjunction with those of some other covariates are likely to be underestimated (table 2). For instance, age and gender both were important risk factors for mortality. With reference to the effects of health conditions, disability (Odds ratio =2.13), and self-report disease (Odds ratio =1.72) were significant predictors of mortality. Working status was significantly associated with both probabilities of death and moving out from the study areas.

Table 2 Odds ratios of death, moving away relative to follow up

Status at baseline (2000)	Status at follow up	
	Death (n=319)	Moving away(n=616)
Age	1.06***	1.00
Male (female ref.)	1.73***	1.14
Unmarried (currently married ref.)	0.97	0.69***
Education	0.99	1.02
Not working (currently working ref.)	1.69*	1.36**
Have disability (no disability ref.)	2.13***	1.38
Have self-report disease (no self-report disease ref.)	1.72***	1.04
Number of household member	1.05	0.96
Household assets	0.99	0.92***
Rural residence (urban residence ref.)	0.78	1.90***
Wald X ² (df)	412.03 (24)	
n	3255	

Reference category=follow up respondents (n=2320) in 2001, 2002 and 2003 census.

*p<0.05, **p<0.01, ***p<0.001.

Source: KDSS 2000-2003, IPSR, Mahidol University.

Ideally dying and moving out should be randomly distributed, and thus risk of living arrangement change would not be biased. However, the above findings suggest that the respondents who were less healthy were more likely to be excluded from the risk set for changes in living arrangements. Therefore, the health effects in living arrangement in conjunction with those of some other covariates are likely to be underestimated.

To analyze labor migration and intra-household elderly care, the study population is based on 2320 elderly who were explored in the first analysis. We exclude 92 elderly that lived in a single person household in the 2003 census, because there was no potential care giver for those older persons for providing intra-household care. The final sample for the analysis is 2228 cases.

Statistical Model

To study the relationship between labor migration and change in elderly living arrangement, Cox regression model are used for the analysis. The regression coefficient (B) and the corresponding Exp(B) (Hazard ratio) were estimated for each variable. The Exp(B) estimates refer to the risk of living alone.

For examining the effect of labor migration on the probability of older persons receiving different types of intra-household elderly care, we estimate a series of multivariate logistic regressions. Three models were fitted separately for older persons. The outcome variables in these regressions are, respectively: a. receiving money; b. receiving food; c. being taken to the hospital.

Definition of key terms

Household: refers to those in which one person provides for his/her own food and other essential of living or a group of two or more persons make mutual arrangements for the common provisioning of food and other essentials of living. These persons may either be related or unrelated by blood, marriage or adoption (IPSR, 2000). Household member refers to anyone who resides in a particular household (sharing food, living arrangements, etc. in the same household) beginning from the day that data collection begins, which in the case of the baseline data collection was 1st July 2000.

Migrants: the definition used to define migration in the annual IPSR reports bases on information from the household questionnaire and their movement in or out of the village during 12 months prior the census. People who remained in the households at both census times are considered as non-migrants. A minimum of one month of residence is required for a person to be defined as a usual resident of the household (IPSR, 2001). In this study, both household and individual questionnaires are used to identify migrants. The definition is modified to look at persons in working age. Migrants are defined as persons who were 15-59 years old, who were not students, who had been usual residents of a sample household and had moved to another province at least three months. Because our interest outcome variable is living arrangement transition from co-residence to living alone and intra-household elderly care, rather than looking at the length of each migration, we consider number of migrants in each round of census and timing of first migration in the household during the observation period. As we only measure the first living arrangement transition, it is necessary to define at least three months leaving the household as migration in order to avoid short time mobility.

The living arrangement variable was constructed from the detailed household roster, which provided headship status and relationship with the household head (e.g., spouse, son, daughter-in-law, etc.) of all household residents. We could classify

respondents into four categories: 1). living in a single person household 2). living with spouse only 3). living with at least one child and 4). living with people other than his or her child.

Living alone: refers to living arrangements in which the respondent lived in a single person household or lived only with their spouse when the time of census was conducted.

Co-residence: refers to living arrangements in which the respondent lived in a household with at least one of his or her children or other relatives when the time of census conducted.

Intra-household elderly care: These include various aspects of care received by the elderly from their co-residing household member in aspects of receiving money, receiving foods, and being taken to the hospital when they got sick during the past one year prior to the 2003 census.

Dependent Variables

Duration of living arrangement change from co-residence status to living alone: The duration for living arrangements to change from co-residence status to living alone, measured in months ranging from 1 month to 36 months. For example, an elderly person who in round 1 was co-resident and in round 2 was living alone, would have a duration that would be equal to, or less than, 12 months. In addition with the information that the last household member moved out from the household 3 months before the round 2 census, we compute the duration of time it took for the elderly to change from co-residence to living alone which is 9 months. If their round 1 and round 2 living arrangement status was co-residence, and round 3 living arrangement status was living alone, and the last household member moved out from the household 5 months before the round 3 census, the time interval is equal to 19 months. If in all 4 rounds the living arrangement status was co-residence, duration is equal to 36 months (i.e. the observation is censored).

Intra-household elderly care: These include various aspects of care received by the elderly from a co-residing household member during the past one year prior to the 2003 census in aspects of receiving money, receiving foods, and being taken to the hospital when they get sick. In the 2003 census, every individual aged 15 and above was asked to report their experience in taking care of aged parents and other aged persons. The detailed information included age, gender, residence of the elderly

whom the caregiver provide care to, relationship between elderly and the caregiver, whether the caregiver still looked after the aged person, how to take care of the aged person (give money, buy food, buy clothes, take to a doctor/ pay for doctor's fee, visit, employ others to take care, others), and the frequency of providing each type of care. We computed the elderly care variables using the detailed information in three aspects receiving money, receiving food, and being taken to the hospital when they got sick from the merged KDSS 2003 individual data file and household member data file. Other aspects of care, i.e. employ others to take care, are rare for the intra-household care to the elderly. The data is measured as dummy variables, e.g. have received money=1 and have not received money=0.

Independent Variables

Migration: Migration status is the main predictor variable for the analysis, which is computed from the residential status variable in the household member file. Three aspects of migration are taken into account (a) cumulative number of labor migrants in the household that the elderly are exposed to when each round census conducted. It is a time varying covariate, because in different rounds, the number is different; (b) The year when the elderly person was first exposed to labor migrant from the household, which has four categories: exposed to labor migrant in 2001, exposed to labor migrant in 2002, exposed to labor migrant in 2003 and not exposed to labor migrant; (c) exposed to labor migration status during 2000, 2001, 2002 and 2003. It is a dichotomous variable. Elderly who were not exposed to labor migration during 2000 to 2003 are coded as "0" and those who exposed labor migration are coded as "1".

Other explanatory variables include demographic variables (age, gender, and marital status), socio-economic variables (education, working status, economic security, and residential location) and health status variables (disability, and self-reported disease) of the elderly, kinship resources (number of household member, and number of household member moving within the same village) and living standard of the household. Factors included in the analysis are chosen either because prior empirical research has found them to be important for elderly living arrangements, and/or due to theoretical reasons.

For the analysis of labor migration and change in living arrangements, most explanatory variables are treated as time varying co-variants; that is, they are

observed at one-year intervals in the KDSS and can influence the risk of living arrangement transition in each year. Time-varying variables have different values at different time periods, but are not systematically related to time. In such cases, we define a segmented time-dependent covariate. Time varying variables include cumulative number of labor migrants in the household that the elderly were exposed to when each round census conducted, elderly marital status, working status, household assets, number of household member, and number of household member moving within the same village. Fixed variable were measured at 2000. Economic security index was measured in 2003.

For labor migration and intra-household elderly care analysis, all controlling variables are measured in 2003 census. In addition, we add number of elderly in the household to measure the burden of care giving. Number of elderly in the household: is measured in terms of the actual number of old persons aged 60 and above living in the same household at 2003 census.

RESULTS AND DISCUSSION

Demographic and socio-economic characteristics of the elderly at the baseline census (shown in table 3) reveal that the average age of older persons in the sample was 68.6 years. In comparison with other age groups, a higher proportion of respondents were observed in the age's group 60-69. About 62 percent of individuals belong to this age group. Thirty percent of respondents were 70-79 years and only 8 percent of them were age 80 and above (data not shown here). The age distribution shows that most of the individuals are young elderly. Slightly more than half the sample (56%) was female, 64 percent were married, and 47 percent were currently working. The majority of elderly lived in rural areas (86%). On average, respondents had completed 2.6 years of schooling. The average household assets score was lower than half (4.7 out of a possible 17). The mean economic security score is 1.69 out of a possible 3.38. The average respondent lived in a household that had about five household members. About 68 percent of respondents reported that they had some form of chronic disease that was serious enough so that they could not work as usual during the year prior to the 2000 census. Six percent of elderly reported that they had at least one disability. .

Table 3 Description of socio-economic and health characteristics of the elderly in the baseline census, 2000 (N=2,320)

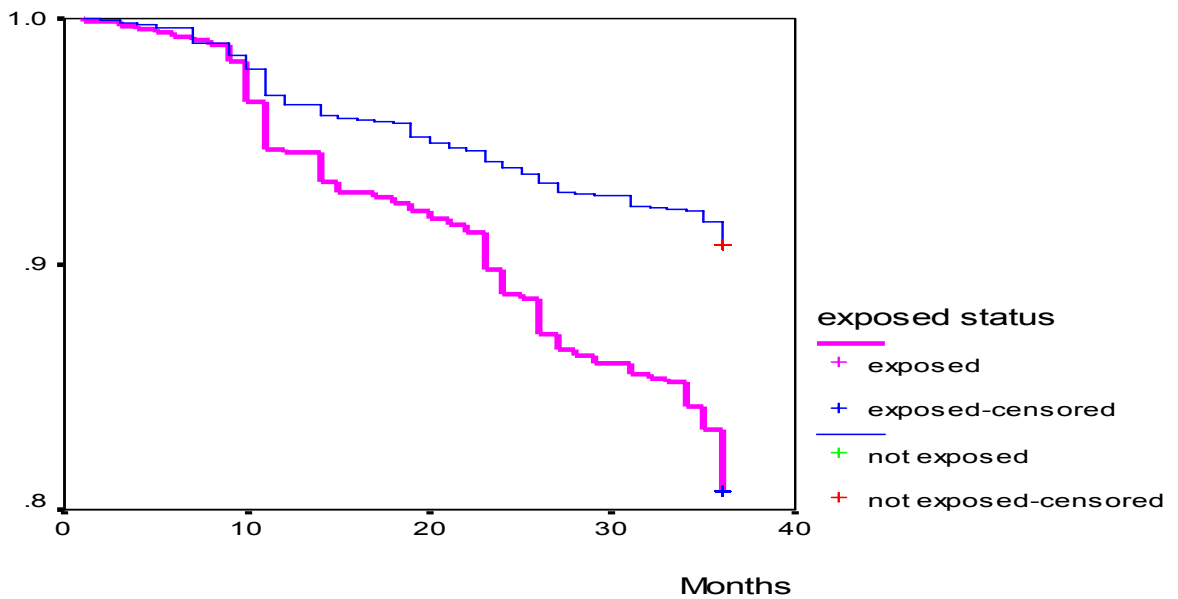
Variable	Mean	S.D.	Measurement
Age	68.61	6.89	60-100 in years
Gender (male ref.)	0.56	0.49	1=female, 0=male
Marital status (single/divorce/separate ref.)	0.64	0.47	1=married, 0=single/divorce/separate
Education	2.63	2.64	0-20 in years
Working status (currently not working ref.)	0.47	0.49	1=currently working (including agricultural working), 0=not working
Economic security index	1.69	0.81	0-3.38
Disability (no disability ref.)	0.06	0.24	1=have disability, 0=no disability
Disease (no disease ref.)	0.68	0.47	1=have disease, 0=no disease
Number of household member	4.77	1.99	2-20
Household assets index	4.70	2.95	0-17
Residential area (urban ref.)	0.86	0.35	1=rural, 0=urban

Source: KDSS 2000-2003, IPSR-Mahidol University

Labor Migration and Change in Elderly Living Arrangement

Twenty seven percent of the elderly (631 cases) were exposed to labor-migration during the three years observation. About 12 percent of elderly (282 cases) changed their living arrangement from co-residence to living alone at least once during the four years of observation (data not shown here). The co-residence frequencies for the exposed to migration and non-exposed group are depicted in relation to time after year 2000 in Figure 2. The curves were constructed using the Kaplan-Meier method and were compared by the log-rank test. For those exposed to migration, 94.5 percent maintain their co-residence status for 12 months or more versus 96.5 percent for the non-exposed. Similarly, after 24 months 88.8 percent of exposed were co-resident versus 93.9 percent of non-exposed. After 36 months 80.8 percent of exposed were co-resident versus 90.8 percent of non-exposed. The living arrangement transition curves for the exposed to migration and the non-exposed group were significantly different (Log rank statistic=44.42, $p < 0.001$).

Figure 2: Cumulated co residence estimate of elderly over the observation period



Source: KDSS 2000-2003, IPSR-Mahidol University.

We examine effects of labor migration on elderly living arrangement change while simultaneously considering attributes of the elderly characteristics, kinship resources and migration factors. The results presented in table 4 indicate support for the hypothesis that labor migration increases the risk of elderly living arrangement change from co-residence to living alone. The first model shows the base model with time fixed covariates; the second model adds time varying factors. Model 1 reveals that hazard of living alone decreases with an increase of age (Hazard ratio=0.98). Compared to their male counterparts, female elderly face a lower risk of living alone (Hazard ratio=0.73); those living in rural areas have a higher risk of living alone (Hazard ratio=1.62). Net of the demographic and socio-economic impact, the results of model 2 shows a positive influence of number of out-migrants exposed (Hazard ratio=2.01) on the risk of living alone. Older persons who are exposed to out migration in an earlier round (2001) have the highest risk of living alone (Hazard ratio=2.16) compared to those exposed to out migration in later years. The number of household members moving nearby also has a strong positive relationship with the risk of living alone (Hazard ratio=2.65). Household assets (Hazard ratio=0.91) shows a negative influence, while economic security index has a positive influence (Hazard ratio=1.22) on the risk of elderly living alone. After controlling for other variables, the marital status of the elderly (Hazard ratio =0.56) has a strong effect on the

outcome variable. Unmarried elderly are more likely to co-reside with others than are married elderly. The other factors investigated have no independent influence on the risk of living alone.

Table 4.5 Results of multivariate Cox regression analysis.

	Model 1			Model 2		
	B	SE(B)	Exp(B)	B	SE(B)	Exp(B)
Age	-0.02*	0.01	0.98	-0.01	0.01	0.99
Female (Male ref.)	-0.30*	0.13	0.73	-0.23	0.14	0.79
Education	-0.03	0.03	0.97	-0.01	0.03	0.99
Economic security index	0.14	0.08	1.15	0.20*	0.08	1.22
Having disability (No disability ref.)	0.07	0.27	1.05	-0.11	0.28	0.72
Having disease (No disease ref.)	0.08	0.13	1.01	0.03	0.13	1.04
Rural residence (Urban residence ref.)	0.48*	0.22	1.62	0.14	0.23	1.15
Currently not married (time varying) (Currently married ref.)				-0.57***	0.15	0.56
Currently working (time varying) (Currently not working ref.)				-0.08	0.14	0.93
Number of household member (time varying)				-0.64***	0.05	0.53
Household assets index (time varying)				-0.10**	0.03	0.91
Year when firstly exposed to out-migration (not exposed)						
-exposed in 2001				0.77 ***	0.22	2.16
-exposed in 2002				0.51 *	0.19	1.67
-exposed in 2003				0.74 ***	0.18	2.09
Number of out-migrants exposed (time varying)				0.70 ***	0.10	2.01
Number of household member moving nearby (time varying)				0.97***	0.09	2.65
-2 Log likelihood	4301.92			3911.46		
X square change	35.01***			390.46***		
Degrees of freedom	9			18		
N	2320			2320		

* p<0.05, **p<0.01, *** p<0.001. The hazard ratio (Exp(B)) estimates refer to the risk of change living arrangement from co-residence to living alone.

Source: KDSS 2000-2003.

Traditional patterns of living arrangements in Thailand reflect high levels of family care giving for the elderly and a high incidence of parent-child co-residence. Living alone is uncommon due to limited services or institutional coverage for the elderly, and to social norms that emphasize the importance of the family. Because migration is an age-specific phenomenon of growing prevalence in KDSS, it may disrupt such traditional arrangements and increase the risk that the elderly live alone. The results show that labor migration plays an important role in change in elderly living arrangements. An increase of one labor migrant from the household increases the odds by 2 times that the elderly would live alone at each time duration (table 4). In addition, the elderly exposed to out migration in earlier round (2001) have a higher risk of living alone. This probably is because earlier out-migrants can induce

additional household members to move. Migration networks are usually described as providing positive social capital to both sending areas and potential new migrants, yet this source of social capital also may be negative for the elderly in KDSS if we assume that the majority of the elderly who live alone as a result of labor migration are worse off compared to others who co-reside with others. The results support our hypothesis that labor migration increases the risk of living arrangement transition.

Older persons who live alone had significantly lower levels of household assets than did people who lived with others. It is reasonable to argue that although elderly prefer to live with their children, in poor households they need to encourage young household members to find jobs in other places and they expect in return that they will receive remittances, which would help diversify household risk. An important issue necessary to examine is whether the left behind elderly receive remittances and whether the elderly who receive remittances in substitution for co-residence are better off or worse off than they would have been if their children were available to meet their daily needs at home. Living alone and receiving remittances or co-residence with adult children with more traditional support forms imply different types of support to the elderly. Left behind elderly may have fewer reliable sources to call upon for daily assistance or other emotional and physical needs. However, they may also have greater financial resources to spend on living cost. This would influence the well-being of elderly.

Wealth is positively associated with independent living in the Western societies. However, in the Asian societies the relationship is not obvious. Some researchers argue that if the elderly prefer to live independently, wealth likely plays a facilitating role. However, if the elderly prefer to live with children, a power bargaining model would predict that wealth induces children to cohabit in order to increase their inheritance (Lee et al., 1994; Davey and Eggebeen,1996). In our study, multivariate analysis shows that the economic security index had a positive relationship with living alone. Increasing one unit of economic security index, the chance of living alone increase by 1.22 times (table 4). The result is consistent with the research in Taiwan and Japan (Kan et al. 2001, Brown et al 2002).

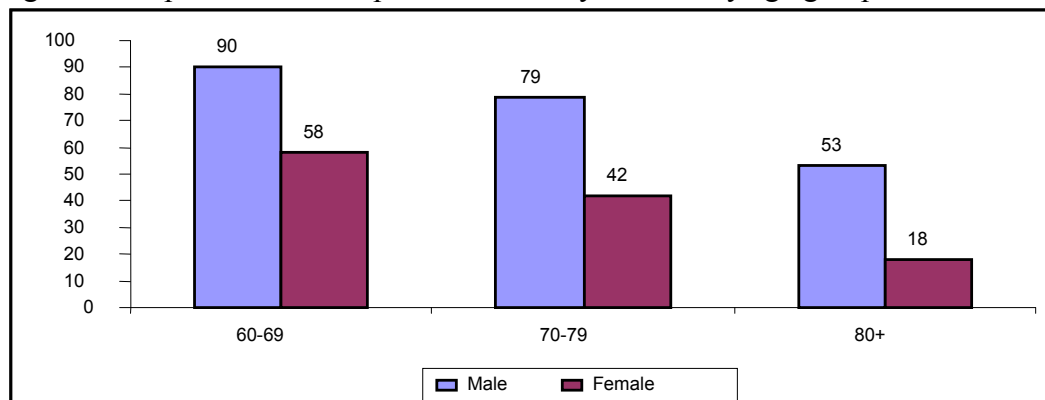
Nearly all studies incorporate a measure of kin availability (e.g. the number of living children) to define an opportunity structure for living arrangements. For example, the literature consistently shows that the probability of living with a child increases with the number of living children. Children's geographic proximity also

matters because the majority of older parents would rather move closer to an adult than live with an adult child (Hermalin, 2005, Kanaiaupuni, 2000). Our study also shows that there are some advantages to having a very large household, which lowers the risk of living alone. An increase of one household member, results in the odds of living alone decreasing by more than half (47%) (table 4). Our results also shows that an increase of one household member moving nearby was associated with the odds of living alone more than doubling. We might assume that because a family member living nearby could take care of the elderly, migration of other family members became easier. A study in Pakistan also found that extended family and community networks are important sources of support for left-behind families, helping to make the migration of some other members possible (Sofranko and Idris, 1999).

The hazard of living alone is decreased by 44 percent among those currently not married elderly compared to their married counterparts (table 4). The possible explanation is that for those who are married support in performing activities of daily living is primarily provided by spouses. Furthermore, it is wives rather than husbands who mainly provide support in the basic activities of daily living (Knodel et al, 2005). So the presence of a spouse can have a large effect on living alone.

Demographic factors are an important factor in understanding elderly living arrangements. In the base model, age and gender have significant influences on duration of co-residence. Age is positively correlated with the duration of co-residence. Female are more likely to co-reside with others. When we add migration and other time varying covariates in the second model, age and gender have no independent effect on co-residence length. This is probably because age and gender differentials in the risk of living alone may result from the increase with age in the likelihood of being widowed, and this trend is more pronounced for female elderly. Figure 3 shows that the marital status varies with age between older men and women.

Figure 3. Proportion of older persons currently married by age group



Source: KDSS 2000, IPSR-Mahidol University.

Research has found that elderly health is associated with living arrangements. Kan et al. (2001) found that in Taiwan, older persons current functional limitations increase the likelihood of living with children rather than living independently. Brown et al. (2002) found that poor health triggers changes in living arrangement. Both physical (i.e. chronic conditions and functional status) and mental health conditions play a role in such transitions. In our study, health status has no significant effect on elderly living arrangement change, probably because health conditions are correlated with competing risks of mortality and hence health effects on changes in living arrangements are underestimated.

Labor Migration and Intra-household Elderly Care

Among 2,228 eligible elderly, 27 percent (601 elderly) had exposure to labor migration from 2000 to 2003. The comparison between the elderly with exposure to labor migration and those without exposure in terms of receiving all three types of intra-household elderly care is presented in table 5. The result shows that 49 percent of elderly without exposure to labor migration received food care from their co-residing household member, while only 43 percent of those with exposure to labor migration received food care during the past one year prior to the 2003 census. The difference is statistically significant ($P < 0.05$). For being taken to the hospital, 44 percent of elderly without exposure to labor migration received care compared to only 38 percent of elderly with exposure who received this form of care during the one year prior to the 2003 census ($P < 0.05$). For receiving money, the respective percentages are 39% and 35% among exposure and no-exposure elderly, but the difference is not statistically significant.

Table 5 Percentage of elderly receiving intra-household elderly care by exposure to labor migration status

Aspects of intra-household elderly care	Not exposure to labor migration	Exposure to labor migration	P -value
Receiving money	38.5	35.1	>0.05
Receiving food	49.4	42.6	<0.05
Being taken to the hospital/pay for doctor's fee	43.8	37.6	<0.05
Number of elderly	1627	601	-

Source: KDSS 2003, IPSR-Mahidol University.

In order to assess the effect of labor migration on the probability of intra-household elderly care, the study uses binary logistic regression models. The outcome variables in the series of regressions are receiving money, receiving food and being taken to the hospital, respectively. As the outcome variable is dichotomous in nature, binary logistic regression is the most appropriate method. The method is used to model the odds of receiving care versus not receiving it. Table 6 presents mean, standard deviation, minimum and maximum values of variables included in the Analysis. The figures shown in Table 7-9 are odds ratios; as such, values greater than one indicate greater odds of receiving care.

Table 6. Mean, Standard deviation, Minimum, Maximum of variables in Binary Logistic Regression analysis of labor migration and intra-household elderly care, census 2003 (N=2228).

Variables	Mean	S.D.	Minimum	Maximum
Exposed to labor migration (not exposed to labor migration ref.)	0.26	0.44	0	1
Age	71.60	6.98	63	110
Female (male ref.)	0.56	0.50	0	1
Not married (married ref.)	0.42	0.49	0	1
Education	2.61	2.64	0	20
Currently working (not working ref.)	0.41	0.49	0	1
Household assets index	6.34	3.53	0	18
Economic security index	1.68	0.82	0	3.38
No disability (have disability ref.)	0.84	0.36	0	1
No disease (with disease ref.)	0.58	0.49	0	1
Number of household member	4.40	2.07	1	16
Number of elderly in the household	1.54	0.58	1	5
With household member moving nearby	0.15	0.35	0	1
Live with at least one child (live with no child ref.)	0.69	0.46	0	1
Rural residence (urban residence ref.)	0.86	0.35	0	1

Source: KDSS 2003, IPSR-Mahidol University.

The results of the binary logistic regression analysis reflect the direction of association between labor migration and intra-household elderly care in terms of receiving money, receiving food and being taken to the hospital from the co-residing household member (table 7-9). Compared with the elderly without exposure, elderly exposed to labor migration are less likely to receive food from their co-residing household member (Odds ratio=0.76); and elderly exposed to labor migration are less likely to receive care of being taken to the hospital from their co-residing household member (Odds ratio=0.78). Migration of young people reduces the availability of physical care for the elderly. Because increased physical separation of the elderly and their adult children could reduce the number of potential care givers, and thus affects the quality of elderly care.

The present study supports the above argument. The results shows that exposure to labor migration had negative effect on elderly care in aspects of receiving food and being taken to the hospital. The results support our hypothesis that labor migration has a negative effect on elderly care in aspects of receiving food and being

taken to the hospital. However, our results indicated no influence of labor migration on elderly care in term of receiving money. The possible explanation is that physical care like providing food or taking elderly to the hospital require the personal ministrations and time of a care giver which could be affected by labor migration; while providing money is neither personal nor time consuming. So that labor migration only effects the left behind elderly in aspects of physical care but not financial care. The result is consistent with the recent study in Thailand by Knodel et al. (2007). They found that migration impedes services requiring face-to-face contact. Children who remain near, and especially those who remain co-resident, are much more important sources of services that need to be performed frequently and on a sustained basis to be meaningful such as assistance with household chores, help with most types of household economic activities, or providing meals.

The results indicate that control variables influence three aspects of the intra-household elderly care. These variables include elderly age, working status, whether living with at least one child, number of household members, number of elderly in the household and household assets.

Age has a positive relationship with the outcome variables. Older age of the elderly, more likely to receive all three aspects of care. We might assume that age indicates need, with the elder, frail elderly requiring the more assistance. Working status also has significant relationship with elderly care. Those who are currently still working are less likely to receive all aspects of elderly care compared to those who are currently not working. It may be because that elderly who are able to work, normally can carry out their daily routines and care for themselves and so do not have to depend on others.

The study shows that those living with at least one child are more likely to receive all aspects of elderly care compared to those in other living arrangements, i.e. living with spouse only and living with other relatives. This is because in Thai culture there is a strong sense of moral obligation that adult child should support and care for elderly parents and this provides a strong normative basis for the prevailing pattern of familial care. This finding is consistent with the previous studies in Thailand (Cowgill and Homles, 1972, Knodel, et al., 2005). The number of household members has a positive effect on elderly care, while the number of elderly in the household has a negative relationship with the outcomes. The possible explanation is that a small number of household member means a reduced number of household members to

provide care to the elderly. The result is consistent with the study of the multicenter survey on Health, Well-being and Ageing in Latin America and the Caribbean in 2000, which shows that number of co-residents is what ultimately matters in respect of older persons receiving certain forms of informal support, particularly types of help that are more directly dependent on physical proximity (United Nations, 2005).

The household assets index is one of the factors that reflect the family capability in taking care of their elderly. The result indicates that households with more assets are likely to be able to take better care of the elderly and better respond to elderly needs. This is probably because poverty limits the ability of the family to allocate its resources to older persons, as taking care of elderly seems more expensive than that of younger members (Caffrey, 1992). Cowgill and Holmes (1972) also stated that families with higher income tend to have more access to services and have higher purchasing power, so that they might have better chances of providing care for the elderly. In Thailand, the study found that the more land a household owns, the more likely the traditional pattern of elder caregiving will be maintained. When land is limited, children leave to find employment elsewhere and will try to send money to help their parents as they are able (Caffrey, 1992).

Table 7 Logistic regression analysis of the influences of labor migration on elderly care of **receiving money** (N=2,228)

	B	SE(B)	Exp(B)
Exposed to labor migration (not exposed ref.)	-0.15	0.12	0.86
Age	0.04***	0.01	1.04
Female (male ref.)	0.18	0.12	1.20
Currently not married (married ref.)	0.02	0.15	1.02
Education	-0.02	0.02	0.98
Currently working (not working ref.)	-0.97***	0.12	0.38
Household assets index	0.10***	0.02	1.10
Economic security index	-0.03	0.07	0.96
Without disability (with disability ref.)	-0.06	0.18	0.94
Without disease (with disease ref.)	-0.09	0.11	0.91
Number of household member	0.12***	0.03	1.13
Number of elderly in the household	-0.35**	0.12	0.70
With household member moving nearby (no household member moving nearby ref.)	0.17	0.15	1.18
Live with children (not live with a child ref.)	1.15***	0.14	3.14
Rural residence (urban residence ref.)	-0.00	0.16	0.99
N=2228 df=15 Nagelkerke R ² = 0.250			

* p<0.05, **p<0.01, *** p<0.001. The odds ratio (Exp(B)) estimates refer to odds of receiving money.
Source: KDSS 2000-2003, IPSR-Mahidol University.

Table 8 Logistic regression analysis of the influences of labor migration on elderly care of **receiving food** (N=2,228).

	B	SE(B)	Exp(B)
Exposed to labor migration (not exposed ref.)	-0.28*	0.12	0.76
Age	0.08***	0.01	1.08
Female (male ref.)	0.15	0.12	1.17
Currently not married (married ref.)	0.26	0.15	1.30
Education	-0.03	0.02	0.97
Currently working (not working ref.)	-0.90***	0.12	0.41
Household assets index	0.12***	0.02	1.13
Economic security index	-0.03	0.07	0.98
Without disability (with disability ref.)	-0.08	0.18	0.93
Without disease (with disease ref.)	-0.18	0.11	0.83
Number of household member	0.09**	0.03	1.09
Number of elderly in the household	-0.30	0.12	0.74
With household member moving nearby (no household member moving nearby ref.)	0.09	0.15	1.09
Live with children (not live with a child ref.)	1.44***	0.13	4.26
Rural residence (urban residence ref.)	0.47**	0.16	1.60
N=2228 df=15 Nagelkerke R2= 0.338			

*p<0.05, **p<0.01, *** p<0.001. The odds ratio (Exp(B)) estimates refer to receiving food.
Source: KDSS 2000-2003 , IPSR-Mahidol University.

Table 9 Logistic regression analysis of the influences of labor migration on elderly care of **being taken to the hospital**.

	B	SE(B)	Exp(B)
Exposed to labor migration (not exposed ref.)	-0.25*	0.12	0.78
Age	0.07***	0.01	1.08
Female (male ref.)	0.06	0.12	1.06
Currently not married (married ref.)	0.38*	0.15	1.47
Education	-0.03	0.02	0.98
Currently working (not working ref.)	-0.79***	0.12	0.46
Household assets index	0.12***	0.02	1.12
Economic security index	-0.00	0.07	1.00
Without disability (with disability ref.)	-0.07	0.18	0.94
Without disease (with disease ref.)	-0.38***	0.11	0.68
Number of household member	0.12***	0.03	1.13
Number of elderly in the household	-0.26*	0.12	0.75
With household member moving nearby (no household member moving nearby ref.)	-0.07	0.15	0.92
Live with children (not live with a child ref.)	1.36***	0.14	3.88
Rural residence (urban residence ref.)	0.24	0.16	1.28
N=2228 df=15 Nagelkerke R2= 0.316			

* p<0.05, **p<0.01, *** p<0.001. The odds ratio (Exp(B)) estimates refer to being taken to the hospital.

Source: KDSS 2000-2003 ,IPSR-Mahidol University.

CONCLUSION

Older persons are often subject to multiple needs for care due to declining health. Families remain the major source of support for elderly. As in other developing countries, family members provide income, personal care and emotional support to the elderly in Thai society. However, in addition to declining fertility and the consequent decline in the number of children available to care for their elderly parents,

the rising level of internal migration potentially can undermine the traditional co-residence pattern and intra-household elderly care. When older people live in households separate from family members, it is important to consider the support which potentially can be provided by non-resident family members. Similarly, when older people live with their family, it remains necessary to examine the actual support which may or may not be provided within the household (Hashimoto and Kendig, 1992). This study examines the influence of labor migration on changes in elderly living arrangement from co-residence to living alone and intra-household elderly care obtained from co-residing members in Thai society.

The study hypothesized that migration increases the risk of elderly living arrangement change from co-residence to live alone; migration have a negative effect on elderly care in the aspects of receiving food, and being taking elderly to the hospital when they get sick.

The results of analysis indicate support for the hypothesis that migration increases the risk of elderly living arrangement change from co-residence to living alone. Net of the demographic and socio-economic impact, the results shows a positive influence of number of out-migrants exposed on the risk of living alone. Older persons who are exposed to out migration in an earlier round (2001) have the highest risk of living alone compared to those who had no exposure to labor migration. Elderly exposed to labor migration are less likely to receive intra-household care in the aspects of receiving food and being taken to the hospital, even after controlling for other confounding factors.

The above results raise the concern that with the population aging that is occurring in Thailand, the society will face increasing needs of long term care defined as “the full range of health, personal care and social services provided at home and in the community for a continuing period to adults who lack or have lost the capacity to care fully for themselves and remain independent” (Tily et al. 2001, Philips and Chan, 2002). Migration is inevitable in Thai society and the remittances sent by labor migrants contribute in various ways to the well-being of the households of their origin (Guest, 1998, Osaki, 2003, Knodel et al., 2007). However, in this study we found negative social consequences of labor migration on left behind elderly. Labor migration increases elderly living arrangement change from co-residence to living alone. Also migration has several negative effects on intra-household elderly care in terms of receiving food and being taking to the hospital when necessary. To address

these negative aspects of labor migration, the government and community should play their role in taking care of those left behind old persons, such as maintaining older people in their own homes and providing community-based services for them. Secondly, elderly living alone and elderly who receive less care from co-residing household member are disproportionately likely to be in poor households. Strategies are needed to improve the household economy. The government, for instance, may need to provide financial support for low-income families, so that people can be less dependent on migration.

The research reported upon here is unique in several aspects. First, because living arrangements are dynamic, changing over the life course of the elderly, the use of panel data provided us with a much better understanding of casual links. Traditional regression on cross-sectional data lacks the ability to establish causal direction of the net effects. Second, time varying independent variables can be handled in Cox regression but not in traditional regression. Last, the KDSS, a systematic collection of longitudinal data, enable us address the problem of endogeneity between duration of living arrangement change from co-residence to living alone and its covariates. The paper provides evidence in support of the causal effects of theses variables on living arrangements transition.

These findings suggest issues for further research. First, the measure of co-residence in this study ignore situations in which elderly parents and children live in separate dwellings very nearby, an arrangement that can also meet many of the same needs of the elderly as sharing a dwelling (Cowgill, 1972). The same shortcoming stands for the measurement of intra-household elderly care. In future studies, the definition of a household should be expanded to include children living in the same neighborhood as their elderly parents. Second, to fully understand the effect of labor migration on left behind elderly, the intergenerational exchanges between elderly and non-coresident family members, particularly with migrants, is also needed, because the extended family may provide support to the elderly without co-residence, i.e., by transferring money, goods, and/or services (Martin,1989, Knodel et al.,2005, Hermalin et al., 2005).

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