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Availability of Adult Children with Elderly Parents and Their Spatial Patterns: Evidence from a Rural District, Northeastern Thailand

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In many parts of the developing world, massive movement of young adults from rural to urban areas has been occurring, raising the question of family support for rural elderly. This study investigates whether rural elderly in Northeast Thailand have children living in their village, if yes, how close to the elderly's dwelling unit, and what determines the availability of children. Traditionally, Thai elderly in rural areas rely on their kin as care givers, especially their children. This study employs a rich longitudinal data set containing individual -, household -, and village-level characteristics. Social network data are used to measure child-parent ties within the village. Geographic information system (GIS) techniques are used to measure the distance between the elderly to their nearest son and/or daughter. Logistic regression models are estimated to understand demographic and economic factors related to the availability of children. Despite high rural-urban migration, most elderly have children living in the village. The preference for matrilocal residence is evidenced by patterns of co-residence and distances between non-co-residing children and their parents. These patterns are consistent with evidence from the qualitative part of the study. In the logistic regression analyses, demographic factors are found to be consistently more important than socio-economic factors.

Keywords: *kinship network, social network, elderly, care giver, spatial pattern*

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Introduction

Among common demographic trends in many developing countries are declining fertility levels, increased longevity, and high rates of rural to urban migration, especially among young adults. Thailand is not an exception. As the result of a successful family planning program, the contraceptive prevalence rate increased from 15% to 70% during 1970 - 1987 (Prasartkul et al., 2011). By 2012, the prevalence rate increased to 80% and the total fertility rate is now 1.5 (Institute for Population and Social Research [IPSR], 2012). Prior to and after the fertility decline, mortality declined; life expectancy at birth was 66 in 1985 - 86 and 73 in 2012 (Kulpravit, 2002; IPSR, 2012). This combination of declining fertility and increased longevity leads to an aging population. Further, the pattern of substantial rural out - migration of young adults seeking better employment opportunities in Bangkok and other industrial areas (Chamratrithirong, 2007) has increased the aging of the rural population relative to the urban population. In 1980, 17% of the population lived in urban areas; by 2010, with substantial rural to urban migration, this had increased to 41%. Taken together, these trends have led to a reduction in the number of people aged 15 - 64 who are economically active relative to the number of elderly aged 65 and over (IPSR, 2006), and this is especially pronounced in rural areas. And as the proportion of working - age population (15 - 59 years old) relative to the elderly (60 and older) shrinks, it becomes more difficult to provide support to the elderly through tax revenue (Knodel et al., 2011).

In addition to these broad demographic trends, patterns in household structure and post - nuptial living arrangements can affect the support that elderly can expect to receive from their children. In much of Asia, household structures changed from traditional extended families to smaller nuclear families (Hirschman & Rindfuss, 1982; Jiang & O'Neill, 2007; Kamo & Zhou, 1994; Knodel et al., 1992; Kramarow, 1995; Weinstein et al., 1990). While it is easier for children to provide support to the elderly if they are co - resident, if the children live nearby the difference between an extended family household and a set of nearby nuclear households will be minimal in the ability to provide support when needed by the elderly (Knodel & Saengtienchai, 1999).

Generally, support provided to the elderly by adult children differs by the gender of children, with daughters more likely to cook and provide assistance with the everyday needs of elderly parents. Thus it is important to consider differences in residential arrangements of adult sons and daughters. These gender differences depend on cultural values and traditions. Some Asian countries are influenced by Confucian traditions, with the parents expected to reside with their eldest son (Ogawa & Retherford, 1993). In Thailand, post-nuptial residence varies by local custom, with matrilocality expected in the North and Northeast (Chamratrithirong et al., 1988; Podhisita, 1984; Yoddumnern-Attig et al., 1992). Especially in rural areas, newly married couples are expected to live in the wife's village, and stay in the wife's parents' household, at least temporarily. This tradition implies that the daughter, typically the youngest one (Curran et al., 2005; Foster, 1975), is obligated to care for her parents when they are older and can no longer work. But these post-nuptial residence norms are flexible (Chamratrithirong et al., 1988).

Recent government programs provide 600 Baht per month to those aged 60-69, 700 Baht to those 70-79, 800 Baht to those aged 80-89, and 1,000 Baht for those aged 90+. While this is of help, it seems insufficient to cover the basic needs of rural elderly, unless they have other financial resources at their disposal. Practically, most elderly Thais rely on their children for economic resources. While financial assistance can be provided by children from distant locations (Knodel et al., 2010), the evidence from focus group discussion shows that closer proximity to parents makes it easier (Rittirong, 2012). Although distant migrant children may provide more financial assistance to their rural parents compared to those still living in the village (Knodel et al., 2010), elderly participants prefer to ask their children who live nearby first for urgent financial assistance and, if still needed, consider seeking help from their distant children.

The central assumption of this study is that the well-being of the elderly, who have children nearby, available and reachable, will be better than for elderly who do not have children nearby. "Well-being" here is defined as being able to maintain their instrumental daily living activities (IADL) including shopping, food preparation, housekeeping, laundry, transportation, medications, finance and other needs (Lawton & Brody, 1969). This assumption leads to an important question: Do rural Thai elderly have children residing nearby? Usually, when children are nearby they are available for regular support such as meal preparation, personal care,

and transport, should such support be needed. As such, the main emphasis in this study is on the *potential for support* based on propinquity rather than actual support which depends on the needs of the parents as well as the availability of children. We also address a related question of the spatial patterns of the residences of parents and their children who live in the parents' village. The question is: Do the children reside in the parents' household, next door, or on the other side of the village? Answer to this question involves an analysis of the proportion of elderly who have their children available in the village and the patterns of child - parent locations for those in the same village. Data for this are drawn from a case study of Nang Rong district, Buri Ram province, Northeast Thailand. We hypothesize that the gender of both parents and children would determine of the availability of children as potential care givers.

The present study extends previous work on the availability of kin to care for the elderly. Earlier studies focused on who in the households of the elderly might be available to provide support if it were needed (Knodel & Chayovan, 1997). Given the trend toward adult children remaining in the village but living in their own nuclear household (Knodel & Chayovan, 1997), it is important to look not only inside the households of rural elderly, but also those children living in nearby dwelling units within the same village. More recent work by Knodel et al. (2010) expanded to include all children of the elderly residing in the village, but for those not in the same dwelling unit, distance between dwelling units was not measured, and for many types of support the elderly might need propinquity matters. Finally, a study of social and spatial networks in Nang Rong district, using the same data set used in the present paper, examined kinship dwelling unit proximity (Verdery et al., 2012) but did not specifically examine the elderly and their adult children. To better understand the availability of potential care givers in rural Northeast Thailand, this study investigates the proximity of adult children to the elderly.

Data and Method

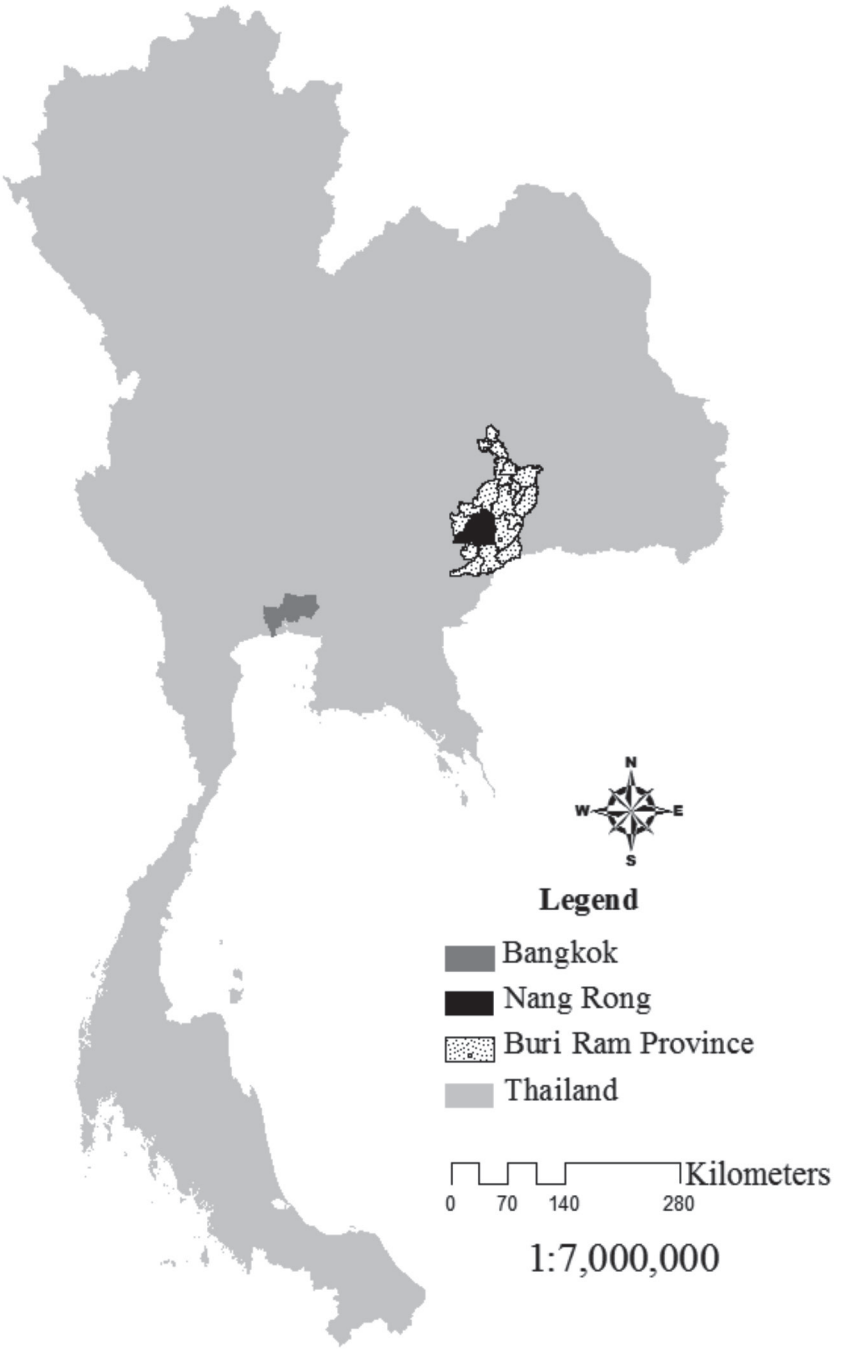
a) The Research Setting

Data for the present analysis are from surveys conducted in Nang Rong, a rural, agricultural district located in Buri Ram province, Northeast Thailand (see Figure 1). The area of Nang Rong in 1984 (when the first survey was conducted) was approximately 1,300 square kilometers. In 1990 the district had the population of 183,000 (Rindfuss et al., 2004). Subsequently, this area has been split into four administrative districts, namely Nang Rong, Non Suwan, Chamni, and Chalermprakiet. In this analysis we use the data from original 1984 area which covers all four current districts.

According to the data from the Department of Provincial Administration, Ministry of Interior, the population of Nang Rong in 2000 was 178,080; it increased to 181,748 to the 2010. The slow growth rate of population in this area is due to substantial out-migration to Bangkok and the Eastern Seaboard. Economically, most households in Nang Rong grow rice mainly jasmine and sticky rice for consumption. Although rubber trees have been adopted and grown by a large number of households in recent years, most of the land in the district is still used typically for growing paddy. Agriculture is mostly rain-fed; drought and sometimes floods have much impact on crop yields. The difficulties and uncertain aspects of rice farming, combined with the attractiveness of higher pay employment in urban areas, has led to high out-migration in this area as in most parts of the Northeast region.

Two things worth mentioning here that may provide demographic context of this analysis. First, until the late 1950s Nang Rong was a frontier region where land was relatively freely available. This led to a relatively young population with high fertility levels (VanLandingham & Hirschman, 2001). Second, the 1997 economic crisis severely affected employment in the urban areas more than the rural areas, and this resulted in some reverse migration back to the rural origins. The numbers of elderly with children in the village need to be interpreted in light of the 1997 economic crisis.

Figure 1: Location of Nang Rong



b) The Nang Rong Data

This analysis uses longitudinal data from the Nang Rong Project. (http://www.cpc.unc.edu/projects/nangrong). Surveys of this project were conducted in 1984, 1994, and 2000 covering 51 villages in the district Some of the 51 villages have since split for administrative reasons. For the purpose of the present study we use the 1984 village boundaries. The Nang Rong project is a broad study of social change and captures such key features as size of population, economy, spatial organization, and demographic change. Kinship networks of child - parent ties and spouse ties were collected for every household in each village; they are further described below. Moreover, in 2000 the information on locations of all dwelling units in each of the 51 villages were collected using the global positioning system (GPS) (Rindfuss et al., 2004).

This study focuses on people who were enumerated in the first survey in 1984 and were 60 years of age or older in 2000. The total number of 3,342 elderly are included in the analysis. Table 1 shows the number of the study population, hereafter referred to as 'focal elderly'. Very few of these elderly had never married. Almost all men were currently married whereas a substantial proportion of women were widowed reflecting both the pattern of women's marrying older men and their longer survival than men.

Table 1: Number of focal elderly by sex and marital status in 2000

Marital Status	Male	Female	Total
Single	16	87	103
Married	1,217	937	2,154
Widowed	181	860	1,041
Divorced/Separated	6	38	44
Total	1,420	1,922	3,342

Findings

Results are presented in the following three sections: the availability of children of the elderly, location of children, and determinants of availability of children in the village.

a) Availability of Children of the Elderly

To examine whether children of the focal elderly who reside in the same villages as the elderly themselves we take advantage of the complete kinship social network features of the Nang Rong data (Entwisle et al., 2007; Rindfuss et al., 2004). For every individual residing in the village in 2000, information was obtained on the identity of their mother and father, whether they were alive, lived in that person's household, in another household within the village or outside the village. Since every individual and household had a unique ID number, it was possible to link parents with their children using the matrix algebra multiplication approach common in social network analyses. It is also possible to know whether each elderly person had sons and daughters in the village, and, if yes, whether they resided within the elderly person's household. (Details of the matrix algebra procedures can be found in Rittirong (2012) and Verdery et al. (2012).)

Table 2 shows the proportions of the focal elderly who have one or more sons and one or more daughters living in the same village with them in 2000. The important message from Table 2 is that daughters are more likely than sons to live in the same village with their elderly parents. As shown in the table, 61% of male elderly have at least one son living in the same village with them compared to 79% who have at least one daughter living in the same village. Among female elderly, 59% have at least one son while 78% have at least one daughter in the same village. This finding suggests that despite high levels of out - migration and increased longevity the elderly in Nang Rong still have children living close to them in the village. The reason is that this generation of elderly had relatively large numbers of children and hence the odds of having at least one remaining in the village are high. The relatively high proportion of the elderly who have at least one child in the same village with them may be surprising, but from the perspective of the elderly this is reassuring. However, this circumstance is likely to be different among today's men and women of the younger generation who have smaller number of children.

Table 2: Percent of focal elderly living in the same village with at least one son and those with at least one daughter in 2000

Male Elderly (N = 1,420)		**Female Elderly (N = 1,910)**	
Son in same village	Daughter in same village	Son in same village	Daughter in same village
61	79	59	78

The relatively greater proportion having daughters living in the same village seems to reflect traditional preference for the matrilocal postnuptial residence widely practiced in this region. The practice is characterized by the newly married couple's residing in the wife's parental house often for a few years before moving out to set up their own household in the same compound or at nearby place in the same village. Given the gendered nature of many types of assistance to the elderly, the matrilocal norm is important.

b) Location of Children

From the perspective of rural elderly, it is important to know not only whether children live in the village, but also where in the village they located. This information is important for understanding the care elderly parents might have from their children. As described above, the 2000 Nang Rong data includes the location of every dwelling unit in each of 51 villages. For each focal elderly who had children residing in the village but not in his or her household, ArcGIS was used to compute the Euclidian distance between the focal elderly person's dwelling unit and each child's dwelling unit. The results are shown in Table 3 for the nearest son and nearest daughter. Four sets of columns are presented: average distance between focal elderly and their nearest son and daughter including co-residents, average distance between focal elderly and their nearest son and daughter excluding co-residents, the proportion of focal elderly who resided with their sons and/or daughters, and the proportion of focal elderly who resided with their married sons and/or daughters.

It can be noted from Table 3 that about one-fifth of the elderly have a son living in their household and about two-fifths have a daughter. Obviously, the difference between sons and daughters with regard to place of their residence is not unexpected given the flexible matrilocal residence norm discussed above. If we then exclude co-resident children, sons live about 270 meters from their parents and daughters about 220 meters. To put these distances in perspective for those who are professional football fans, these distances are more than twice longer than the standard football field which is 105 meters. While these distances are certainly within a walking distance, they are more than one might want to do multiple times a day. Also note that the distance to nearest daughter is considerably shorter than the distance to nearest son. The reason is that if the parcel of land on which the parents' house sits is large enough, the daughter is likely to have priority to build her house there next door to that of the parents. Among children who resided with their parent, most of them are married.

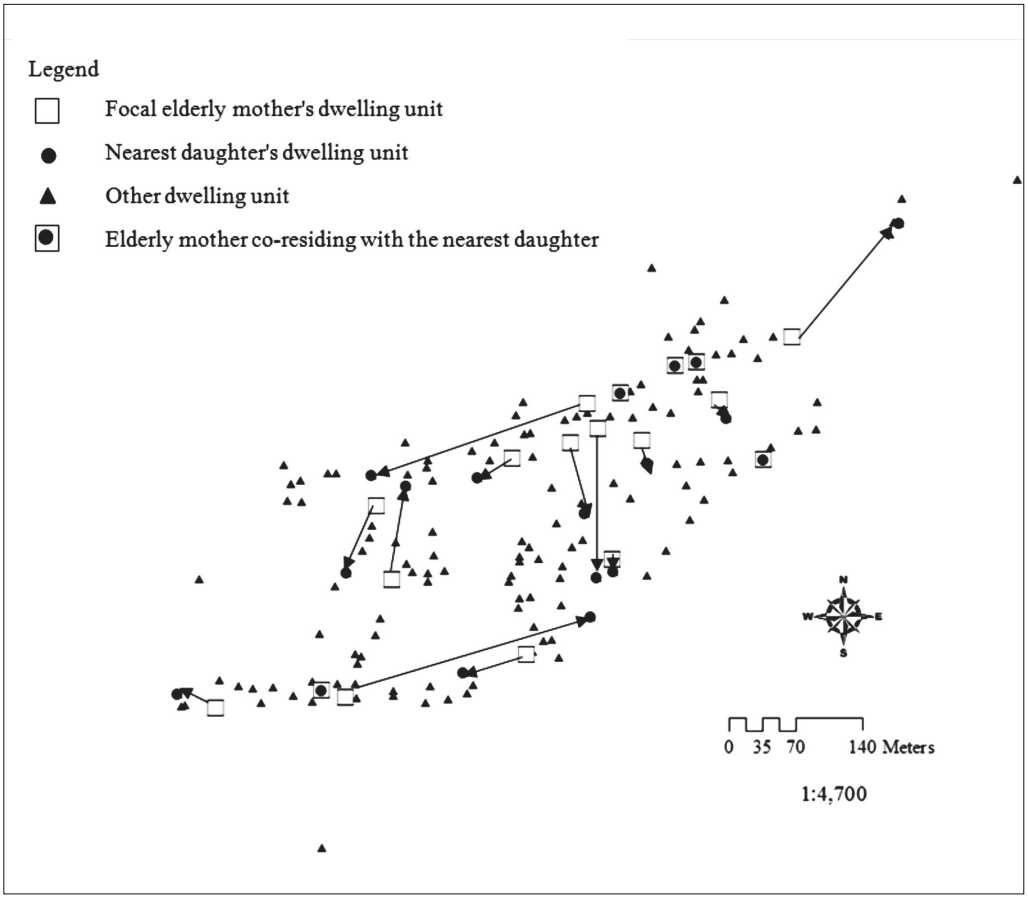
Table 3: Average distance between focal elderly to their nearest son and daughter living in the village

Average distance between focal elderly to their nearest son/daughter including co-residents (meters)				Average distance between focal elderly to their nearest son/daughter excluding co-residents (meters)			
Male		Female		Male		Female	
Son	Daughter	Son	Daughter	Son	Daughter	Son	Daughter
170.7	116.8	170.2	119.7	281.5	217.2	261.8	219.8

Percent of focal elderly residing with children in 2000 (Distance = 0 meter)				Percent of focal elderly residing with a married child in 2000			
Male		Female		Male		Female	
Son	Daughter	Son	Daughter	Son	Daughter	Son	Daughter
24	39	21	37	96	94	97	92

To provide an intuitive illustration of these various geographical arrangements between parents' and children's dwelling units, Figure 2 shows, for a selected village, the relationship between mother's and nearest daughter's dwelling units, with a square representing the mother's dwelling unit, a dot representing the daughter's dwelling unit, a dot within a square representing a co-resident pair, and a triangle representing the rest of the dwelling units within the village that do not contain an elderly mother-daughter dyad. For ease of visualization, roads, water bodies and other geographical features are not shown, but it is important to recognize that they help shape the location of dwelling units. The figure shows a mix of location arrangements. There are 5 pairs of co-resident mother-daughter, or dyads (Figure 2). There are also a few cases where dwelling units of the mother and daughter are quite close, likely both are on the land parcel belonging to the mother. For some dyads the distance between them is quite far, in many cases because of the need for the daughter to find land on the periphery of the tightly clustered village.

Figure 2: Location of dwelling units of elderly mothers and their nearest daughters who are living within the same village, 2000



In addition, ArcGIS was used to measure the extent to which villages were tightly clustered or not. The expectation is that in the tightly clustered villages neighbors are more likely to know if an elderly person needs assistance. Usually, in the tightly clustered villages neighbors could provide help to those elderly whose children are not living nearby at least temporarily till their children arrive. For each dwelling unit in the village, we measured the Euclidian distance between that dwelling unit and the next nearest, the two next nearest through the five next nearest, and then averaged across all dwelling units in the village. The results are shown in Table 4 as an average across all 51 villages.

Table 4 provides more context on the nature of Nang Rong villages: they are very clustered or nucleated, with the farm plots used distributed outside the cluster of dwelling units. (The average number of households in a village is 169.) Table 4 shows the average distance between the dwelling units of neighbors within villages. The measure with more neighbors has higher means and standard deviations, as would be expected. These five variables are highly correlated with one another. In preparation for the multivariate work in the next section, we ran five preliminary models that included one and only one of these five average distance variables. The average distance between 2 neighbors worked best and is included in the models examining the availability of children in the village as an indicator of the probability of adult children moving out of the village.

Table 4: Average distance between neighbors within villages

Number of Neighbors	Average Distance (meters)	Standard Deviation (meters)
1 Neighbor	26.92	7.69
2 Neighbors	41.56	12.79
3 Neighbors	53.30	17.21
4 Neighbors	64.22	22.11
5 Neighbors	74.10	25.85

c) Determinants of Availability of Children in the Village

We now ask what factors are associated with the elderly having a child in the village in 2000, taking advantage of the longitudinal structure of the data set and using logistic regression. We estimate a multi-level model including individual attributes of the elderly, characteristics of their households and their villages. Individual variables are demographic (sex, age, marital status, household size) and socio-economic (education, non-agricultural occupation). Household variables include assets (land, cars, and motorcycles), as well as 1984 perceptions of household needs for improving earning possibilities and the dwelling unit. Village variables include the village clustering variable discussed above (average distance between two neighbors) and whether there was bus service to and from the village in 1994. Descriptive statistics for all the variables are shown in Table 5. The dependent variable is whether a son (or a daughter or both) lives in the village with their elderly parents.

While there are a large number of processes that affect the likelihood that the elderly have one or more children within the village, most probably fall under two broad categories: a) those that affect the number of living children the elderly have had, and b) those that affect the likelihood that the elderly's children migrated out of the village. The variables included in the models (see Table 5) were chosen because they are theoretically expected to influence fertility and/or migration. Given the large number of variables, we will not go through the hypothesized effect for each of them, rather we illustrate only the effects of a few selected variable.

Age, here, is the equivalent of birth cohort, since everyone is aging at the same rate from 1984 - 2000. The earliest birth cohorts had their children during the time when Nang Rong was still a frontier and there were few non - agricultural employment opportunities in Bangkok or elsewhere (see VanLandingham & Hirschman, 2001). Hence we expect the earliest birth cohorts to be most likely to have their children in their Nang Rong village in 2000. Education level in 1984 is measured as four categorical variables: primary school (grade 1 - 3), primary school (grade 4), primary school (grade 5 and higher), and no education which is the reference category. We expect those with the highest education levels to be in a position to provide opportunities for their children that would result in out - migration.

A direct measure of fertility, specifically number of living children, is not available for the year 2000. Instead we use household size in 1984 as a proxy. While the correlation would be less than perfect, we expect that the more children a focal elderly had the greater the household size was in 1984.

At the household level, household wealth includes measures of land, as well as whether a car(s) and/or motorcycle(s) are owned to indicate resources for their children. For example, children who have access to enough land for building a house as well as for farming would be less likely to move out of the village, other things being equal. Adult children whose elderly parents had a non - agricultural occupation in 1984 have more flexibility to move because their parents were not necessarily tied to the land. In addition, living conditions, measured by the perception of household needs in 1984 including earning and improving their house, could be a factor pushing children to find employment opportunities elsewhere.

Table 5: Descriptive statistics

Variables	Male	Female
Married 1994	88.3	59.7
Age in 1984		
44 - 49	41.4	37.4
50 - 59	43.0	41.6
60 - 69	13.8	16.1
70 - 79	1.6	4.3
80+	0.2	0.6
Education in 1984		
None	10.1	24.0
Primary school 1 - 3	5.9	8.8
Primary school 4	78.0	66.3
Higher	5.9	1.0
Non - agricultural occupation in 1984	4.8	2.7
Household size 1984 (range 1 - 18)		
0 - 4	13.4	20.5
5 - 9	72.3	67.9
10+	14.4	11.7
Whether and how much household size increased between 1984 and 1994		
0 (no increase)	13.2	12.1
1 - 4	59.7	60.3
5 - 9	26.3	26.7
10+	0.8	0.9
Land ownership (rai) in 1984		
0	2.0	2.3
1 - 19	48.9	48.1
20 - 39	28.5	29.2
40 - 59	9.7	9.0
60 - 79	5.0	4.5
80 - 99	3.3	4.3
100+	2.5	2.8
Car owned in 1994	7.1	5.3
Motorcycle owned in 1984	8.8	8.6
Motorcycle owned in 1994	34.6	28.3
Whether a household needs to improve earning in 1984	27.6	81.6
Whether a household needs to improve their house in 1984	17.7	18.5
Bus system in village in 1994	90.8	91.6
Average distance between 2 neighbors (in meters) in 2000	41.6	41.6

At the village level, the elderly in rural areas can expect to receive help from their neighbors living nearby or their neighbors should be aware when they need emergent help. Thus the elderly who live in tightly clustered villages should be more secure than the elderly who live in more diffuse villages. Average distance between two neighbors is used to indicate how close neighbors live within the village. Availability of the bus system may either help people commute to work in the district town or enhance people moving out of the village. Hence, we have no expectation for the direction of effect from this variable.

Table 6 shows logistic regression results for male elderly and Table 7 shows results for female elderly. First, looking at the broad patterns, the variables thought to have important effects do not show any, particularly those associated with socio-economic status, such as education, agricultural versus non-agricultural occupation, and various household wealth indicators. This non-significant finding is important in that it indicates that, for this generation of elderly, their individual and household attributes do not have any effect whether they have their children living in the village. This means that for both men and women, age and the 1984 household size measures do affect the likelihood of having children in the village. These measures likely reflect earlier life course decisions regarding childbearing.

Turning now to different patterns for men and women, for men we find that if their household size became larger between in 1984 and 1994, they are more likely to have their children living in the village. Contrary to our expectation, the 1984 perception that the household needed to improve the dwelling unit has a positive effect on having children in the village. This seems to suggest that children tend to stay in the village to help the elderly who in 1984 lived in a house needing improvements. It is possible that the perception of need to improve house is related to the number of children the elderly had. Generally, those who have more children are likely to need a bigger house to accommodate them and this may result in at least one or two of them remaining in the village.

For elderly females, the most consistent effect is that if they were currently married in 1994 they are more likely to have a son and/or daughter living in the village in 2000. This is the opposite of what we had expected, namely that children of widows would remain in or return to the village to assist their widowed mother. We are not sure why the children of currently married women are more likely to be in the village, but it is possible that children of widows are in Bangkok or other industrial areas earning money to support their widowed mother. Like in the case of elderly men,

older elderly women are more likely to have children in the village, probably reflecting their higher fertility. All the other significant coefficients are only significant in one of the three equations, and hence they may need further study for explanation.

Summary and Discussion

Children play an important role in the care of their elderly parents, especially in rural areas of developing countries where other types of support systems for the elderly tend to be lacking. Further, due to traditional gender-specific role expectations, sons and daughters tend to provide different types of support to their parents (Campbell & Martin-Matthews, 2003). Traditional norms in the Northeast hold that at least one of the daughters should reside with their elderly parents or live nearby so that they can provide them assistance and support (Podhisita, 1984; Potter, 1979; Yoddumnern-Attig et al., 1992). Consistent with these norms, we find that percentage of the elderly in Nang Rong who have daughters living with them is higher than those who have a son co-residing with them. Among those who do not have a child living in the same household, there are some, often daughters, who live in a short distance away from them and thus can provide assistance when needed, again reflecting matrilocal residence. It appears that despite high rural-urban migration rates, the tradition of post-nuptial matrilocality remains. This confirms the finding from a previous study by Limanonda's (1979). It is also important to note that despite the prevailing high rates of out-migration from Nang Rong, most Nang Rong elderly have at least one son and/or daughter living in their village. These children are potentially available to provide care should the elderly parents need it.

Our examination of factors related to having children in the village shows that demographic factors, such as age and family size, have more consistent impacts than socio-economic factors, such as education, occupation or various wealth indicators. The older among the elderly and those with larger family sizes are more likely to have a son and/or daughter reside in their village. An implication of this finding is that since the younger generation of Nang Rong couples have considerably fewer children, They are less likely to have children living in the village especially if large-scale out-migration of young adults continues.

Table 6: Logistic regression results for factors affecting the availability of children in the village among male elderly

Independent Variables	Male Elderly (N = 1,270)								
	Son			Daughter			Son and/or Daughter		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Married 1994	-0.17	0.20	0.41	0.04	0.25	0.87	0.57	0.31	0.07
Age in 1984	0.03***	0.01	0.00	0.05***	0.01	0.00	0.09***	0.02	0.00
Primary school 1-3 vs No Education	-0.32	0.31	0.31	0.61	0.43	0.16	0.58	0.57	0.31
Primary school 4 vs No Education	-0.13	0.22	0.55	0.03	0.27	0.90	0.44	0.36	0.22
Primary school 5 and higher vs No Education	-0.52	0.33	0.12	-0.47	0.39	0.23	-0.26	0.51	0.61
Agricultural occupation in 1984	-0.25	0.31	0.42	-0.38	0.35	0.27	-0.66	0.44	0.14
Household size 1984	0.17***	0.04	0.00	0.22***	0.06	0.00	0.15*	0.07	0.03
Whether and how much household size increased between 1984 and 1994	-0.08	0.05	0.10	-0.05	0.06	0.43	0.09	0.08	0.23
Land ownership (rai) in 1984	0.00	0.00	0.42	0.00	0.00	0.64	0.00	0.00	0.54
Car owned in 1994	0.20	0.26	0.44	0.31	0.33	0.35	0.04	0.43	0.92
Motorcycle owned in 1984	-0.21	0.25	0.41	0.25	0.33	0.46	-0.26	0.41	0.52
Motorcycle owned in 1994	-0.08	0.13	0.56	0.21	0.17	0.20	0.43	0.24	0.07
Whether a household needs to improve earning in 1984	-0.07	0.14	0.62	0.07	0.18	0.70	0.04	0.23	0.86
Whether a household needs to improve their house in 1984	0.35	0.21	0.09	0.07	0.25	0.76	1.05*	0.48	0.03
Bus system in village in 1994	-0.15	0.19	0.43	-0.16	0.24	0.51	-0.12	0.32	0.71
Average distance between 2 neighbors (in meters) in 2000	0.01	0.01	0.06	0.00	0.01	0.90	-0.01	0.01	0.13
Constant	-2.03	0.74	0.01	-2.32	0.91	0.01	-4.09	1.27	0.00

Significance level: * p-value < .05, ** p-value < .01, *** p-value < .001

Table 7: Logistic regression results for factors affecting the availability of children in the village among female elderly

Independent Variables	Female Elderly (N = 1,684)								
	Son			Daughter			Son and/or Daughter		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Married 1994	0.38***	0.11	0.00	0.52***	0.13	0.00	0.85***	0.17	0.00
Age in 1984	0.03	0.01	0.00	0.05***	0.01	0.00	0.07***	0.01	0.00
Primary school 1-3 vs No Education	0.13	0.21	0.51	-0.39	0.23	0.09	-0.20	0.30	0.50
Primary school 4 vs No Education	0.05	0.15	0.72	0.06	0.17	0.73	0.22	0.23	0.34
Primary school 5 and higher vs No Education	0.12	0.56	0.84	-0.67	0.58	0.25	-0.66	0.65	0.31
Agricultural occupation in 1984	-0.79*	0.31	0.01	-0.28	0.35	0.42	-0.30	0.43	0.48
Household size 1984	0.05	0.04	0.20	0.13***	0.05	0.00	0.05	0.06	0.37
Whether and how much household size increased between 1984 and 1994	0.09*	0.04	0.03	0.03	0.05	0.57	0.17*	0.06	0.01
Land ownership (rai) in 1984	0.00	0.00	0.71	0.00	0.00	0.39	0.00	0.00	0.44
Car owned in 1994	0.30	0.24	0.22	0.13	0.29	0.66	0.07	0.37	0.85
Motorcycle owned in 1984	0.00	0.22	0.98	0.15	0.27	0.58	-0.12	0.33	0.72
Motorcycle owned in 1994	-0.06	0.12	0.64	0.02	0.15	0.91	-0.04	0.19	0.82
Whether a household needs to improve earning in 1984	-0.07	0.13	0.56	0.04	0.15	0.80	0.13	0.20	0.53
Whether a household needs to improve their house in 1984	-0.03	0.17	0.89	-0.14	0.20	0.48	0.26	0.28	0.35
Bus system in village in 1994	0.00	0.16	0.98	-0.31	0.21	0.14	-0.27	0.28	0.34
Average distance between 2 neighbors (in meters) in 2000	0.02***	0.00	0.00	0.00	0.01	0.49	0.00	0.01	0.97
Constant	-2.60	0.61	0.00	-2.61	0.74	0.00	-3.06	0.97	0.00

Significance level: * p-value < .05, ** p-value < .01, *** p-value < .001

Among the female elderly, those who were currently married in 1994 were more likely to have sons and/or daughters in the village. This finding is found in all three analytical models and is opposite to what we had expected. On the other hand, our analysis does not reveal a consistent significant coefficients of the socio-economic factors, implying that the effect of this set of factors is perhaps unpredictable.

To what extent can the results from this analysis be generalized to other settings? We believe that, at least to a certain extent, our results can be used to understand availability of children to provide care to elderly parents in most rural setting of Thailand where similar practice of matrilocal residence is still the norm. Beyond these setting, generalization of these results should be done with caution.

Nevertheless, caution should be taken in interpretation of the results from this analysis. Despite our careful treatment of the data, some of them were not originally designed particularly for the purpose of this analysis. For example, we used household size in 1984 as a proxy of actual number of children of the focal elderly in that year. Another limitation is that we can directly measure the number of living children of the focal elderly only in 1994 (5.6 children per a woman) but not in 2000. We made an assumption that number of living children of the focal elderly in 2000 did not change substantively and that whatever the change occurred it did not significantly affect the availability of children of the elderly in the village. These data limitations certainly call for careful research design to collect relevant data for the future studies on this subject.

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