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Research Report

Comparative Study of Elderly in Asia

Albert I. Hermalin, Mary Beth Ofstedal,
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Moving from Household Structure to Living Arrangement Transitions: What Do We Learn?

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Albert I. Hermalin, Mary Beth Ofstedal, Kristine R. Baker
Population Studies Center
University of Michigan

and

Yi-Li Chuang
Bureau of Health Promotion
Department of Health, Taiwan

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Abstract:

Household structure, and particularly coresidence with children, is one of the most widely used indicators of elderly well-being. Most studies have focused on household structure at a given point in time or on aggregate trends over time. The prevalence measures typically used may be misleading as to the underlying transitions into and out of coresidence. The primary objectives of this paper are to evaluate these inherent ambiguities in the relationship between coresidence prevalence measures and the transition levels, and to investigate transitions in coresidence with married children among elderly in Taiwan. The paper uses data from five waves of the *Survey of Health and Living Status of the Elderly in Taiwan* (1989-2003), a nationally representative panel survey, employing both multivariate regression and multistate life table methods to examine transitions in coresidence with regard to their underlying rates, implications for 'coresidence life expectancy,' and the factors that predict transitions in and out of coresidence.

Dataset used:

Survey of Health and Living Status of the Elderly in Taiwan, 1989-2003

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Introduction

As concern about population aging and the well-being of the elderly has grown, so too has research focusing on the living arrangements of the elderly. Indeed, living arrangements or household structure has been one of the most widely used indicators of elderly well-being. There is good reason for this given that appropriate measures are often available from censuses and large-scale surveys, and in traditional societies there is a presumption that the elderly will be cared for by children and other kin. The relatively wide availability of household structure measures, such as the proportion living with children or with married children, permit comparison across countries, groups within countries, and the study of trends (e.g., see Kinsella, 1990; Martin and Kinsella, 1994; United Nations, 2001).

There are, however, sociological and formal reasons why such measures should be used with caution. From a sociological perspective, focusing solely on structure confuses "form" with "function." That is, knowing who lives with whom does not inform as to the content of household activities and intra-household resource allocation. The assumption, at least in developing country research, is typically that coresidence benefits older family members and that support flows from younger to older generations. However, with changing socioeconomic conditions there is evidence that older people increasingly are a source of support for their children through meal preparation, grandchild care, and the like (Hermalin, Roan and Perez, 1998; Biddlecom, Chayovan and Ofstedal, 2002). When measures of coresidence with children include married and unmarried children, there is even more ambiguity as to the direction of support. In addition, studies of the characteristics of those coresiding show strong selection for adverse factors like widowhood or low education, as shown below.

From the formal measurement aspect, prevalence measures of the sort utilized (e.g., percent living alone, with spouse, with children, etc.) reveal nothing about the transitions that give rise to prevalence levels. Indeed, studying trends in prevalence may provide misleading inferences about the underlying transitions and this issue serves as the focus for the first part of the paper. Data from Taiwan between 1996 and 1999, for example, reveal that for women aged 77 to 81 years, the proportion coresiding with a married son declined over the period, although the proportion transitioning into coresidence during the period was almost twice the proportion transitioning out of coresidence. With greater utilization of longitudinal panel studies it is possible to measure the level of transitions into and out of coresidence and to examine the factors associated with prevalence vs. those associated with transitions. As shown in Frankenberg et al. (2002), these factors are not necessarily one and the same.

The complexity of the transition rates in a country like Taiwan suggests that with changing cultural and socioeconomic developments, older people may experience periods of both coresidence with children and absence of children several times over their enhanced older life spans, due to both their life cycle needs and those of their children. Accordingly, we need to shift our focus to the entries and exits and the length of coresidence, rather than older individuals' living arrangements at any given time.

The objectives of this paper are two-fold. The first objective is to explicate the formal relationships between coresidence prevalence measures and transition levels to demonstrate the inherent ambiguity between them. The second objective is to examine transitions in coresidence with married children, with regard to their underlying rates, their implications for 'coresidence life expectancy' (i.e., the number of years older adults will spend coresident versus non-coresident during their later years), and the factors that predict transitions in coresidence. To carry out these objectives, we utilize data from a panel survey of older adults in Taiwan.

Prevalence Rates versus Transition Rates

In this section of the paper, we explicate some basic relationships between the rates of change in household arrangements and the observed proportions in a given arrangement at each observation point. Awareness of these interrelationships can help avoid misinterpretations of observed trends in living arrangements.

Assumptions

In the example which follows we assume we have individual-level data on living arrangements for a cohort of elderly at two points in time, obtained through successive surveys or other valid means. As a result, for each individual their residence status is known at each point, as well as whether there was a net move in the interim and the direction of that move. Given this information, the following relationships can be established for those who survive between the two time points.[1]

Notation and Equations

The relationships between transition rates and the observed changes in the overall proportions coresiding can be developed through the following notation and equations:

Let

C_i = number of elderly coresiding with children at time i (i = 1, 2)

A_i = number of elderly not coresiding with children at time i (i = 1, 2) (Includes living alone, with spouse only, with others excluding children.)

$r_{C\to C}$ = Proportion of C_1 who continue to coreside with children at time 2

$r_{C\to A}$ = Proportion of C_1 who are not coresiding with children at time 2 ($r_{C\to A} = 1 - r_{C\to C}$)

$r_{A\to C}$ = Proportion of A_1 who change from not living with children at time 1 to living with children at time 2

$r_{A\to A}$ = Proportion of A_1 who continue not to coreside at time 2 ($r_{A\to A} = 1 - r_{A\to C}$)

T = Size of total cohort under observation; $T = C_1 + A_1$ and $T = C_2 + A_2$

${}_CP_i$ = $C_i/(C_i + A_i) = C_i/T$ = Proportion coresiding at time i (i = 1, 2)

${}_AP_i$ = $A_i/(A_i + C_i) = A_i/T$ = Proportion not coresiding at time i (i = 1,2)

Then

(1) $C_2 = C_1\, r_{C\to C} + A_1\, r_{A\to C}$, and dividing by T

(2) ${}_CP_2 = {}_CP_1\, r_{C\to C} + {}_AP_1\, r_{A\to C}$

That is, the proportion coresiding at time 2 is a weighted average of the transition rates, with the weights equal to the proportions coresiding and not coresiding at time 1.

Equation (2) can also be written as

(2a) ${}_CP_2 = {}_CP_1 r_{C\to C} + (1 - {}_CP_1)\, r_{A\to C}$ since

$${}_AP_1 = 1 - {}_CP_1$$

(3) to ask under what conditions ${}_CP_2$ will exceed ${}_CP_1$, write

$${}_CP_1 r_{C\to C} + {}_AP_1 r_{A\to C} > {}_CP_1$$

$$r_{C\to C} + ({}_AP_1 / {}_CP_1)\, (r_{A\to C}) > 1$$

$$({}_AP_1 / {}_CP_1)\, (r_{A\to C}) > 1 - r_{C\to C}$$

$${}_AP_1 / {}_CP_1 > (1 - r_{C\to C}) / r_{A\to C} = r_{C\to A} / r_{A\to C}$$

that is, given transition rates $r_{C\to A}$ and $r_{A\to C}$, the operation of these rates will lead to an increase in the proportion coresiding from time 1 to time 2 (i.e., ${}_CP_i$ will increase) whenever the ratio ${}_AP_1$ to ${}_CP_1$ exceeds $r_{C\to A} / r_{A\to C}$

Conversely, the operation of the transition rates $r_{C\to A}$ and $r_{A\to C}$ will produce a decrease in the observed proportion coresiding whenever

$${}_AP_1 / {}_CP_1 < r_{C\to A} / r_{A\to C}$$

The ratio of the two transition rates $r_{C\to A}$ and $r_{A\to C}$ provide the tipping point for the ratio of ${}_AP_1 / {}_CP_1$ which will determine whether the operation of the given transition rates will produce an increase or decrease in the observed proportion coresiding.

Numerical Illustration

Time 1	Transition Rates
${}_CP_1 = .75$	$r_{C\to C} = .90;\ r_{C\to A} = .10$
${}_AP_1 = .25$	$r_{A\to C} = .20;\ r_{A\to A} = .80$

In this situation, three quarters of the elderly respondents live with children at time 1. Over the observation period, 10 percent of those coresiding with children cease to live with children, and 20 percent of those not living with children, start to coreside. (These illustrative data are close to those observed empirically by Frankenberg et al. (2002) for Indonesia between 1993 and 1997 and for Taiwan between 1996 and 1999.)

As a result of these transition rates, the proportion coresiding at time 2 will be:

$${}_CP_2 = {}_CP_1\, r_{C\to C} + {}_AP_1 r_{A\to C}$$

$${}_CP_2 = .75\ (.90) + .25\ (.20) = .675 + .05$$

$${}_CP_2 = .725$$

Despite the fact that $r_{A\to C}$ (.20) is twice as high as $r_{C\to A}$ (.10), the overall proportion coresiding decreases over the period.

This comes about because

$${}_AP_1 / {}_CP_1 = .25/.75 = .333 \text{ is less than } r_{C\to A} / r_{A\to C} = .10/.20 = .5$$

At such point that ${}_AP_1 / {}_CP_1$ exceeds .5, the operation of the same transition rates would produce an observed increase in the proportion coresiding.

For example, if ${}_CP_1 = .60$ and ${}_AP_1 = .40$ so that ${}_AP_1 / {}_CP_1 = .667$, then

${}_CP_2 = {}_CP_1 r_{C\to C} + {}_AP_1 r_{A\to C}$ would be

$${}_CP_2 = .60\ (.90) + .40\ (.20) = .54 + .08 = .62$$

So that P_i increases under the operation of the same transition rates.

Implications

One implication of the foregoing analysis is that in focusing on the proportion of elderly coresiding at different time points we are in effect looking at "crude rates" that do not take into account important compositional elements. In demography, standardization and decomposition are key tools for understanding the interrelationship between weights and rates and how they combine to produce a crude rate. More specifically we can decompose many crude rates of interest as a sum of products of weights

and rates in order to understand the effect of each component. (And the life table is in effect a technique to work only with rates in order to avoid the effect of composition.)

On topics like crude birth rates and death rates, we decompose the rate in question into a series of age-compositional weights and age-specific rates, defined as the frequency of the event (having a birth or dying) divided by the population at risk. But the age-specific rates are also transition rates—the proportion moving from one state to another (from not giving to birth to giving birth, or from living to dying), so that the meaning and structure of the decomposition is identical to that set forth in equation (2).

When interest centers on certain prevalence measures—like the proportion of women using contraception or the proportion of older people coresiding as in the example presented above, there is a tendency to overlook the operation of the underlying transition rates and the effect they may have on observed trends. With regard to living arrangements, it is important to keep the relationship explicated in equations (2) and (3) in mind when tracing changes in the proportions coresiding, since the key weights in question (the proportions residing and not coresiding) vary considerably over time and between countries, and it is important not to confuse the observed changes in proportions with what is happening in terms of transition rates.

Transitions in Coresidence with Married Children

As noted in the above discussion, focusing on prevalence of coresidence and changes in prevalence over time does not reveal anything about the underlying transitions. The second objective of this paper is to conduct a detailed examination of transitions in coresidence with married children using data spanning a 14-year period in Taiwan (1989-2003). We focus on the underlying transition rates, their implications for 'coresidence life expectancy' (i.e., the number of years older adults will spend coresident versus non-coresident during their later years), and the factors that predict coresidence transitions. We choose married children rather than all children, as this is the traditional arrangement for the support of the elderly in Taiwan and many developing countries, and as noted previously the direction of support is much more ambiguous between parents and unmarried children. In addition, with changing ages of marriage, trends in coresidence with any child may be greatly influenced from this source alone.

Data and Methods

The data used in the analyses that follow are from the Study of Health and Living Status of the Middle-Aged and Elderly in Taiwan (Hermalin, Liang and Chang, 1989), a nationally representative panel survey of older adults in Taiwan. The original sample was comprised of 4,049 persons age 60 years or over at the start of the survey in 1989. To date, seven waves of interviews have been conducted, including in-person interviews in 1989, 1993, 1996, 1999, and 2003 and abbreviated telephone interviews in 1991 and 1995. In 1996, the sample was refreshed and expanded to include a new cohort of 2,130 individuals between the ages of 50 and 66.

The analyses performed in this paper are based on data from all five in-person interview waves between 1989 and 2003. We use a combination of descriptive, logistic regression and multistate life table methods to summarize the observed transitions in coresidence and their determinants. In the first part of the analysis we present a series of transition tables to examine the extent to which coresidence with a married child is a stable versus transitional arrangement for older adults in Taiwan, and provide several summary measures of the respondents' coresidence history.

In the second part of the analysis we utilize multistate life table (MSLT) analysis to estimate the length of time that older adults will spend in and out of coresidence during the remainder of their lives. The specific program we use is 'Maximum Likelihood Computer Program using Interpolation of Markov Chains' (IMaCH), which was developed by Nicholas Brouard and colleagues (Brouard and Lièvre, 2002) using methodologies pioneered by Laditka and Wolf (1998). The first stage in the MSLT analysis involves estimates of transition probabilities between each of the survey waves using maximum likelihood estimation procedures. The transition model includes one absorbing state (death) and two non-absorbing states (non-coresidence and coresidence). Within each survey interval, there are three possible transitions from each non-absorbing state for a total of six transitions: non-coresidence to non-coresidence, coresidence, and death; coresidence to non-coresidence, coresidence, and death. We estimate transition probabilities for the total population age 60 or over, as well as for subgroups defined by sex and marital status. The second stage involves calculation of the multistate life tables for each subgroup, from which we obtain estimates of total life expectancy, non-coresident life expectancy, and coresident life expectancy.

In the third and final part of the analysis we focus on the predictors of coresidence and transitions therein and use a set of logistic regression models to estimate the effect of demographic, socioeconomic and family factors on the log-odds of ever-coresiding with a married child (versus being non-coresident in all waves), transitioning out of coresidence (for those who were coresiding at the start) and transitioning into coresidence (for those not coresiding at the start).

The sample is restricted to respondents who were interviewed in all five waves, were age 60 years or over at baseline, and had one or more living child in 1989. The only exception is the multistate life table analyses, which utilize the full baseline sample and incorporate mortality and wave non-response into the life expectancy estimations.

Transition Rates

Table 1 presents a cross-tabulation of household structure at the beginning and end of the survey period, i.e., in 1989 and 2003. As indicated in the marginal distributions in the far right column (for 1989) and bottom row (for 2003), the proportion coresiding with a married child stays fairly stable over the 14 year period, at close to 50 percent. The proportion of respondents living alone or with a spouse only increases during the survey period, from 19 percent in 1989 to 31 percent in 2003, and the prevalence of coresidence with unmarried children declines significantly. It appears that these two shifts compliment one another, and indeed many older adults who were living with unmarried children in 1989 become "empty nesters" by the time of the later wave, as children move away for work, education, or marriage. "Empty nests" also occur with some frequency as married children who are coresiding for short periods after marriage move away to new jobs and/or homes.

Although there is a high degree of stability in the marginal distributions of household structure at the two time points, particularly for the percent coresiding with a married child and percent in the 'other' category, there is also a substantial amount of transition that occurred at the individual or household level during the period. This is shown in the interior of Table 1. Only one-half of those living alone or with a spouse only were in the same household structure 14 years later; the remaining one-half were either coresiding with a married child (32 percent), coresiding with an unmarried child (10 percent) or in some 'other' household arrangement (7 percent). Likewise, about three-fifths of persons who were coresiding with a married child in 1989 were still coresiding in 2003, with the remaining two-fifths living alone or

with a spouse only (22 percent), coresiding with an unmarried child (10 percent) or in some other arrangement (8 percent). Respondents starting in each of the other household structures also experienced a great deal of transition, particularly those who were coresiding with an unmarried child in 1989, for whom only one-quarter were still in that arrangement in 2003. Although the percent in "other" arrangements is fairly similar in 1989 and 2003, the detailed matrix shows that this is a rather unstable category, with considerable movement into other arrangements, as well as new entrants. Furthermore, the figures presented in this table mask additional change that may have occurred during the survey period, since an older person who was coresiding with a married child in 1989 and 2003 may have experienced a different household structure at some point in between. Subsequent analyses will reveal transition patterns across all of the survey intervals.

Table 2 breaks out each of the survey intervals (1989-1993, 1993-1996 and so on) and presents transition rates in coresidence with married children between the beginning and end of each interval. Column 1 displays the prevalence of coresidence with a married child at the start of the interval. Columns 2 and 3 display the distribution of respondents at Wave 2, according to whether or not they were coresiding with a married child in Wave 1, making clear the transitions for each group, and Column 4 shows the overall rate of transition. Several important patterns are embedded in this table. For each 3-4 year interval there is substantial overall transition, ranging from 16 percent in the 1996-1999 period to 27 percent in the 1993-1996 period. Despite this persistent degree of shifting, the proportion coresiding does not change much over the 14 years, fluctuating between a high of 53 percent in 1993 to a low of 48 percent in 1999 and 2003. Within each period, the proportion of coresidents who shifted to non-coresidence was not very different from the proportion of non-coresidents who shifted to coresidence; the largest difference is 4.5 percent in the 1989-1993 period.[2] The reasons for the much larger transition rate between 1993 and 1996 are not entirely clear. It may partially reflect the institution of the Farmer's Retirement Pension during that time period. The pension provided income to many older adults, perhaps reducing the pressure for coresidence with a married child. It is important to note that over a third of the original sample as of 1989 is between the ages of 60 and 64, and many of them will have children who are marrying in the 1993 to 1996 period, as well as children who have recently married. These changes on the part of the children can give rise to changes in living arrangements at least in the short-term.

Table 3 summarizes the transitions in coresidence with a married child between 1989 and 2003, according to their direction and number (single versus multiple). The symmetry just noted is quite striking in the distribution of the various transitions. Approximately 23 percent of the respondents were coresident with a married child in all waves of the survey and 22 percent were non-coresident all waves. Of the respondents coresident in 1989, 28 percent transition out of coresidence at some point during the 14 year span; 18 percent of whom remain non-coresident and 10 percent of whom experience multiple transitions in and out of coresidence. Similarly, of the respondents who were non-coresident in 1989, 26 percent transition into coresidence, over half of whom remain coresident after the transition. The percentages ever coresident and ever non-coresident are also very similar. About 78 percent of the respondents are coresident at some point during the time period covered by the five surveys, and 77 percent are non-coresident at some point during the period.

Multistate Life Table Analysis of Coresidence Transitions

The finding that over one-half of Taiwanese elderly experience a transition in coresidence during their later lives underscores the importance of considering coresidence as a fluid, rather than stable arrangement. Indeed, older people may experience multiple periods of both coresidence and non-coresidence during their later lives. This calls for a shift in focus from coresidence at a single point in time to the entries and exits and length of coresidence. Multistate life table techniques can be used to capture these movements.

Figures 1-4 present results of analyses that use a multistate life table approach to partition overall life expectancy (at ages 60 and above) into the number of expected years that will be spent in versus out of coresidence with a married child (which we refer to as coresident and non-coresident life expectancy, respectively). Figure 1 plots total life expectancy (darkest line), non-coresident life expectancy (medium line), and coresident life expectancy (lightest line) by age. Non-coresident life expectancy slightly outweighs coresident life expectancy up to about age 77, after which the two lines converge. Thus, up to age 77, older Taiwanese can expect to spend a slightly larger proportion of their remaining years non-coresident, but from age 77 on, they can expect to spend roughly equal numbers of years coresident and non-coresident. This is further illustrated in Figure 2, which presents the percent of remaining life spent coresiding with a married child for all respondents, and separately for respondents who were married and unmarried in 1989. Focusing on the total sample, the percent of remaining life spent in coresidence is about 47 at age 60 and this increases slowly to 50 percent around age 77 and to 53 percent at age 100. Married respondents exhibit a more marked increase in the percent of remaining life spent coresident with age, whereas the pattern for unmarried respondents is much flatter, remaining slightly above 50 percent at all ages. Figure 3 further breaks out these patterns by the respondents' marital status and sex and reveals that the pattern for married individuals shown in Figure 2 is primarily driven by married men. Indeed, there is little variation by marital status for women (the two lines are very close to one another across the age range), however there is a substantial divergence in patterns for married and unmarried men. The percent of remaining life that unmarried men can expect to spend coresiding with a married child is under 50 percent at all ages and shows a very slight decline with age. In contrast, this percentage increases across the age range for married men, from 46 percent at age 60 to 57 percent at age 100.

Figures 4 and 5 present status-based estimates of coresident and non-coresident life expectancy. Figure 4 presents life expectancies for respondents who were not coresiding in 1989 and Figure 5 presents the same estimates for respondents who were coresiding in 1989. The most striking finding is the consistency in patterns in the two figures. First, the total life expectancy curves are very similar for those who were and were not coresiding with a married child at baseline. Second, the coresidence and non-coresidence curves are nearly overlapping in both figures. This implies that, regardless of the starting state, older Taiwanese parents can expect to spend roughly equal amounts of time coresiding and not coresiding with a married child during the remainder of their lives. The only minor difference between the two groups is that the non-coresidence curve remains slightly above or equal to the coresidence curve for those who started in the non-coresident state (Figure 4), whereas there is a crossover in the two curves for those who started in the coresident state, such that from ages 60 through 75 individuals spend more of their remaining years non-coresident as opposed to coresident, whereas the reverse is true at ages 75 and beyond. But overall, the results are remarkably consistent, echoing the symmetry that we observed in earlier tables.

Predictors of Coresidence Transitions

The recognition of living arrangements as a dynamic process leads us to question the motivations that give rise to transitions in living arrangements. What factors predict transitions into and out of coresidence? This is the focus of the final part of the analysis.

Table 4 presents results from a series of logistic regression models predicting stability versus transition in coresidence. The results are presented in the form of odds-ratios for three separate models: the first predicts coresidence with a married child at one or more waves during the 5 surveys versus non-coresidence in all surveys; the second predicts a transition out of coresidence between 1989 and 2003, among those who were coresident in 1989; and the third predicts a transition into coresidence between 1989 and 2003, among those who were non-coresident in 1989. As with the analyses presented in Tables 1-3, these regressions are restricted to respondents who participated in all 5 survey waves. The predictors used in the model are baseline measures.

Findings pertaining to the first model predicting any coresidence during the survey period are largely consistent with those shown in cross-sectional analyses for Taiwan and other Asian countries (Knodel and Ofstedal, 2002). Respondents with low levels of education are more likely than their respective counterparts to ever coreside with a married child, whereas Mainlander respondents, those who are divorced, separated or never married, those who are working, those who report fair or poor health (versus good to excellent), and those with a moderate (versus high) level of income are less likely to ever coreside with a married child. (Note that the result pertaining to marital status should be interpreted with caution due to the small size of the divorced/separated/never married group.) In addition, availability of married children also exhibits strong effects in the expected direction. Those with larger numbers of married sons and daughters are more likely to ever coreside with a married child.

Of central interest for this paper, however, are the factors that predict transitions in coresidence (models 2 and 3). Here we see few significant effects among the factors examined. Widowed individuals are less likely to transition out of coresidence between 1989 and 2003 than are married respondents, as are those with incomes in the second quartile. In addition, older Taiwanese with lower levels of education are more likely to experience transitions in either direction than are those with secondary or higher education. Lastly, among those who started out non-coresident, respondents with larger numbers of married sons and daughters and those who were coresiding with an unmarried child at baseline are all more likely to become coresident during the follow-up period. At the same time, there is no significant effect of availability of children on transitioning out of coresidence. These findings suggest that the motivations for coresidence transitions are more complex, e.g., they may be a response to changing circumstances or events, and this requires us to look beyond the standard sociodemographic predictors that are used to understand living arrangements at a given point in time.

Discussion

Our primary goal in this paper is to present the case for the importance of moving beyond point-in-time estimates of living arrangements to investigate the underlying transitions that give rise to those estimates. We attempt to achieve this in two ways: 1) by demonstrating the inherent ambiguity between coresidence prevalence levels and transition rates, and 2) by providing empirical results that reveal a substantial amount of transition in coresidence in the later years of life for Taiwanese parents. With regard to the first objective, we explicated the formal relationship between prevalence and transition levels and illustrated how, given the same underlying transition rates, the prevalence of coresidence can

increase or decrease over time depending on the starting level. We addressed the second objective by using various analytic techniques to summarize the coresidence history of Taiwanese elders during a 14-year period, from 1989-2003.

There are several key findings from our analysis that are worth highlighting. First, despite what appear to be very modest changes in the level of coresidence with married children over time for this cohort (fluctuating between 52 percent and 48 percent between 1989 and 2003), there is a substantial amount of individual-level transition in coresidence with a married child for older Taiwanese parents. Over one-half experience at least one transition (either into or out of coresidence) during the 14 year period. In addition, people often make multiple transitions; over one-fifth of the sample made at least two transitions during the period.

Second, the net result of these transitions is a picture of surprising symmetry. About three-quarters of older Taiwanese were coresident at some point during the survey period, and about three-quarters were non-coresident at some point. The 46 percent of respondents who did not make any transitions are about equally split between those who were coresident in all waves and those who were non-coresident in all waves. Furthermore, the multistate life table analyses revealed that older Taiwanese can expect to spend roughly equal amounts of time coresident and non-coresident during their later lives. This is true regardless of whether or not they started out coresiding with a married child. There were slight differences in coresident life expectancy patterns by sex and marital status, but even these differentials were modest.

A third key finding is that the factors that predict transitions in coresidence are not necessarily the same as those that predict coresidence at a single point in time or as a status (e.g., ever vs. never coresident). As Table 4 indicates, more of the sociodemographic characteristics are significantly related to status (ever vs. never) than to the transitions over the period. For the most part, these factors are well patterned with regard to underlying theory and dynamics, reflecting the needs and preferences and resources of the elderly, and less explicitly, characteristics of the children. For example, the low odds-ratios of Mainlanders and those divorced or separated for ever coresident (column 1 of Table 4) no doubt reflects the lower availability of children for coresidence (even after controlling numbers of children); the higher probability of coresidence among the less educated reflects in part the preference structure of these elderly vis à vis the most educated (see Hermalin and Yang, 2004), as well as lessened resources for independent living. The effect of work status speaks to a lower need for coresidence among those still working.

Only a few of these motivations and forces appear to carry over to explaining the transitions. The lower odds ratio for moving from coresidence to non-coresidence for widows may reflect the greater dependence of this group, once the decision to coreside has been made. But this factor is not reflected in a higher odds ratio for the likelihood of moving from non-coresidence to coresidence. Similarly, the higher odds ratios of going from non-coresidence to coresidence among the less educated may reflect needs and preferences, but the similarly high odds ratios of going from coresidence to non-coresidence suggests that there are countervailing forces in such arrangements, arising perhaps through additional pressures on children.

To the extent that the older population changes living arrangements multiple times as they age, these events are likely to be triggered by fairly specific life course events like changing health and resources of the elderly, as well as changing opportunities and constraints among their children. If so it may well be difficult to capture these changes in any one period through a standard set of

sociodemographic characteristics, and more in-depth data collection may be needed. Stated otherwise, while the factors used to explain status at any one time point are able to capture the broad forces affecting coresidence and non-coresidence, transitions that occur within any one period are more family-specific and, hence, more elusive. As a next step in our analysis of the determinants of coresidence transitions, we will incorporate as predictors measures that reflect changes in marital status, employment, economic status, health, and other key precipitating factors.

At this point, this reasoning is highly conjectural. Relatively few countries have had the detailed transition data now available for Taiwan and there have been relatively few analyses of the topic. It is hoped that with longitudinal designs now increasingly employed, it will be possible to replicate this type of study to see whether the symmetries and multiple transitions discovered here emerge in other countries, or whether these patterns are highly variable across settings. It will also be possible to carry out comparative analyses of the factors related to residence status and transitions to see if the differential effects noticed in Taiwan emerge elsewhere.

At the same time it is important to stress that these analyses for Taiwan are only a first look at the data and we recognize a number of limitations as well as the need for more analyses. One limitation of the current analysis relates to our use of baseline characteristics to predict transitions over a long (14-year) period. As just noted above, coresidence transitions are likely a response to changes in health, economic and family circumstances, and we plan to extend the analysis to incorporate both time-varying measures and explicit change measures as predictors as a next step. A second limitation relates to the sample, specifically the exclusion of respondents who were not interviewed at all five survey waves from the analyses presented in Tables 1-4. This exclusion results in a highly selective sample of people who survived for the entire period and were located and willing to participate in each of the interviews. These individuals likely differ from those who died or dropped out of the study with respect to their coresidence patterns, particularly those who were unable to be located for the interview because they had moved. In addition, to the extent that health decline at the very end of life is an impetus for change in living arrangements, excluding persons who died from the analysis may lead to biased results. In future analyses we will make use of the full sample by focusing on an interval-level analysis for which we will pool the sample across intervals and model mortality and non-response as competing outcomes.

As a final extension of this analysis, we plan to conduct a series of cohort comparisons to determine whether underlying propensities for coresidence, age patterns of coresidence and the factors affecting coresidence and transitions therein have changed over time. The addition of a new cohort (age 50-66) in the 1996 survey wave will allow us to compare coresidence propensities and histories for the same age group at two different points in time, e.g., persons age 60-69 in 1989 vs. persons age 60-69 in 1999.

When studies in population aging first got under way, it was to be expected that readily available measures of household structure from censuses and surveys would be used to gain partial insight into the well-being of the elderly. With further development of the field, limitations in this measure from both a substantive and formal standpoint are becoming clearer and the longitudinal designs in greater use are revealing that living arrangements are far from static at older ages. Assessing just how volatile these arrangements are, what precipitates change, and how these changes impinge on the well-being of the elderly are important topics for future research.

Footnotes

[1]Differential mortality between those residing and not coresiding can affect the actual percentage observed coresiding at time 2 and needs to be taken into account in tracing actual trends. Especially at the oldest ages, insofar as poor health is a factor leading to coresidence, differentials in mortality between those coresiding and not coresiding can be noticeable.

[2]Consideration of equation (2) will show that when the proportions coresiding and not coresiding at time 1 are each .50, the equation can be written as: ${}_{C}P_{2} = .50 + .50(r_{A\rightarrow C} - r_{C\rightarrow A})$

That is, the proportion coresiding at time 2 will be .50 plus or minus .50 times the difference in transition rates. If the two rates are fairly similar, there will be little change in the over-all magnitude of coresidence, even if there is a high degree of movement in both directions. This is the pattern in effect across the various waves in Table 2.

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Table 1. Household structure at the beginning and end of the survey period: Taiwan 1989 to 2003 (N=2101)

Household structure in 1989	Household structure in 2003					Total (1989)
	Alone/ spouse only	Coresides with married child	Coresides with unmarried child	Other	Total	
Alone/ spouse only	51.5	31.7	9.8	6.9	100.0	18.5
Coresides with married child	21.5	60.9	10.0	7.6	100.0	51.9
Coresides with unmarried child	30.3	39.5	24.8	5.4	100.0	23.8
Other	49.2	28.7	11.5	10.6	100.0	5.8
Total (2003)	30.8	48.5	13.6	7.1	100.0	100.0

Table 2. Coresidence with Married Child at Beginning and End of Each Survey Interval, 1989-2003 (N=2101)

	Wave 1 (1989) Totals (1)	Wave 2 (1993)		Rate of Transition (4)
		Coresides (2)	Does not coreside (3)	
Wave 1 (1989)				
Coresides	51.9	82.4	17.6	
Does not coreside	48.1	22.1	77.9	
% transitioning by 1993				19.7
Totals, Wave 2 (1993)		53.4	46.6	

	Wave 2 (1993) Totals (1)	Wave 3 (1996)		Rate of Transition (4)
		Coresides (2)	Does not coreside (3)	
Wave 2 (1993)				
Coresides	53.4	71.4	28.6	
Does not coreside	46.6	25.3	74.7	
% transitioning by 1996				27.1
Totals, Wave 3 (1996)		49.9	50.1	

	Wave 3 (1996) Totals (1)	Wave 4 (1999)		Rate of Transition (4)
		Coresides (2)	Does not coreside (3)	
Wave 3 (1996)				
Coresides	49.9	82.0	18.0	
Does not coreside	50.1	14.5	85.5	
% transitioning by 1999				16.3
Totals, Wave 4 (1999)		48.2	51.8	

Table 2 (cont.)

	Wave 4 (1999) Totals (1)	Wave 5 (2003)		Rate of Transition (4)
		Coresides (2)	Does not coreside (3)	
Wave 4 (1999)				
Coresides	48.2	80.4	19.6	
Does not coreside	51.8	18.9	81.1	
% transitioning by 2003				19.2
Totals, Wave 5 (2003)		48.5	51.5	

Table 3. Transitions in Coresidence with a Married Child, 1989-2003 (N=2101)

Transition	% distribution	% ever coresident	% ever non-coresident
Coresident all waves	23.5	---	
Coresident → Non-coresident		|	---
- single transition	18.0	|	|
- multiple transitions	10.4	| 77.7%	|
Non-coresident → Coresident		|	| 76.5%
- single transition	14.0	|	|
- multiple transitions	11.8	---	|
Non-coresident all waves	22.3		---
Total	100.0		

Table 4. Odds-Ratios from Logistic Regression Models Predicting Stability and Change in Coresidence with Married Children Over a 14-Year Period from 1989-2003 (n=2101)

Covariate		Logistic Models of Transitions in Coresidence		
		Model 1 Ever Coresident[a]	Model 2 Move Out: Coresident → Non-coresident[b]	Model 3 Move In: Non-coresident → Coresident[c]
Sex	Male	0.90	1.10	0.91
Marital status (ref=married)	Widowed	1.02	0.68*	0.71
	Div/Sep/Nev marr	0.33***	1.41	0.50
Age		1.00	0.99	1.02
Ethnicity	Mainlander	0.51***	1.23	0.87
Education (ref=Secondary+)	No education	1.46*	1.63*	1.34
	Primary education	1.69***	1.30	1.67**
R's work status	Working	0.69**	0.94	1.10
Self-rated health	Fair or poor	0.68*	1.01	1.00
Household income (ref=4th quartile)	1st quartile	1.05	0.71	0.63
	2nd quartile	0.81	0.60*	1.03
	3rd quartile	0.64**	1.12	0.75
	Missing income	0.57**	0.44**	0.42**
Availability of children	# married sons	1.14***	1.03	1.11**
	# married daughters	1.16***	1.00	1.19***
	unmarried child in hh	1.13	1.01	2.40***

* p < .05 ** p < .01 *** p < .001

[a]Contrast category is non-coresident in all years.
[b]Contrast category is coresident in all years.
[ca]Contrast category is non-coresident in all years.

Figure 1. Life expectancy in total and by coresidence with a married child: Taiwan, 1989-2003

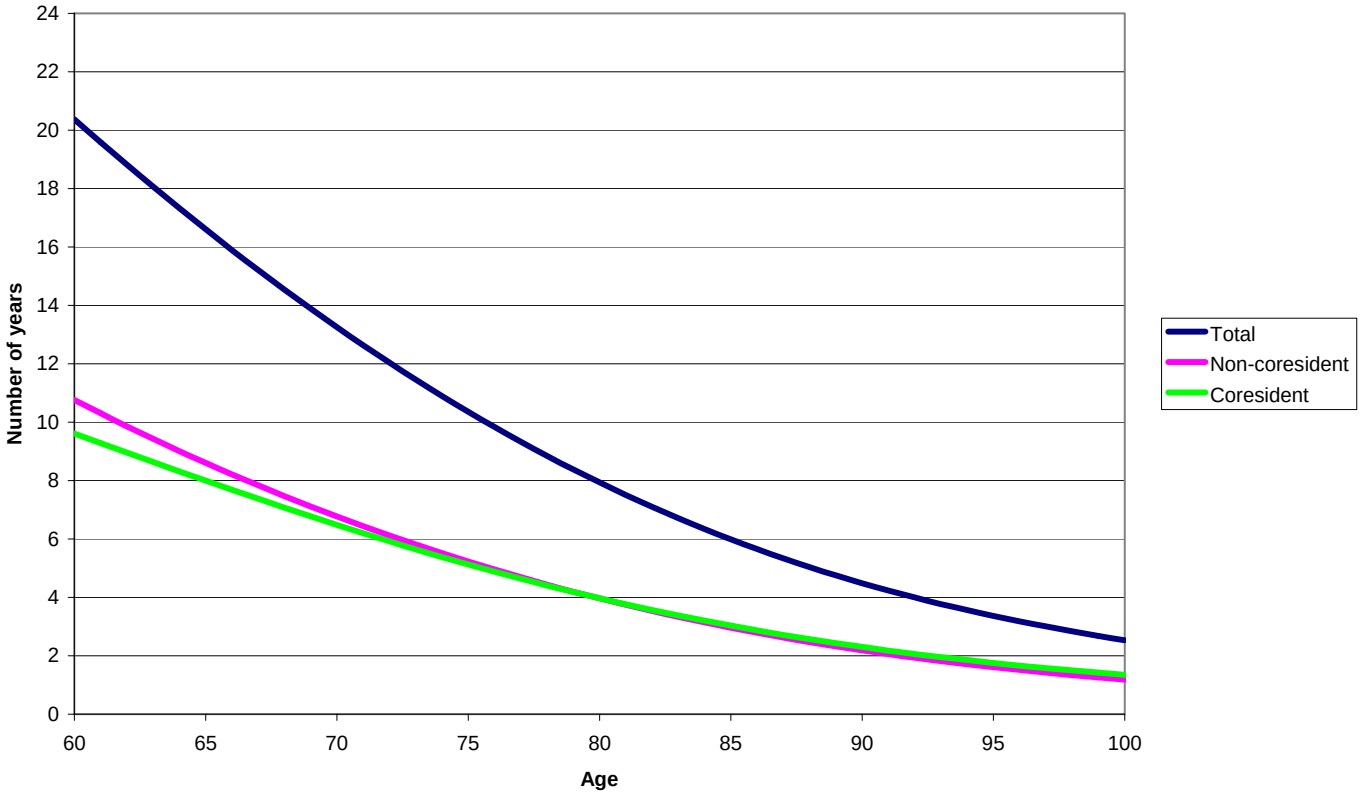


Figure 2. Percent of remaining life spent coresiding with a married child, by age and marital status of respondent: Taiwan, 1989-2003

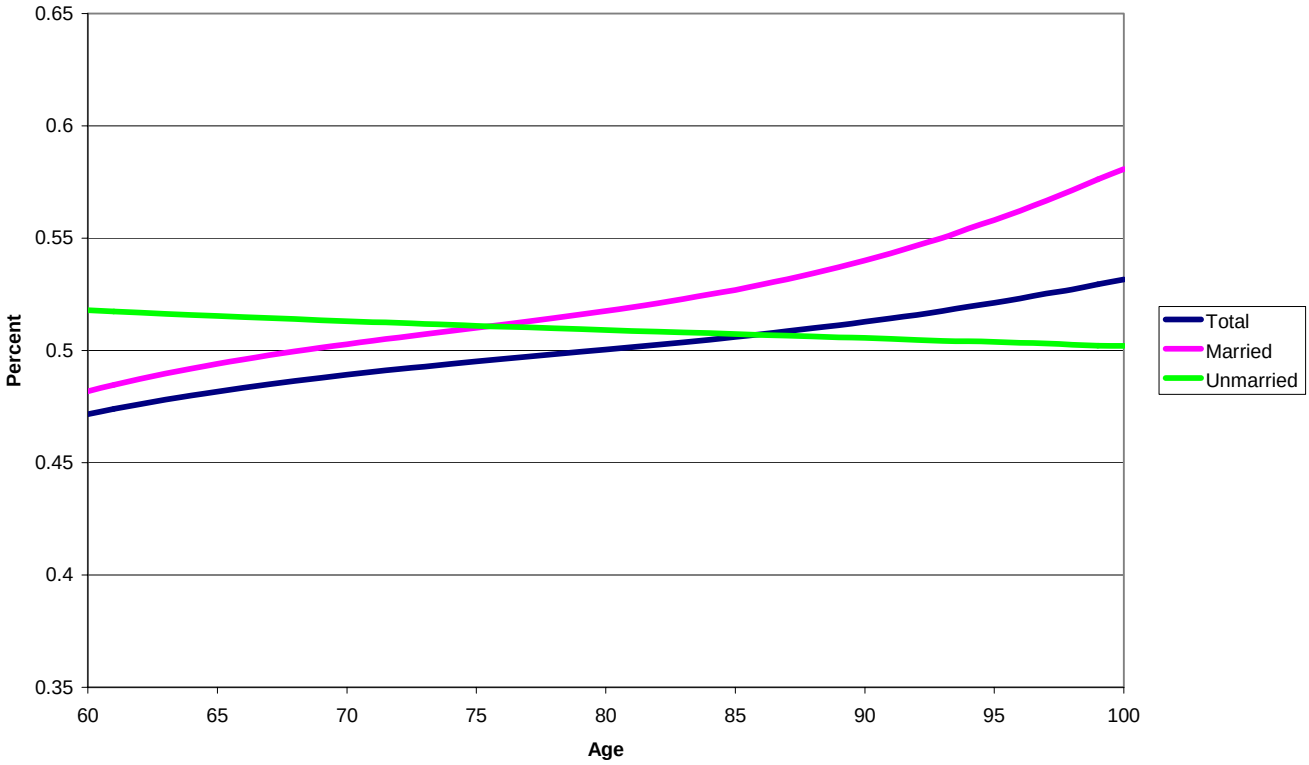


Figure 3. Percent of remaining life spent coresiding with a married child, by age, sex and marital status of respondent: Taiwan, 1989-2003

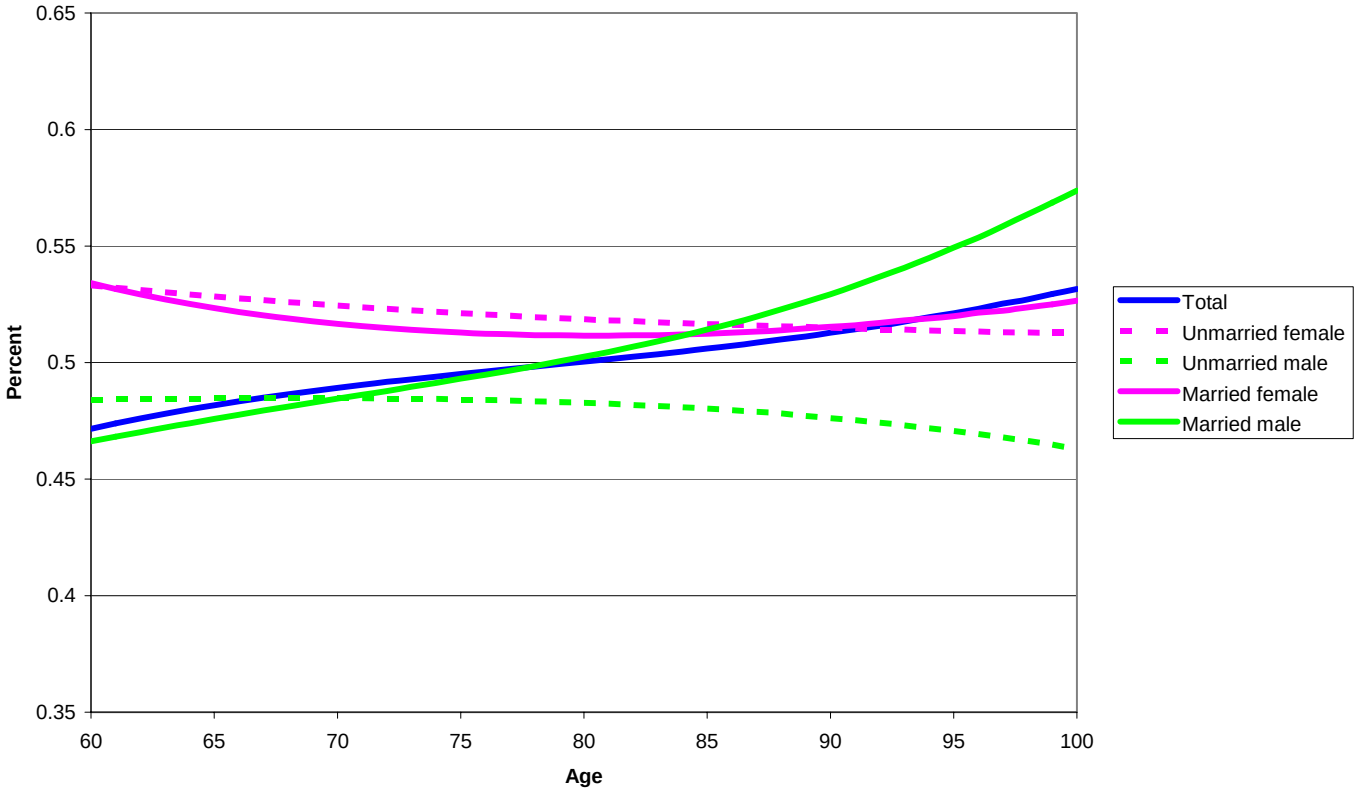


Figure 4. Life expectancy by coresidence with married child, among those who are not coresiding at start of observation period: Taiwan, 1989-2003

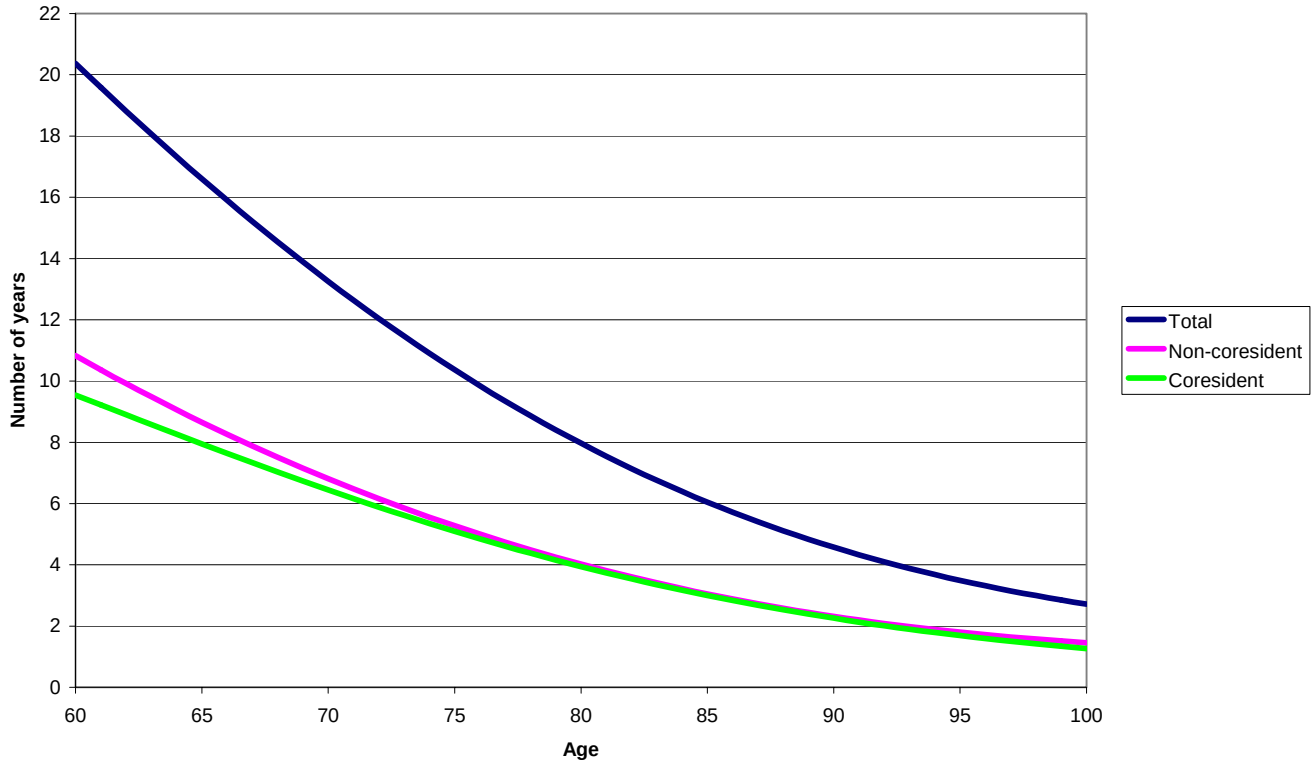
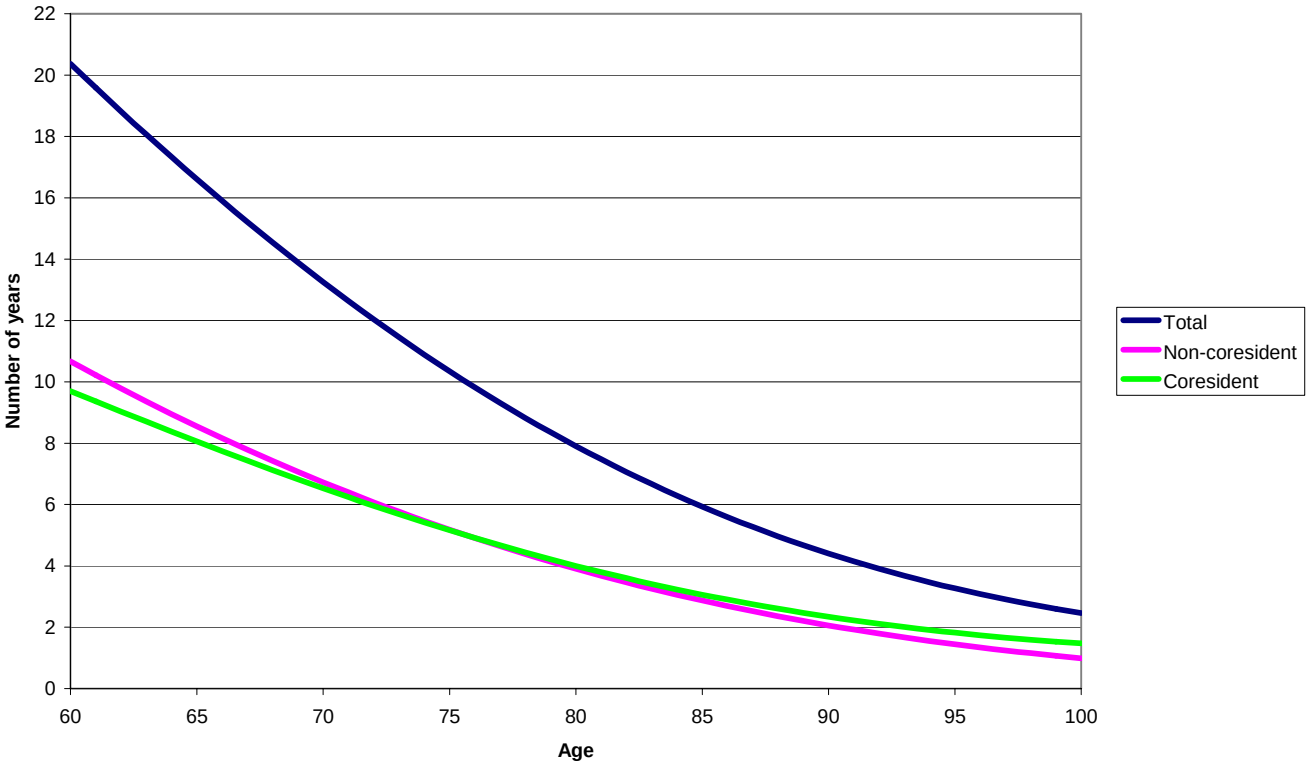


Figure 5. Life expectancy by coresidence with married child, among those who are coresiding at start of observation period: Taiwan, 1989-2003



Comparative Study of the Elderly in Asia

This series of research reports deals with the status of the elderly in several Asian countries. The series was initiated in 1989 under a broad project sponsored by the U.S. National Institute on Aging (Grant No. AG07637) and directed by Albert I. Hermalin. This particular report presents research that was conducted under a parallel R01 grant from the National Institute on Aging, A Comparative Study of Aging and Health in Asia (AG20063-01 and AG20072-01). This is a multi-country collaborative study whose overall goal is to describe and analyze health transitions and health care utilization patterns in four Asian countries undergoing rapid population aging and social and economic change.

The project uses existing longitudinal survey data from five Asian settings: Taiwan, the Philippines, Singapore, Indonesia, and China. Organizations collaborating in this research include the Population Council, New York; the Population Institute, University of the Philippines; the Department of Sociology, National University of Singapore; the Bureau of Health Promotion, Department of Health, Taichung, Taiwan; the Beijing Geriatric Clinical and Research Center, Beijing, China; and the Nihon University Population Research Institute, Tokyo, Japan.

For additional information on this research project, please visit the project website: http://aha.psc.isr.umich.edu or contact the Principal Investigator: Mary Beth Ofstedal, Population Studies Center, University of Michigan, PO Box 1248, Ann Arbor, MI 48106-1248, USA.

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