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Number of children and proximate residence among older adults in the
context of population aging:

A comparative analysis of six societies in the Asia-Pacific region*

Zachary Zimmer, Ph.d.
Professor, Sociology Department

Kim Korinek, Ph.d.
Assistant Professor, Sociology Department

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Institute of Public and International Affairs
The University of Utah
260 S Central Campus Drive, Room 214
Salt Lake City, UT 84112
<http://www.ipia.utah.edu>
(801) 581-8620

Number of children and proximate residence among older adults in the context of population aging:

Procedural and Technological Solutions to the Ballot Transit Problem

Abstract

Population aging, occurring concurrently with social and economic change, has the potential to dismantle traditional support structures for older adults in the Asia-Pacific region. An example is the traditional system of living with an adult child, which may be threatened by smaller families and more mobile populations. The following study examines the probability that an adult aged 65 and older, living in one of six Asian societies, lives with or near an adult child, and how this fluctuates by number of children, rural/urban residence, and additional covariates that relate to the material and physical needs. Results show positive associations between number of children and proximate residence, but varying results with co-residence. Virtually no association with co-residence is found in China, non-linear associations are found in Cambodia, Philippines, Taiwan, Thailand, and a linear association is found in Singapore. At the same time, rates of co- and near-residence remain high, particularly in rural areas. Findings indicate the importance of considering both near and co-residence when examining proximate living. Conclusions suggest ambiguity with potential decline in support facilitated by changes in living arrangements. While more children increases chances of proximate living, probabilities of living near a child remain high for all, with the possible exception of those with only one living child.

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AUTHOR CONTACT INFORMATION

Zachary Zimmer
Institute of Public and International Affairs
University of Utah
260 S. Central Campus Drive, Room 214
Salt Lake City, UT 84108
USA

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INTRODUCTION

The following study examines the probability that an older adult living in one of six Asian societies lives either with or proximate to one of their children and how this probability fluctuates according to number of living children, rural versus urban residence, and several additional covariates that relate to the material and physical need. The significance of these associations are rooted in rapid social and demographic changes taking place across the Asia-Pacific region and the implications that they may have for older people (Hermalin and Myers 2002, Kinsella and Phillips 2005; Phillips 2000). In particular, unprecedented and ongoing declines in fertility are destined to reduce family sizes substantially over the next couple of decades. As one example, China, which is so demographically important due to the sheer size of its population, has witnessed a decline in its Total Fertility Rate from over 6 in 1970 to about 1.7 today (United Nations 2006). Such precipitous declines in fertility are not restricted to nations with birth limiting policies, but rather characterize many in the region (Bongaarts 2001). Fertility decline means smaller cohorts of young individuals are entering these populations, which in turn makes the older population large relative to the younger, a phenomenon called 'population aging'. Due to population aging in the Asia-Pacific region, the proportion of older adults is growing faster than any other population segment. Furthermore, the population of older adults is growing faster in the region than in any other part of the world.

Population aging is creating concern among policy-makers who seek to anticipate future support needs (Hendricks & Yoon 2006). Few developing Asian societies have created formal welfare or pension schemes that extend beyond a small segment of relatively affluent elders, in particular those formerly engaged in government or formal sector employment. Instead, across the region, and indeed across nearly all developing countries, material and physical support derive overwhelmingly from

family sources, and especially adult children (Knodel and Debavalya 1997). Reliance upon adult children for support is not merely a function of lack of formal sources; it is indeed a cherished, traditional practice that has remained strongly entrenched through ideological systems that prize filial piety (Deutsch 2006). Moreover, support has customarily been facilitated through co-residential living arrangements (Bongaarts and Zimmer 2002; Knodel and Ofstedal 2002; Logan, Bian and Bian 1998). Clearly, reductions in family size diminish the availability of children with whom elderly adults may co-reside. Thus, given a strict demographic argument, the most pertinent consequence of fertility change for older adults may be the implications that reduced family sizes have for co-residential living and subsequently the probability that older adults across the region obtain the levels of material and physical support required for comfortable survival (Choi 2000; Jones 1993; Whyte 2003).

Concerns about the consequences of fertility decline are exacerbated by two other concurrent demographic changes taking place in the region. First, since physical functioning tends to deteriorate with increasing age, it is often the old-old, say those 80 and older, who are in greatest need of physical support. People in Asia are living longer and surviving to ages where these types of limitations are commonplace. Second, socioeconomic development throughout the region is creating a more mobile population, leading to higher rates of migration, particularly from rural to urban areas (Castles and Miller 2003; Liang 2001). The age selective character of migration contributes to an “aging in place,” or a spatially concentrated increase in the rate of population aging in rural areas (Watkins and Ulack 1991). Accordingly, the proportion of older adults in local populations is higher in rural than in urban areas in most countries of the world (Wenger 2001).

The potentially disruptive consequences that fertility decline, increased longevity and population mobility may have for older adults have certainly not escaped the notice of the public, the press, or the academe in Asia. There have been a number of alarmist media reports across the region suggesting that frail and needy older adults are increasingly being abandoned by a smaller population of

mobile adult children (e.g., Charasdamrong 1992; DeParle 2007; French 2006). This apprehension most often focuses on older adults in rural areas. Academic writings, too, have cautioned that the wellbeing of older adults may be threatened by changes in traditional support structures (Du and Guo 2000; Phillips 2000; United Nations 1999). The consequences of migration for family members “left behind,” especially older adults, have begun to motivate regional conferences and journal special issues (Toyota, Yeoh and Nguyen 2007).

Whiles concerns about living arrangements and subsequent wellbeing for older adults may certainly be warranted, our understanding of the issue must be guided by thoughtful analysis and appropriate measurements so as to best determine whether and under which circumstances older adults are found living at a distance from their adult children. On the theoretical side, the thinking highlighted above supports a ‘demographic’ perspective, that is, that the probability of living with a child is tied to the supply of children (Kojima 1989; Wolf and Soldo 1988). The demographic argument would suggest then that rates of co-residence would decline in societies experiencing fertility decline, and those older adults with few children would be less likely to co-reside with a child than would those with a greater number. Yet, strict demographic viewpoints tend to overlook the impact of deeply embedded cultural norms related to filial piety (Deutsch 2006; Ofstedal, Reidy and Knodel 2004; Whyte 2003). Thus, an alternative perspective, based on an ‘altruistic’ framework initially adapted from the work of Becker (1974), is gaining recognition (Hermalin 2002a; Frankenberg, Chan and Ofstedal 2002; Lee, Parish and Willis 1994; Zimmer 1995). This emerging perspective also extends the logic of the ‘new economics of labor migration’ perspective, which treats the household as a collective unit whose members’ activities, diversified across sectors and space, aid in minimizing risk in settings where capital, credit, and insurance markets are absent, incomplete or prone to failure (Lauby and Stark 1988; Stark and Bloom 1985; Stark and Lucas 1988). The altruistic perspective conveys that in most Asian societies the wellbeing of the totality of family members tends to take precedence over any individual

member. As a result, the basic notion that the younger generation is responsible for the survival of the older generation is slow to change, and families adopt suitable parental support strategies in the face of socioeconomic development, fertility reduction and urbanization. This is especially the case in rural communities where agricultural subsistence remains the norm, where credit, insurance and capital markets are weak and incomplete, and where formal institutions of support and care for the elderly are particularly limited (Stark and Lucas 1988).

Hence, an altruistic perspective would predict that family size has little to do with co-residence patterns, particularly in rural areas, as long as societies remain organized around the family, public systems of support remain weak, and older adults consequently remain reliant upon the family for support. On the contrary, more children might even promote migration since support tasks can be distributed across family members, thus reducing the obligation of any one child. Proponents of this perspective would also maintain that characteristics of older adults indicative of greater need for support, such as poor health or widowhood, would increase the probability of co-residence regardless of family size (Frankenberg et al. 2002; DeVos and Lee 1993).

On the empirical side, evidence to date appears scattered across studies which do not focus systematically on the association between numbers of children and the probability of intergenerational co-residence. It is certainly true that co-residence rates have remained high in most countries in the Asia-Pacific region (Frankenberg et al. 2002; Hermalin 1997; Knodel and Ofstedal 2002; Logan et al. 1998; Zeng and Wang 2003). Where family size is considered as a determinant of co-residence, however, results are ambiguous. In a fairly early example, Martin (1989) found greater numbers of children related to a higher probability of living with a child in Malaysia, Philippines and Fiji, but not Korea. DaVanzo and Chan (1994) showed more sons and married daughters, aged 20 to 39, increased the probability of co-residence for older adults in Malaysia; however, no effect was observed for unmarried daughters. Casterline et al. (1991) found an increase in number of children decreased the

likelihood that an older adult lived alone and increased the chances of living with a child in the Philippines, Singapore and Taiwan, but the strength and specific nature of the association varied greatly across countries. Knodel and Ofstedal (2002) provided evidence that number of children increased the chances of living with children in Philippines, Singapore, Taiwan and Thailand, but Natividad and Cruz (1997) uncovered virtually no association between number of children and co-residence in their Philippine sample. Logan et al. (1998) did not notice an association between having more than one son and co-residence in China. Knodel, Chayovan and Siriboon (1992) suggested that the proportion of older adults in Thailand that live with a child is not likely to change in the future because older adults with only one or two children are likely to be in a co-resident situation with at least one of them. These and other studies conducted in the region defy definitive or consistent conclusions about the nature of the relationship across the region.

There are several possible reasons that empirical results have diverged across studies and societies, which in turn point to challenges that remain for future research. One of these involves the ways in which supportive living situations have been conceptualized. Past studies almost exclusively rely on dichotomous measures of co-residence, implicitly or explicitly regarding the absence of co-residence as a divergence from traditional modes preferred by aging adults (for example, see Martin 1989; DaVanzo and Chan 1994; Frankenberg et al. 2002, for reviews of research that mostly rely on dichotomous measurements of living arrangements). Yet, some societies, particularly ones that are experiencing rapid social change, may be quickly adopting other forms of supportive arrangements. Certainly technological advancement is allowing for the maintenance of regular contact with migrating children, and material assistance can more easily be provided by those living at a distance. But, perhaps even the definition of proximate living needs to be expanded. For instance, Knodel and Chayovan (1997) found that older children in Thailand are likely to set up 'pseudo-coresidence' or a household near their aging parents that both allows some degree of independence but also provides the proximity

necessary to maintain adequate levels of support. A limited body of evidence has emerged to suggest that in some settings older adults prefer to live close to children rather than under the same roof (Bian, Logan and Bian 1998, Unger 1993). Martin (1989:672) points out that, “family support can be given without living together;” in particular, if one lives nearby, such as next-door, down the street, or in the same village or neighborhood. In addition, one of the benefits of co-residence highlighted in previous research (e.g., DaVanzo and Chan 1994), economizing on the cost of living, can be met nearly as well by having adult children build their own small home nearby the parents’ living quarters on a shared plot of land.

Another reason for divergent results may be that the tendency of older adults to co-reside with adult children may be informed by social context. Certainly, there are likely to be specific differences that exist across societies, but in both theoretical and practical terms, the rural or urban character of a place may also be a significant line of distinction. Several scholars observe, for instance, higher rates of co-residence in urban areas (e.g., Cameron 2000; Cooney and Shi 1999; DeVos and Lee 1993) [although DeVos (1990) finds little difference across rural/urban areas in Latin American countries]. An explanation for this is that although urbanites may, on the whole, hold attitudes more favorable toward independent living, housing market constraints and high housing costs may lead to residential patterns that fit with urban economic and geographic realities. In contrast, it is in rural communities, where normative ideologies may be more favorable to co-residence, that adult children may feel compelled to migrate in order to provide financial support from a distance (Wenger 2001).

The discussion thus far highlights that: a) the association between number of children and proximate living arrangement is a critical one with respect to the possibility of continued support for older adults in the Asia-Pacific region; b) there are conflicting perspectives that predict how the association should operate, and; c) there has been inconsistent evidence regarding the association. In hopes of providing some clarification, the current study unites data from six societies (Cambodia,

China, Philippines, Singapore, Taiwan, and Thailand) and models the relationship between number of children and proximate living among older adults. We consider both the traditional measure of co-residence as well as a more expansive one that includes those living nearby within the definition of proximate living situations. We consider rural/urban residence as a covariate and we interact place of residence with number of children to detect whether there are divergent associations for those living in rural versus urban areas. In addition, we examine several other covariates that fit within an altruistic framework, that is, they indicate a degree of physical or material need characteristic of the older adult.

There are, of course, numerous obstacles when conducting comparative analyses, not the least of which is utilizing different data sources collected at different time points and under different administrations. Yet, the potential gains for generalization and advancement of theory make such efforts worthwhile. Indeed, the National Research Council (2001) has recently made a case for such analyses, despite the complications involved. For the current study, we do employ different data sources, but they are all ones that were collected generally within the same time frame. We limit our analyses to variables that are measured consistently or can easily be compared. While this comparability stipulation limits the number of predictors that we can control for, it also provides us with greater breadth of geographical coverage.

METHODS

Data

To choose data sources for the current comparative analysis we examined available data from surveys of older adults in East and Southeast Asian countries. We then chose datasets based on several criteria: a) surveys completed over the last ten or so years; b) datasets including reliable measures of the number of children alive, co-resident, and near-resident, and; c) datasets including reliably measured information on several key covariates such as education, marital status and functional health. In the

end, we selected six datasets. Information about these is shown in Table 1. Each dataset is either publicly available or permission was granted for its use. Some of these data are from longitudinal panel studies. In these instances, we chose the one cross-sectional dataset that best fit with the others in terms of comparability with respect to time, age of respondents and measures. The Chinese data include individuals aged 65 and older while the other datasets include a broader range of ages. To be consistent, we limited the sample in each country to adults aged 65 and older. The number of cases aged 65 and older varied between a low of 816 in Cambodia and a high of 16,020 in China, although except for China, the number of cases is between about 1,000 and 3,000. Each of the surveys was nationally based and representative. Weights were used when necessary. For instance, several surveys over-sampled the old-old. Weights were applied so that there is generalizability of results for those aged 65 and older across the individual countries. Space limits our ability to discuss each of the six datasets in greater detail, but in each case there are earlier publications that attest to their quality. Table 1 lists some applicable citations.

Measures

The outcome variables of interest are: 1) whether an older adult co-resides with one of their children, and; 2) whether an older adult lives proximate to one of their children, with proximate defined as living either with or near a child. Since all of the cases being examined consist of persons aged 65 or older, it is very likely that each of the ‘children’ is actually an adult themselves aged at least 20. Therefore, our study really considers co-residence and proximate residence with adult offspring, but we use the word children to be consistent with the common language in the literature.

Each dataset employed a household register to establish relationships between household members and the older adult. Each survey also ascertained whether the older adult had non-co-resident children, and if so, their residential location. Both outcomes are dichotomized and treated

separately. Co-residence is coded as 1 if a child is present in the same household and 0 if not. Across all the datasets, about 55% of persons 65 and older co-reside with a child. Proximate residence is coded as 1 if a child lives either in the same household or nearby and 0 if not. Table 1 displays the specific definition of proximate residence for each dataset. Across all the datasets, about 83% of persons 65 and older live proximate to a child.

The coding for proximate residence is not perfect. First, location of a non-co-resident child was recorded differently across the surveys. However, across all surveys, we are able to at least determine whether a child lives within the same village or, for urban areas, in the same neighborhood. Second, despite consistency in measurement, the definition of a village or neighborhood may differ according to administrative realities in different countries or different surveys. Third, a child may be living in a neighboring village or neighborhood, but still be quite proximate to the older adult. It is not possible to determine this consistently across the surveys. Given these caveats, we nonetheless code proximate residence in the most reasonable way given available data, and it is fairly certain that nearly all of those coded as living proximate to a child would be within a reasonable walking distance. If anything, our definitions might under-estimate the number of older adults living within a reasonable distance of a child.

The main predictor variable of interest is number of children alive during the time of the survey. Fertility across the region was very high during the time that the current group of elderly was completing their family size. Generally, fertility rates during these times were about five or six children per woman. Given some mortality, the number of children alive during the time of interview is a little less. Cambodia is somewhat unusual in that its civil war that began in the 1970s resulted in very high mortality, decreasing substantially the number of children of older adults that would currently be alive. China is unusual in that it experienced rather low fertility in the 1950's and 1960's in temporal sequence with its 'Great Leap Forward,' a subsequent famine and generally poor living conditions.

Preliminary analyses were conducted in order to test for various constructions of the variable number of children. A linear-continuous treatment is not suitable since in some countries there are thresholds after which associations rise or fall appreciably. It was determined that the most parsimonious coding involved a categorization into five groups: 1 child, 2 or 3 children, 4 or 5 children, 6 or 7 children, 8 or more children. Having one child was separated out because there is often a large change in the tendency to co- or near-reside when moving from one to more than one child. The 8 or more category was chosen as an upper boundary because it was determined that in no country did rates of co- or near-residence vary much for those who have any number of children greater than 7. In regression analyses, a series of dummy variables were created in order to contrast having one child with having other numbers of children. Another key variable is rural/urban residence. Each of the surveys includes a pre-coded measure for rural/urban, and we used this as our designation. The exception is Singapore which is an urban sample only.

We employ a series of other covariates in the analyses of co- and proximate residence. The first two are age and sex. Age is coded into four categories (65 to 69; 70 to 74; 75 to 79; 80 and older) and gender is coded as 1 for female and 0 for male. We also chose additional covariates that 1) were measured consistently or could be easily compared across surveys and; 2) provided indication of socioeconomic situation or physical or material need. Using these covariates, we test the hypothesis that those with higher levels of need are more likely to co-reside with or reside proximate to at least one child. Although comparability limited the number of covariates available, some key ones exist. Each survey asked respondents whether they have recently been involved in work for pay. We believe that those working are generally less in need materially since they have a source of income. Yet, working in rural areas may often be associated with involvement in a family agricultural enterprise, which in turn associates with traditional extended living situations. This measure is coded dichotomously. Also coded dichotomously are variables indicating whether an older adult has any

education and whether an older adult is currently married. Education is suspected to be another indicator of material need since those with higher education likely have greater resources. Marital status, or more specifically the presence or absence of a spouse, is an indicator of both physical and material need.

A final covariate that we consider is functional health. Items that measure the ability to conduct physical tasks are commonly found in surveys of older adults. The tasks are generally grouped into Activities of Daily Living (ADLs), which are tasks necessary for self-maintenance, like bathing and dressing, Instrumental Activities of Daily Living (IADLs), which are tasks necessary for maintenance of personal environment, such as cooking and cleaning, and more general physical movement items, such as walking or lifting things (Katz et al. 1963; Lawton and Brody 1969; Nagi 1979). Respondents are normally asked whether they can do these tasks by themselves, and if not, they are asked about their degree of difficulty. The latter is often coded as a little difficulty, a lot or cannot conduct the task.

Unfortunately, there are not a standardized set of items included in surveys of older adults, nor are response categories or the specific wording of questions consistent across surveys. For instance, the Cambodian survey that we use asks respondents about their ability to walk, lift things, crouch, grasp things with fingers, climb stairs, eat, dress, bathe and get in and out of bed, on their own, without help from others. Responses are coded on a three point scale depending on degree of difficulty. The China survey asks respondents about their independent ability to bathe, dress, use the toilet, get in and out of bed, eat, visit neighbors, shop, cook, do laundry, walk, lift things, crouch, and use transportation. Responses are also coded on a three point scale. As can be seen there is some overlap, but it is not total. Although this makes comparisons challenging, we determined that establishing some level of physical functioning is critical in order to determine whether physical need was associated with co- and proximate residence. Therefore, we calculated a score for functional health within each country using whatever items are available. We did this by first scoring each item on each survey with a higher score

being a higher order of functional problem (for instance, 0 being no difficulty, 1 being some difficulty and 2 being a lot of difficulty), and second normalizing the sum of the scores. In this way, we have a measure of physical functioning that is standardized to account for the specific questions and response categories used in each particular survey. Since scores are normalized across surveys, the end result is comparable. For instance, we can interpret a high score as representing a great deal of functional health difficulty in comparison to others who answered the same survey.

Analysis

The first aim of the analysis was to determine whether there are consistent associations between number of children and co- and proximate residence across datasets. Although we begin below by showing some descriptive and bivariate statistics, the main part of our analysis presents associations using multivariate logistic regression. Ideally, we would have used hierarchical linear modeling using two analytical levels, considering individual observations to be nested within surveys. However, since we only had six datasets we lacked sufficient statistical power to conduct such analyses. Instead, we pooled the data across the countries, added controls for country, and regressed co- and proximate residence on number of children, simultaneously controlling for other covariates. This provided us with a general pattern across the datasets. We then examined associations for each survey in order to determine whether the general pattern found in pooled results can be considered to represent well the various individual datasets. In order to examine whether associations differed across rural and urban areas, we added interaction effects and repeated the steps outlined above.

RESULTS

Descriptive results

Descriptive statistics are shown in Table 2. Columns indicate results for each country. The last column is simply the average across the datasets. A pooled average would not be meaningful without adjustments for country since China dominates with respect to number of observations. The average simply assumes that the number of cases is similar across each dataset. The mean number of children alive at the time of survey ranges from a high of 5.7 in the Philippines to a low of 3.5 in China, reflecting cross-national differences in levels of fertility during the period within which women in the sample were completing their families. The average is 4.7. Thus, levels of fertility typical several decades ago were consistently high, although variation was wide. It is worthwhile noting that despite differing mean numbers of children, being childless is a rare outcome in any of the countries.

The age distribution across each sample is as would be expected, with a higher percent in the younger age groups. Except for Taiwan, the samples are disproportionately female. The higher proportion of males in Taiwan is the result of a substantial immigration movement in the aftermath of the Chinese revolution in the late 1940's (Hermalin, Ofstedal and Chang 1996). Most of these immigrants from the mainland were male soldiers who are now entering old age. This has created an unusual sex distribution. The percent reporting recent involvement in work varies from a low of 9% in Singapore to a high of 32% in the Philippines, and it is lowest in Singapore and Taiwan and highest in Cambodia, Philippines and Thailand. Different levels of work involvement across countries may reflect levels of socioeconomic development and subsequent levels of formal support within countries. Figures on formal education suggest that historically, access to education has varied widely across the countries. While just over 30% of older adults in Singapore received formal education, the same is true of more than 65% of those in the Philippines. Education for these individuals occurred more than forty years ago when systems of education differed greatly from what is typical today. The high percentage with formal schooling in the Philippines reflects American involvement in the country in the early part of the century. The U.S. promoted education for Filipinos; many teachers were imported

from the U.S. and primary level education was pushed in remote parts of the country (Carroll et al. 1970). The percent currently married ranges from a low of about 45% in Cambodia, where the civil war in the 1970s resulted in many deaths to spouses, to a high of about 62% in Taiwan. The final statistic shown in Table 1 is the mean disability score within countries. Since scores were normalized, the mean is zero and standard deviation is one for each country by design.

Table 3 shows co-, near and proximate residence rates across countries and by rural and urban areas within countries. Co-residence rates range from a high of about 80% in Cambodia and Singapore to low of about 45% in China. Except for China, at least two out of three older adults is living with at least one child. The fact that Cambodia and Singapore differ so markedly in terms of their levels of economic development and rural-urban character, yet are so similar with respect to rates of co-residence, suggests that decisions to co-reside are likely the product of a complex array country and cultural-specific factors. Although China has the lowest rates of co-residence, it has the highest rates of near-residence. About one in three elders in China lives not with, but near, a child. The final row shows the percent not living with or near at least one child, which is simply the reverse of the percent living proximate. The percent co-residing is higher in urban areas than in rural areas, with China being an exception. But, the percent coded as living near a child is higher in rural areas, in some cases by a very substantial margin. The end result is that although co-residence rates are generally higher in urban areas, the percent living proximate to a child generally does not differ much across areas. As a final observation, we note that the highest percent not living proximate to a child in urban areas is in China, but still, a majority lives proximate to a child, and the average not living proximate is only about 14% across the countries. The highest percent not living proximate in rural areas is in Taiwan and China, two societies that have been experiencing very rapid development and high rates of rural to urban migration. But still only 18% in rural Taiwan and 14% in rural China do not live proximate to at least

one child. On balance then, across the region, and across rural and urban areas, older adults are very likely to be living either with or near at least one child.

Determinants of co-residence

Table 4 presents the results from logistic regressions that predict co-residence. Results are shown as odds ratios for co-residing with at least one child in comparison to not co-residing. The first two models, the results of pooled sample regressions, show general patterns across the region. The first pooled model includes all six countries. The second omits Singapore, which is an urban sample only, and adds a variable for rural (vs. urban) residence. Country effects in the pooled regressions indicate the level of co-residence within the country in comparison to China, which is chosen as the contrast category because it has the lowest co-residence rates.

Controlling for country in the pooled regressions means that the results showing the association between number of children and co-residence in these models can be generally interpreted as indicating the general pattern across the six countries. The pooled samples display non-linear but overall positive associations between co-residence and numbers of children. Those with one child are least likely to be in a co-resident situation, while those with eight or more are clearly most likely. There is little difference in the chances of co-residence for those who have between two and seven children.

Looking at results for the other models, we see that the overall pooled pattern is, in fact, not characteristic of any individual country. Inspection of the specific odds ratios across countries suggests three different patterns of association between number of children and co-residence. The first is a linear association. This pattern is seen most clearly in Singapore where each additional increment in number of children relates to a fairly sizable increase in the odds ratio of co-residence. The second is no association. This pattern is evident in China where additional children do not seem to make any difference in the chances of co-residing with at least one. China and Singapore then represent directly

opposed realities and exemplify the inconsistency in the association that has been found across countries in the region.

A third pattern, which is a little more difficult to pinpoint, is seen in the rest of the countries. This pattern indicates a positive association between number of children and co-residence, but one with ‘diminishing returns’, especially at the higher ends of number of children. In Cambodia and Thailand, neighboring countries with similar cultural traditions, the odds ratios generally increase with number of children but only modestly, and there is a definite leveling off of the effect when comparing those with six or seven children and those with eight or more. In Taiwan, there is a very large increase in the chances of co-residence when moving from one to two or three children, but changes after that point are relatively inconsequential. In the Philippines, only those with eight or more children significantly differ in their chances of co-residence in comparison to those with one.

Associations with other covariates show that co-residence is influenced by several additional individual characteristics that are indicative of social position and degree of need for material and physical assistance. Those who work and those who are married are generally less likely to co-reside. Those working are less likely to have material needs, and they may also be individuals generally in better health than others. Those married likely receive support from their spouse when needed. Education, on the other hand, has virtually no influence on co-residence. The exception is in Taiwan where the expected negative association is present. We observe a significant and positive association between physical functioning problems and co-residence in the pooled sample. The positive association also emerges as significant in two of the individual countries (China and Taiwan), and is positive but not significant in two others (Philippines and Thailand). Thus, we obtain moderate evidence for the hypothesis that older adults with functional problems tend to co-reside with an adult child.

Once controlling for functional status, age has little association with co-residence, and any association that is present indicates that the chances of co-residence are greatest for younger elderly. A possible explanation is that in many Asian contexts newly married individuals and new parents experience a period of co-residence with parents or parents-in-law. This period provides the young married couple time to accrue resources needed to create an independent household, and when children are born, to provide assistance with child care. If adult children's housing and childcare needs are an important factor shaping co-residence patterns then we might expect co-residence to be greater in early years of old-age, which relates to children being in the prime ages of family formation, as opposed to advanced ages when children have edged into middle-age and late adulthood. We find that elderly women are less likely to co-reside with adult children than their male counterparts, a result that may reflect a gendered perception of need for instrumental and social support in old age. Finally, consistent with the descriptive results shown above, we find that rural residence substantially and significantly decreases the probability of co-residence in four of the five countries, with the exception of China.

Determinants of proximate residence

Table 5 shows results for proximate residence. For the country effects, China is again used as the comparison category. The overall association between number of children and proximate residence is very different from the association with co-residence, and in fact, patterns are much more clear and consistent. For pooled samples, and across every individual country, there is a strong positive correlation. In each country, the odds ratio comparing the chances of proximate living for those with one versus two or three children is near or greater than 2. Therefore, the probability of living near a child greatly increases when moving from having one to having more than one child regardless of country. The odds ratios continue to increase substantially with increasing numbers of children in

Cambodia, Philippines, Singapore, Taiwan and Thailand. The odds ratio increases are less substantial in China, although a positive association is still fairly evident. In China, however, there is evidence of diminishing returns.

The cross-national picture of supportive residential arrangements that we derive is very different, depending on whether we consider co-residence or proximate residence. For instance, while Singapore's odds ratio was about 4 in comparison to China when looking at co-residence, it is only 1.3 for near-residence. Indeed, looking back at Table 3 it is clear that a large majority of older adults in Singapore who live proximate to a child actually live with a child. This may not be surprising given that Singapore itself is a small country contained within a city, with good transportation that allows residents to be fairly well connected. Therefore, living outside of a parent's neighborhood, which is the definition being employed for non-proximate residence, is likely still near enough to afford regular contact with parents. Odds ratios for Taiwan, Thailand and Philippines are between about 1.8 and 2.4, while the odds ratio in Cambodia is about 3.5 in comparison to China.

With respect to other covariates, there are some interesting variations when comparing co- and proximate residence. Age effects are relatively inconsequential. Gender is not significant except for China, where males are more likely to be living in a proximate situation, and Philippines, where it is females. The association of working is positive in China and negative in Thailand, but is non-significant elsewhere. Therefore, while a working elder is less likely to be living with a child, the same is not true for living proximate to a child. In China, the results may be a function of state provisions that afford housing to workers (Huang and Clark 2002). In contrast, while education did not have much influence on co-residence, it has a marked effect on proximate residence, reduces the odds in three of the six countries. Marital status appears to have a similar impact on proximate residence as it does on co-residence. Physical functioning problems result overall in slightly stronger positive associations with proximate residence as compared with co-residence. Perhaps the most striking cross-

national divergence occurs with respect to rural residence. While those in rural areas are generally much less likely to live with a child, they are more likely to live proximate to a child in China and Thailand. But, a negative association with rural residence is evident in Taiwan, a country that has witnessed very rapid economic development and urbanization over the last several decades.

Variation in associations across rural and urban areas

We examined whether associations between number of children and co- and proximate residence differed across rural and urban areas by estimating models for each country (with the exception of Singapore) with interaction effects. The interaction effects tended to be statistically non-significant, with the exception of proximate residence in China. In order to present results that can be interpreted intuitively, we display graphically, in figure 1, particular associations across rural versus urban areas. The figure depicts the predicted probability that an individual does not live proximate to any child, that is, they do not live with or near at least one child. The predicted probabilities were calculated holding all other variables constant. So, these probabilities are somewhat heuristic, indicating the chances that an individual who is average in all other ways does not live proximate to a child. The probabilities include the interaction effects in China, since they were significant, but do not include interaction effects for the other countries, since they proved to be non-significant.

Figure 1 highlights the strong negative impact that number of children has on living relatively far from children. Generally, the probabilities decline from about 20% or 30% for those with one child to nearly 0% for those with eight or more children. The probabilities decline slightly less sharply in China, but in rural China we still see that those with six or more children have only about a 10% chance of living relatively distant from all of them. In Cambodia, Philippines and Thailand, there is not much difference in the probability of not living proximate to a child in rural versus urban areas. In China, the probabilities are much higher in urban areas, and in Taiwan they are higher in rural areas.

Over the course of our investigation, we examined a number of other interactions that, due to parsimony and space limitations, we do not show in tabular or graphic form. We examined, for instance, the association between all other covariates (e.g. working status and education) across rural versus urban areas using additional interactions. For the most part, these interactions did not alter the overall findings. For instance, marital status associates strongly with co- and proximate residence in both urban and rural areas. A select few associations proved to be stronger in urban areas. Specifically: work status in Taiwan, marital status in China, and education in the Philippines.

DISCUSSION

Social, economic and demographic changes unfolding in the Asia-Pacific region have brought apprehension about the future wellbeing of elderly populations, especially in regards to the robustness of traditional systems of intergenerational support and old-age security. Declining family size, a consequence of fertility decline, is reducing the availability of children, who are the traditional sources of support for elderly in the region. Urbanization and increasing mobility of labor, a consequence of economic development, is increasing rates of migration and, for the elderly, the physical distance between them and their children. A strict demographic argument, which focuses on the supply of children, suggest that these forces may result in reductions in co- and proximate residence of an older adult with at least one of their children, a consequence that has policy-makers, academics and members of aging populations wary about future support opportunities. But, there are other forces at work in the region - ones that are more cultural in character. These suggest that long-standing normative patterns of familial behavior, which are altruistic in nature, are likely to sustain traditional systems of residence into the future. If analyses of current patterns indicate that small numbers of children lessen the probabilities of living with and near a child, one might conclude that fertility decline may contribute to changes in traditional modes of support and that alternative structures for support of older adults

will be needed to sustain the rapidly increasing elderly populations. Unfortunately, the literature on co-residential living arrangements generally does not focus on associations with number of children, and the evidence that does exist does not provide a clear or consistent picture about the relationship. The ambiguity that emerges from this body of research makes it difficult to draw conclusions about the nature of the relationship and its implications for future support of older adults across the region.

In the current paper, we advance upon previous examinations by assembling six datasets across six Asian-Pacific societies and analyzing the issue through a single lens using a simply defined model that predicts residence probabilities on the basis of number of children, rural/urban residence, age, sex, education, marital status, work status and functional health. Importantly, we also explore the determinants of proximate residence, an arrangement that may offer an older adult a degree of support but may also be a preferred arrangement given changes in attitudes towards independence. By expanding upon the co-resident versus non-co-resident distinction that has held sway in most previous research, our approach allows us to explore how measurement of concepts influences results and interpretations.

Comparative research such as the type performed here is inherently tricky. Results may be influenced by a series of subtle differences that include how survey questions are interpreted across languages, how studies are administered and how national and cultural factors influence the meaning and measurement of things. As such, we prefer to focus our discussion and conclusions around results that provide a sense of the ‘big picture,’ and around issues that are most easily generalized and interpreted. Hence, we highlight several findings. First, across the Asia-Pacific region, we find that, on balance, more children results in a greater probability of living in a proximate situation with at least one.

Second, conclusions we draw are sensitive to measurement. There is some evidence that the association between number of children and proximate residence is more robust than its association with co-residence. Certainly, there is a positive association between number of children and co-

residence, but the nature of the association is somewhat inconsistent and more difficult to characterize. For instance, in four of the six countries, we found diminishing returns of increased number of children on the chances of co-residence. No such diminishing returns were found, for the same countries, on the chances of proximate residence.

Third, despite the generally positive association between number of children and proximate (and to a lesser degree co-) residence, a result that supports the demographic argument about the impact of supply of children, it is still the case that the probability that an older adult does not live with or near a child is very low across the region. The exception is those with only one child, and at the moment, this describes only a small proportion of older adults in the region. It is particularly noteworthy that the probability of proximate residence is high for those in rural areas. Therefore, despite the association between number of children and residence situations, we still do not find much support for the notion that older adults are being abandoned by their more mobile children in rural areas.

Finally, we find results in China to be somewhat anomalous. There is no association between number of children and co-residence in China, and with respect to proximate residence, China is the only country where we notice a non-linear association that suggests diminishing returns as number of children increases from two to eight. Explaining why associations are weaker in China than in other countries in the region is not simple and requires that we speculate on the nature of social, economic and historical differences. To make the case, we might contrast the very noticeable differences that exist between Singapore, where associations are positive and very linear, and China, where the association is non-existent with respect to co-residence and less linear with respect to proximate residence. Both Singapore and China have deeply rooted traditional systems of support for older adults that have been facilitated greatly by co- and proximate residence. Rates of co-residence are, however, much higher in Singapore than in China. Part of this may be a function of the totally urban

nature of Singapore and the resultant housing constraints that make it more difficult for individuals to set up and afford independent residences, and the way in which housing has historically been allotted under socialist systems in China. Moreover, Chan et al. (2003) note that Singapore housing policy favors, if not subsidizes, families that coreside with an elderly parent. Much less difference exists with respect to proximate residence, suggesting that living close enough to an older adult to provide support is still normative behavior for children in China. In comparison to China, Singapore is highly developed and has been on a development path for a longer period of time. Pension systems in the country are well established in comparison to other countries in the region, and particularly in comparison to China (Pai 2006). Therefore, individual characteristics related to need may not be as important in determining residence patterns in Singapore as the more absolute realities related to supply of children. China has a pension system that is not very well established. Filial piety, while being a factor in every country, is particularly important in the psychology of the Chinese family (Whyte 2003). As such, individual needs may be more important determinants of residence patterns in China than availability of children, and as such, the altruistic hypothesis may have greater traction. In support of this, we note that physical functioning has a strong positive influence on co- and proximate residence in China but has little association in Singapore.

What do our analyses suggest for the future of co- and proximate residence in Asian societies experiencing rapid population aging? In some sense, the picture, it seems, is a complex one, reflecting the myriad factors that inform constraints and preferences for residential arrangements. On the one hand, it is fair to say that overall, as fertility declines continue to influence family sizes in Asia, it is likely that we will see declines in co- and proximate residence. At the same time, we reaffirm findings from previous research which indicate that co-residence rates are still quite high, and proximate residence is even more pervasive. Only older adults with one child exhibit relatively high rates of living far from any children. This does not portend well for societies where single child families are likely to

become pervasive, such as China with its one-child policy. But, in places where having at least two children remains common, we would predict rates are likely to remain high into the future. In addition, we acknowledge that other aspects of social, economic and demographic change, besides declines in fertility, may actually make it easier for children to support older adults in ways besides co- or proximate residence. In other words, even in developing Asia, social relations and infrastructures of communication and transportation are changing in such a way that physical distance no longer precludes emotional closeness or the ability to provide support and care to an elderly parent (Knodel and Saengtienchai 2007). In fact, providing care and security to one's elderly parents may, in fact, be enhanced through the sort of spatially-diverse family strategies for income generation and risk minimization that have been elucidated in the new economics of labor migration literature (e.g., Stark and Lucas 1988). Additionally, we cannot forget that where co-residence is no longer observed it is often because it is the wish of older adults to live independently from their children (Bian et al. 1998; Unger 1993). That is to say, at the same time that the means to provide support and care according to traditional approaches are evolving, so too are the residential preferences of older adults. All of this points to the need to examine more carefully, among other things, the types of support that are provided by children living with, proximate to and relatively far from their elderly parents, and the changing ability of older adults to support themselves in the face of economic, cultural and social change.

The analyses presented here chart the commonalities and idiosyncrasies that characterize intergenerational residence patterns in a cross-section of Pacific-Asian societies at various stages of transition. Still, the study has limitations. Clearly, conceptualizations of elderly living arrangements may include a myriad of distinctions in physical and social proximity (Knodel and Saengtienchai 2007). Our concentration on proximate residence is only one such distinction. We defined nearby-residence with reference to living in the same village or, in urban areas, in the same neighborhood as a child.

Definitions of villages and neighborhoods clearly differ across countries as well as across rural and urban areas. Living outside of one's neighborhood, in an urban area, can mean many things, including living in an adjoining neighborhood that can afford close and frequent physical contact. Therefore, our rates of proximate residence with respect to the practical notion of being close enough to be able to provide frequent support are likely to be under-estimated, particularly in urban areas. In fact, the datasets we employ do not explicitly define living in the same village or neighborhood and it is likely that these definitions were self-defined by respondents. Moreover, the surveys we employed were conducted in different years and our comparisons are subject to variations in interviewing techniques, survey administration, language, and other such factors that make comparative research challenging. Yet, despite these problems, our cross-national comparisons were able to generate some consistent patterns that allow us to gain some understanding of the realities that inform co- and proximate residence outcomes. The results presented here are thereby intended as a starting point on an issue that will clearly gain importance as demographic, social and economic changes continue to take hold within the Asia-Pacific region.

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Table 1: Information about the seven datasets used in this study

Country	Name of survey	Year	Main Organizations	N 65+ ^a	Citations	Definition of Proximate residence
Cambodia	Survey of the Elderly in Cambodia	2004	Population Studies Center University of Michigan and Royal University of Phnom Penh	816	Knodel et al. 2005 Zimmer et al. 2006	Lives in same household, next door or same village
China	Chinese Longitudinal Healthy Longevity Survey	2000	Duke University and Peking University	16,020	Zeng et al. 2002 Zeng et al. 2001	Urban : Lives in same household or neighborhood Rural : Lives in same household or village
Philippines	Philippine Survey of the Near Elderly and Elderly	1996	University of the Philippines	922	Hermalin 2002b Zimmer et al. 2004	Lives in same household, next door or same village
Singapore	National Survey of Senior Citizens in Singapore	1999	National University of Singapore	1,215	Hermalin 2002b Jatrana and Chan 2007	Lives in same household , next door or same neighborhood
Taiwan	Survey of Health and Living Status of the Elderly in Taiwan	1999	Taiwan Bureau of Health Promotion	2,890	Chang and Hermalin 1989 Hermalin 2002b	Lives in same household, next door or same village
Thailand	Survey of the Welfare of the Elderly in Thailand	1995	Chulalongkorn University	3,004	Chayovan and Knodel 1997 Hermalin 2002b	Lives in same household, next door or same village

a N's are unweighted

Table 2: Descriptive information by country

	Cambodia	China	Philippines	Singapore	Taiwan	Thailand	Average
Mean number of children	4.2	3.5	5.7	4.8	4.4	5.2	4.7
- std. dev.	2.4	2.1	3.0	2.9	2.1	2.7	2.6
Percent with							
- no children	4.1	4.6	5.4	5.3	4.3	4.8	4.8
- 1 child	9.0	5.7	4.2	6.7	4.7	5.0	5.9
- 2 -3 children	21.6	29.2	11.7	20.9	23.4	16.5	20.6
- 4 -5 children	30.5	39.6	21.5	26.9	39.2	26.2	30.7
- 6 -7 children	23.5	18.4	27.6	22.0	22.9	26.5	23.5
- 8 + children	11.3	2.6	29.6	18.2	5.5	20.9	14.7
Age							
- % 65-69	39.5	39.3	37.2	39.1	33.5	41.0	38.3
- % 70-74	31.1	28.7	29.1	30.0	31.3	26.4	29.4
- % 75-79	17.4	18.2	18.2	18.2	20.4	16.2	18.1
- % 80+	12.1	13.8	15.5	12.7	14.8	16.4	15.7
% Female	60.4	53.0	60.1	57.6	45.5	56.7	55.6
% Working	25.7	20.0	32.2	9.3	12.0	27.3	21.1
% With any education	35.5	48.6	65.5	30.5	58.3	61.4	50.0
% Married	45.2	58.0	47.3	47.9	61.5	54.0	52.3
Mean Disability Score	0.0	0.0	0.0	0.0	0.0	0.0	0.0
- std. dev.	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Table 3: Percent co-residing with, near-residing with, residing proximate to and not residing proximate to at least one child by rural/urban residence

	Country						
	Cambodia	China	Philippines	Singapore	Taiwan	Thailand	Average
Total sample							
N ^a	775	14,689	867	1,152	2,762	2,888	3,855
Percent co-residing with 1+ child	80.1	45.2	68.7	78.9	65.7	73.3	68.3
Percent not coresiding but living near 1+ child	14.1	34.4	23.5	7.4	21.4	18.4	20.2
Percent living proximate to 1+ child	94.2	79.6	92.2	86.3	87.1	91.7	88.5
Percent not living proximate to 1+ child	5.8	20.4	7.8	13.7	12.9	8.3	11.5
In urban areas							
N ^a	141	6,704	379	1,152	1,962	748	1,848
Percent co-residing with 1+ child	92.0	44.9	74.7	78.9	68.8	78.1	72.9
Percent not coresiding but living near 1+ child	0.5	22.9	17.2	7.4	20.4	9.0	12.9
Percent living proximate to 1+ child	92.5	67.8	91.9	86.3	89.2	87.1	85.8
Percent not living proximate to 1+ child	7.5	32.2	7.1	13.7	10.8	12.9	14.2
In rural areas							
N ^a	634	7,985	488	---	800	2,140	2,068
Percent co-residing with 1+ child	79.1	45.4	64.3	---	58.3	72.2	63.9
Percent not coresiding but living near 1+ child	15.2	40.6	28.2	---	23.8	20.6	25.7
Percent living proximate to 1+ child	94.3	86.0	92.5	---	82.1	92.8	89.6
Percent not living proximate to 1+ child	5.7	14.0	7.5	---	17.9	7.2	10.4

a N's are unweighted and limited to those with at least one child

Table 4: Logistic regression odds ratios for co-residing with at least one child across countries

	Pooled with Singapore (N=23,133)	Pooled without Singapore (N=21,981)	Cambodia (N=775)	China (N=14,689)	Philippines (N=867)	Singapore (N=1,152)	Taiwan (N=2,762)	Thailand (N=2,888)
Country effects								
China	1.00	1.00						
Taiwan	2.40***	2.37***						
Philippines	2.45***	2.47***						
Thailand	3.27***	3.34***						
Singapore	4.01***	---						
Cambodia	4.73***	4.80***						
Number children								
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2-3	1.31***	1.27**	0.91	1.20	1.19	2.11**	2.13***	1.10
4-5	1.11	1.07	1.71	0.90	1.35	2.89***	2.53***	1.47
6-7	1.28***	1.24**	2.47**	0.95	1.79	3.68***	3.02***	2.04***
8+	1.73***	1.60***	2.66*	1.24	2.35**	8.91***	3.33***	2.02***
Age								
65-69	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
70-74	0.88**	0.89**	0.83	0.90	0.87	0.67*	0.80*	1.01
75-79	0.88**	0.89*	1.67	0.88	0.70	0.82	0.80*	0.96
80+	0.95	0.95	0.86	1.03	0.48***	0.94	0.63***	0.97
Female	0.89**	0.88**	0.50*	0.95	0.87	1.30	0.80**	0.81
Working	0.68***	0.69***	0.40***	0.66***	0.49***	0.89	0.94	0.84
Has education	0.98	0.97	1.43	1.01	0.89	1.11	0.74***	0.94
Is married	0.45***	0.45***	0.37***	0.41***	0.75	0.46***	0.52***	0.60***
Physical functioning problems	1.11***	1.12***	0.92	1.13***	1.08	1.00	1.11**	1.10
Rural residence	---	0.95	0.35***	1.08	0.58***	---	0.56***	0.73***
LL	-14,586.2	-13,978.2	-352.3	-9,492.9	-513.2	-549.3	-1,711.4	-1,634.5
$\Delta -2 X LL^a$	75.6***	61.5***	17.7***	53.8***	12.3*	52.8***	35.8***	35.4***

*** p < .01 ** p < .05 * p < .10 a Represents the change in -2 X Log-likelihood statistic when adding number of children variables to all other variables in the equation.

Table 5: Logistic regression odds ratios for residing proximate to at least one child

	Pooled with Singapore (N=23,133)	Pooled without Singapore (N=21,981)	Cambodia (N=775)	China (N=14,689)	Philippines (N=867)	Singapore (N=1,152)	Taiwan (N=2,762)	Thailand (N=2,888)
Country effects								
China	1.00	1.00						
Singapore	1.31**	---						
Taiwan	1.81***	2.31***						
Thailand	2.43***	2.20***						
Philippines	2.36***	2.64***						
Cambodia	3.47***	2.86***						
Number children								
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2-3	2.00***	1.99***	2.16	1.87***	2.26*	2.66***	2.72***	1.89**
4-5	2.80***	2.64***	6.66***	2.33***	4.01***	4.46***	6.73***	2.44***
6-7	4.08***	3.61***	14.37***	2.87***	10.01***	6.01***	8.04***	6.59***
8+	5.55***	4.66***	81.62***	2.71***	11.65***	16.14***	11.58***	9.13***
Age								
65-69	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
70-74	0.98	0.97	0.88	0.96	0.62	0.94	1.10	1.16
75-79	0.96	0.93	3.62**	0.86	0.53	1.04	1.14	1.53
80+	0.93	0.89	1.36	0.82**	0.93	1.05	1.09	1.62*
Female	0.82***	0.83***	0.65	0.80***	1.92**	1.30	1.07	1.07
Working	1.49***	1.26***	0.79	1.43***	0.85	1.06	0.90	0.65*
Has education	0.59***	0.65***	1.12	0.65***	0.99	1.17	0.60***	0.55***
Is married	0.55***	0.57***	0.41**	0.50***	1.04	0.47***	0.78	1.05
Physical functioning problems	1.09***	1.09***	0.87	1.08**	1.38*	1.01	1.17*	1.06
Rural residence	---	2.06	1.38	2.41***	0.94	---	0.40***	1.71***
LL	-96788.2	-9181.2	-146.1	-6,866.3	-212.4	-418.6	-966.4	-747.9
$\Delta -2 X LL^a$	451.0***	327.0***	40.1***	143.0***	34.3***	62.5***	115.6***	92.3***

*** p < .01 ** p < .05 * p < .10

a Represents the change in -2 X Log-likelihood statistic when adding number of children variables to all other variables in the equation

Figure 1: Predicted probability of not living proximate to at least one child by country, urban/rural residence, and number of children^a

