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Working Paper

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ADB Economics Working Paper Series, No. 777

Provided in Cooperation with:
Asian Development Bank (ADB), Manila

Suggested Citation: Donehower, Gretchen (2025) : Mapping the unpaid care work economy in Asia, ADB Economics Working Paper Series, No. 777, Asian Development Bank (ADB), Manila, https://doi.org/10.22617/WPS250146-2

This Version is available at:
https://hdl.handle.net/10419/322360

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NO. 777

April 2025

ADB ECONOMICS WORKING PAPER SERIES

ASIAN DEVELOPMENT BANK

ADB

ADB Economics Working Paper Series

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No. 777 | April 2025

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ISSN 2313-6537 (print), 2313-6545 (PDF)
Publication Stock No. WPS250146-2
DOI: http://dx.doi.org/10.22617/WPS250146-2

ABSTRACT

Aging populations in Asia are worried that they are facing a “care crisis,” with many older people in need of care having no one to care for them. However, we do not have a clear picture of current care patterns: How much care is currently being consumed? Who is providing that care? Are women and men serving equally as paid or unpaid caregivers? We explore the methods for answering some of these basic empirical questions about unpaid care work using the National Time Transfer Accounts, which show that older people are far from being a major source of unpaid care demand, but are making net transfers of time to other age groups well into their elder years. In our group of Asian countries (Bangladesh, India, the Republic of Korea, Mongolia, Thailand, Türkiye, and Viet Nam), these time transfers come on average from women.

Keywords: eldercare, childcare, unpaid care work, time use, transfers

JEL codes: J22, J16, J13, J14

I. INTRODUCTION

Care sustains our societies and economies. It brings us into the world at birth, when we would be helpless without the care of family, community, and possibly paid caregivers. It is also at this stage that the creation of our human capital begins. As we grow up, care keeps households running, puts food on the table, and makes sure that we have clean clothes for work and school. Finally, care supports us in old age, as many of us experience failing health and reduced capacities, leaving us vulnerable and unable to sustain ourselves independently. In a world where fertility and mortality rates are changing, and over time, changing the shares of young and old people in a population, it is increasingly important to understand the care economy if we want to maintain standards of living and the overall well-being of the population.

Asia and the Pacific is aging rapidly, making it an important place to study the care economy and develop tools to predict its future. As mentioned earlier, old age is often accompanied by deteriorating health, albeit with great heterogeneity at the individual level, but ultimately most of us will need the care and help of others as we age, certainly more so than in our peak working years. Some of this care takes the form of health care provided by professional doctors, nurses, or other medical personnel, but much of the care is less intensive and provided by unpaid family caregivers. Older people may need help with activities of daily living such as feeding and grooming, or with tasks such as shopping, household maintenance, and cleaning. It may also involve intermittent activities, such as monitoring when older people are able to take care of their finances or manage medical conditions. Quality care of this kind enables older people to maintain their health and independence and enjoy a good quality of life. In the face of an aging population, many policymakers, older people's advocates, and other stakeholders are trying to understand how care needs will change in the future and, in particular, whether a "care crisis" is imminent, where there are many older people who need care but too few providers, so that older people's care needs may not be met adequately or at all. In many societies with low fertility rates, where population aging is expected to be quite rapid, the issue of caring for children may also lack attention. What will the demand and supply of care look like across the age range?

How do we explore the issue of availability of care in a population with a changing age structure? We begin by looking at the data on current patterns of care consumption and production. Since the need for care is highly age-dependent, we look at these patterns by age. Since caregiving is traditionally a gendered task and skill associated with women, we also need to look at current patterns by gender.

If we look at current patterns of care production and consumption as representing supply and demand, we can project the current patterns of our care economy by age and gender into the future to see how the demand and supply of care is likely to change. This paper looks at one type of care—unpaid care work (UCW) provided by unpaid family and community caregivers. Market-based suppliers of care play an important role in the overall care economy. While this paper mentions preliminary efforts to include these aspects, it will primarily focus on UCW as a means of establishing the building blocks for documenting current care patterns in both the paid and unpaid sectors. This effort contributes to this documentation of the UCW economy and can be combined with future work on the paid care economy and their interaction.

This paper confines its geographic scope to Asia and the Pacific. The UCW economy will have specific features in this region compared to others. Overall, Europe is currently the oldest region

in the world and the majority of the population lives in wealthy countries. European governments therefore have more resources and potentially more flexibility to meet care needs through a combination of paid and unpaid providers. The demographic transition in Europe, where the population has moved from high to low fertility and mortality, has also been much slower than in Asia and the Pacific. Asia and the Pacific is therefore aging rapidly, but is likely to have fewer resources relative to population size compared to Europe and therefore may not be able to meet any increase in care demand through paid care. This makes the focus on UCW essential in many countries in the region.

Given the importance of focusing on UCW in Asian and Pacific countries, the first objective of this project is to document regional patterns of unpaid care. Time use surveys (TUS) provide the data necessary to determine how much unpaid care older people consume in units of time. To estimate the market value of unpaid care consumed, this time can be weighted by the imputed replacement wages that would be earned if the person providing the care were an "average" market provider, although this paper focuses only on the time-valued estimates.

The National Transfer Accounts (NTA) project is an international research network that focuses on understanding the age dimension of our economies and has contributed important insights into the study of the economics of aging (Lee and Mason 2011). The NTA contributes to the understanding of UCW through the development of the National Time Transfer Accounts (NTTA). The NTA project provides empirical estimates of how countries produce, consume, save, and share market-based resources by age, and the NTTA produce the same empirical estimates for nonmarket-based UCW. Since UCW is traditionally thought of as "women's work," the NTTA estimates are disaggregated by gender so that we can understand the gender dimension of the production and consumption of UCW. The countries in Asia and the Pacific for which these estimates are available are Bangladesh, India, Mongolia, the Republic of Korea (ROK), Thailand, Türkiye, and Viet Nam.

In the context of global population aging, estimates of unpaid care are important to countries seeking to understand what care is likely to be needed in the future. Thus, the second objective of this project is to use the estimated patterns of current UCW to project the demand and supply of care for older people in the face of the changing age structure of the population. These projections provide insight into whether there will be a mismatch between the supply of and demand for UCW in the future if the age patterns of care production and consumption remain the same but the age structure of the population changes. This approach, which combines estimates of the per capita participation of people with certain characteristics in a particular type of work with population projections, is often used by policymakers who want to understand the future labor force (Toossi 2006). Here, this standard method is applied to the projection of the unpaid care workforce and the consumers of this work.

The paper ends with a review of the results and a discussion of the policy insights.

II. DATA AND METHODS

A. Overview of the National Time Transfer Accounts

The National Time Transfer Accounts join in the long-standing work of social scientists who have critiqued standard measures of economic activity for various reasons, one of which has been that they leave out UCW (The Economist 2016; Waring 1999). National accounts (United Nations 2009) is the system of cross-country comparative estimates of economic flows that forms the basis for such well-known economic aggregates as gross domestic product. Since its inception in the years following the Great Depression, it has become an incredibly influential part of the global practice of economic and financial research and monitoring. However, like any other measurement system, it has strengths and weaknesses as well as built-in assumptions. It includes some things in its definition of an economic flow, but excludes others. It includes flows that result from the production and consumption of goods and services that are traded for money and are usually referred to as "market goods and services." However, it is not exclusively market-traded goods and services, as the national accounts also include some flows that are not traded for money in markets. The value produced by owner-occupied housing consumed by residents is included, as are some other types of financial transactions and services that are not bought and sold in markets, such as corporate "goodwill." These flows are not traded, so economists and accountants must use indicators for these flows and make an educated guess as to their value in the national accounts (United States Bureau of Economic Analysis 2008). The production and consumption of goods produced by households for their own use, mostly the value of food grown by a household for its own consumption, is another type of flow that is not traded in a market but whose value is imputed into national accounting measures of total production and consumption. What remains specifically outside the production boundaries of the national accounts is the value of home-produced services.

There are many terms used for this type of production: UCW, household production, unpaid household services, and others. We will use the term "unpaid care work" here. UCW includes the productive activity of people that is not already accounted for in the national accounts. It includes time spent on direct care activities, such as caring for children, older people, sick or disabled people, and caring for the community through volunteer activities. It also includes indirect care activities in connection with managing and maintaining a household. Cooking, cleaning, laundry, and household management and maintenance are all examples of indirect care activities.

UCW is increasingly recognized as a valuable economic activity. Statistical agencies and international measurement and monitoring bodies such as the International Labour Organization and the United Nations explicitly include it in their work plans, goals, and reports. The United Nations has included aspects of UCW as points in its set of Sustainable Development Goals that relate to gender equality and International Labour Organization (2018). In the wake of the ongoing impact of the coronavirus disease (COVID-19) pandemic, new attention has been paid to the role of UCW in maintaining societies. The closure of schools transferred a massive sector of the paid care economy from teachers to parents seemingly overnight, while the arrangement of working from home meant that household production was no longer hidden all day from an adult working outside the home. These and other pandemic impacts have given new importance to the study of the care economy.

Despite progress in recognizing UCW, we are still a long way from having consistent, comparable data across countries on UCW as we have for measures such as gross domestic product and labor force participation. In the meantime, for this project, we are creating these measures for ourselves by following the long-standing methodology developed by researchers to estimate the production of UCW by using TUS to measure how much time people spend on this type of production (Landefeld, Fraumeni, and Vojtech 2009; Abraham and Mackie 2005).

What the NTTA approach contributes to this methodology is a framework that explicitly acknowledges the role of age in determining much of the variation in UCW production. Since UCW is largely determined by the age-related processes of birth, marriage, household formation, aging, and death, a focus on the age dimension is necessary to understand UCW and develop appropriate policies around it. Much work on UCW has focused on a particular age group with a very wide age range, rather than looking at how UCW patterns change by age. In some countries, where age-dependent phenomena such as marriage occur at a particular age with little variation across individuals, age group averages can obscure much of the UCW patterns we are trying to understand.

In addition to an improved focus on age, the NTTA approach shows us the transfer of UCW between individuals, but not only the production. To get the other side of the exchange, we can apply the NTA framework (Lee and Mason 2011; United Nations 2013), which has established methods for imputing the consumption of market goods and services to individuals from survey data, showing the consumption only at the household level. Applying this methodology to UCW services reveals the same system of transfers between individuals in the UCW economy that the NTA has revealed in the market economy—young and old people in different countries and regions have different levels of "dependency" relative to the productive capacities of the peak working age of workers, and these workers provide for the needs of young and old dependent people in different ways and with different generational arrangements.

This is a hybrid methodology in which the estimates of household production satellite accounts are combined with the NTA framework to impute consumption and transfers. This hybrid methodology is called National Time Transfer Accounts and was developed by the Counting Women's Work project (National Transfer Accounts 2017). It brings more detail to the age dimension of UCW than previous research and is therefore also suitable for the study of UCW in aging societies. In addition, it includes a methodology for imputing UCW consumption and transfers that would be much more difficult to observe directly.

B. Production Estimates of the National Time Transfer Accounts

To generate the NTTA estimates, we follow the long-standing research tradition of household production satellite accounting (Pan American Health Organization 2010). The methodology requires TUS data. Some TUS are in the form of time diaries, in which respondents are asked to account for all of their activities, one after another, during a given time window, usually 24 hours or 48 hours. These activities are then coded using a comprehensive coding scheme. Another type of TUS data available is a comprehensive set of questions about how much time respondents spent on a range of specific activities. If the activities asked about are sufficiently detailed, the time spent on a complete set of UCW activities can be determined and a comprehensive picture of UCW can be obtained.

With all the ways a person could spend their time, how is one to decide which activities qualify as UCW? We want the NTTA to include activities that would be included in the national income if they were performed for wages and not by nonmarket labor. One way to determine whether an activity meets this standard is the "third party criterion": you can pay someone else to perform the activity and still reap the benefits (Reid 1934). Activities such as sleeping, eating, sports, and leisure activities would not be included because paying someone to do them would not give you the benefit of them. On the other hand, any home management or care activities would fall under the criterion because you could pay someone to do them and benefit from the service. Another way to think about which activities to include is that they must not be recorded as part of national income in its current form, but could be if they were contracted for instead of unpaid.

The separation and definition of different activities is an important part of the methodology, and there are many ways to classify activities. The countries in this study use different classifications adapted to their own contexts and needs. The coding schemes and which activities qualify as UCW in each country are available in the Appendix.[1] The variation across the countries included how detailed they are able to account for care. Usually, the surveys differentiate between childcare and all other types of care. This limits the ability to analyze eldercare, but fortunately we still have the age of the producer of the care and the household structure to give us clues on whether care is being produced or consumed by an older person. One limitation of the study is that TUS coding schemes vary by time and place. Another potential source of uncertainty is the respondents' interpretation of what is being asked and the application of a particular scheme by the activity coders.

Once all UCW activities have been identified, we can estimate the time each respondent spent on each type of UCW and then calculate the average time of respondents by age and gender. As mentioned earlier, the life-cycle nature of care phenomena highlights the need for the age detail. The separation of production estimates by gender acknowledges the historical division of labor between men and women. As will be shown, there is no country in this study where women are not the main suppliers of UCW. Therefore, an "average" that is not gender disaggregated is bound to be misleading. We smooth the gender-specific age schedules of care production using a cross-validation smoother called Friedman's Supersmoother (Friedman 1984) to reduce sampling noise and make the figures easier to view.

A final note on estimating UCW production concerns the issue of supervisory care, which is also related to the issue of "multitasking." Some surveys try to assess the extent to which people engage in more than one activity at a time. They may ask respondents to find out if any activities were done simultaneously or if there was a secondary activity that the respondent was doing at the time they reported the first activity, or they may focus on a specific type of multitasking, such as having supervisory responsibility for young children while doing another task at the same time. Unfortunately, the variation in accounting for multitasking in the surveys means that they are not very comparable from country to country. Therefore, they are not included in this analysis and only the reported primary activity is examined here. However, research that does include multitasking suggests that it is of large magnitude (Folbre 2015). Another way to approach this issue is to infer supervisory time by assuming that parents are responsible for their children whenever they are in the same household (Suh and Folbre 2016). This makes sense given the legal frameworks in some countries that penalize parents who have neither personally cared for

[1] The Appendix is available at http://dx.doi.org/10.22617/WPS250146-2.

their children nor made provision for others to supply supervisory care. A similar dynamic in supervisory care could have an impact on estimates of eldercare. While this study is not able to produce cross-nationally comparable estimates of multitasking or supervisory care, it is hoped that TUS will become an accepted tool for measuring these additional care needs in the future, and that future research can incorporate this into cross-country comparative work.

C. Consumption Estimates of National Time Transfer Accounts

We do not directly observe how people consume the value of time documented in the NTTA production account. Instead, we use assumptions to allocate the value of this time to consumers in the household.

For general housework activities, also called “indirect care,” the time produced is divided equally between all household members. For example, in a household with four members, a TUS respondent reports spending 1 hour on cooking on the day of the survey. The consumption of cooking time for the four people in this household on this day, including the survey respondent, is assumed to be 15 minutes each. Theoretically, this makes the most sense as the consumption of these activities is generally uniform across the household, or at least the data to make finer distinction of consumption, e.g., which family member consumed how much at each meal or how many hours each household member spent at home, is not similarly available across multiple countries.

For direct care activities within the household, this equal allocation would not be reasonable. Very young and much older people require much more direct care than people in midlife. Instead of the equal allocation method, we use a regression approach that uses the association between care production and household structure to create weights for care consumption by age and gender. These weights are applied to the household care produced in order to apportion the amount of direct care produced in a household to the individuals in that household.

Specifically, when households are observed to each produce some amount of childcare, we estimate a household-level regression model for the survey data for each producer of direct care. We regress the amount of childcare made available by producer on the number of household members in each age and gender group of children. The regression coefficients for each age and gender group then become weights that can be used to apportion the household amount of childcare produced in each household by each time use respondent to each child in that household. Similarly, we regress the household production of adult care on each time use respondent and the number of adults in each age and gender group. Note that for both types of care, the producer of care is not included in the household structure data used in the regression estimation, even if he or she is in the target age group, because he or she is not a potential target of care. (Coding of self-care differs from caring for others in all activity schemes.) This regression approach is limited because it relies only on detecting variability between households with different age and gender compositions and cannot detect differences within households where individuals of similar age and gender may actually receive different levels of care. This is most relevant with regard to gender differences in care consumption estimates. Our ability to detect different amounts of care given to men and women of the same age living in the same household is minimal. Overall, our estimates of gender differences in care consumption must therefore be regarded as a lower bound.

To be more specific about the regression method for imputing consumption, a regression equation is estimated for each potential care producer (i.e., for each household member asked to fill out the TUS questionnaire) and for each type of direct care as follows:

$$X_j = \sum_a \sum_s \alpha(a,s) E_j(a,s) + \varepsilon_j$$

where X_j is the amount of a particular type of direct care time produced by the survey respondent j, $E_j(a,s)$ is the number of members age *a* and gender s in the household of the survey respondent where those household members are "enrolled" in the care target age group, i.e., they are in this age group. Age *a* is grouped in 2-year groups to reduce noise. The regression coefficients indicate the extent to which more care of a particular type is produced in households that have more members of a particular age/gender group. The positive $\alpha(a,s)$ coefficients resulting from the regression are then assigned to the relevant age and gender groups and used as weights to distribute the time provided to household members as consumption.

For the time spent caring for persons outside the household, production is assumed to be consumed by all persons in the target population, using the age profile of the consumption of care provided to household members as weights. This assumes that the care provided by non-household members is consumed in the same relative amounts as the care provided by co-resident household members.

Once all production has been imputed to consumers, only the age- and gender-specific average amounts of imputed consumption for the persons in the TUS need to be calculated to create the age and gender profiles. We smooth the gender-specific consumption schedules by age in the same way as for the production schedules.

D. The Household Roster

In the previous section, the imputation of UCW consumption leans heavily on the household structure. In some TUS, these household structure data are available together with the time-use data collected, in the form of a complete roster of household members by age and sex, regardless of whether they were selected as time-use respondents or not.

For other TUS, the full household roster is not available. This is the case for Bangladesh and Thailand in the group of countries included in this study. In these cases, an alternate source of household structure data was used: census samples available through the Integrated Public Use Microdata Series (IPUMS) International Database (Minnesota Population Center 2018).[2] These samples provide complete listings of household members by age and gender, which can be combined with the time use data on production of UCW activities. The TUS and census household rosters are generated by identifying as many matching variables as possible: (i) household size; (ii) household head characteristics such as age, gender, marital status, and education; and (iii) any other variable that is asked similarly enough in the two data sources to allow for a match. The average amount of UCW activity production is calculated from the TUS in the cells defined by all categories of matched variables and then imputed into individuals in the census sample with the

[2] The author wishes to acknowledge the statistical offices that provided the underlying data included in IPUMS International, which made this research possible: the Bangladesh Bureau of Statistics, and the National Statistical Offices of Bangladesh and Thailand.

same categories of matched variables. In this way, the estimates of time-use production for Bangladesh and Thailand are placed in a context where the full household roster is available, making it possible to estimate the consumption of UCW time.

E. Transfers of National Time Transfer Accounts

For the sake of simplicity, we assume that UCW time is consumed at the same time as it is produced. Therefore, the total production of UCW time must equal its total consumption and no aggregate net transfers are possible. This applies to the population as a whole, but not to individuals or groups within the population. To estimate the transfers, we distinguish between indirect care and direct care.

In the case of direct care, all production is by definition consumed by others (care for oneself is classified differently from care for others and does not fulfill the third-party criteria mentioned earlier). Thus, the transfer outflow of direct UCW equals the production and the transfer inflow of direct UCW equals the consumption.

In the case of indirect care activities such as general housework, the transfer outflows are not the same as production. Since we assume that all indirect UCW benefits all individuals in the household equally, a producer does not transfer all of his own production of indirect UCW, but consumes part of it himself. The transfer outflow is therefore the portion of the production that the producer does not consume himself, and the transfer inflow is the consumed portion that the producer did not produce himself. Referring to the example of the cooked meal produced in 1 hour of a household member's time and shared by him and three other household members, the cook produces 1 hour of cooking time but transfers only 45 minutes of this time to other household members. He consumes 15 minutes himself, which is not a transfer.

F. Care Support Ratios and Population Projections

Once we know the empirical facts of the current UCW economy based on the age profiles of UCW production, UCW consumption, and UCW transfers, we would like to imagine how this economy might change in the future. One way to do this is through a thought experiment: "What if the care economy remained the same in terms of average production and consumption by age and gender, but the number of people in these categories changed?" This is a straightforward calculation in which the NTTA estimates for production and consumption remain constant, while the age and gender structure of the population is changed using a population projection into the future.

The population projections are taken from the United Nations World Population Prospects database (United Nations Department of Economic and Social Affairs 2019), and the "medium variant" of the projection is used. The estimated population in 2020 is the starting point, and the population by age and gender is projected up to 2100. These projections continue the trajectory of population aging for most countries, with a continued gradual decline in mortality and longer life expectancy, as well as continued gradual decline in fertility for countries with fertility above the replacement level and a gradual increase in fertility above the replacement level for countries with fertility below the replacement level. All countries considered here start the projection period in 2015 with fertility at or above replacement level, except Thailand and the ROK, which start below replacement level. Therefore, a gradual decline in fertility is projected for all countries except Thailand and the ROK during this period, while Thailand and the ROK show a slight increase.

The calculation described above, in which the per capita curves of UCW demand and supply are weighted with the changing population figures, creates a UCW support ratio. This type of support ratio is a more empirically informed version of dependency ratios, which are simply ratios of the population age groups. Support ratios have been used extensively as part of the NTA project (United Nations Department of Economic and Social Affairs 2017) to understand the impact of population aging on the market economy, and in other versions have also been proposed for the care economy (Robine, Michel, and Herrmann 2007).

Specifically, the calculation for the UCW support ratio in year *y* (*$UCWSR_y$*) is as follows:

$$UCWSR_y = \frac{\sum_a \sum_s UCWP(a,s)\ N(a,s,y)}{\sum_a \sum_s UCWC(a,s)\ N(a,s,y)}$$

where *N(a,s,y)* is the projected population count of persons age *a*, gender *s*, in year *y* from the United Nations World Population Prospects database, *UCWP(a,s)* is the average amount of time produced by persons of age *a*, gender *s* as estimated using the NTTA methodology for the most recent year available for a particular country, and *UCWC(a,s)* is the average amount of time consumed by persons age *a*, gender *s* as also estimated using the NTTA method, for the most recent year available.

The UCWSR is basically a ratio of projected aggregates of production and consumption of UCW used to represent a future view of supply relative to demand. If the supply and demand age groups shift in the future, the market can become unbalanced. If projected demand exceeds supply, there may not be enough care available for those in need. If the opposite is true, time may be freed up in the future for purposes other than the provision of care.

These basic projections are carried out at different levels, e.g., for eldercare only, or for direct care only, or for all types of care combined. Each analysis reveals a different aspect of the care economy that may be under demographic pressure in the future.

III. RESULTS

A. Measuring the Unpaid Care Work Economy

Following the methods discussed in section II gives a full picture of the UCW economy in a small, diverse group of countries. To learn what these pictures reveal, the discussion of the results follows a series of comparative figures showing the same estimates across all age groups for the seven countries included in this study. The figures proceed as follows: the amount of time spent on work by age; gender aspects of work by age; UCW production, consumption, and transfers; projected changes in the population age structures; and finally, projected care support ratios over time.

1. Work Time by Type

Figure 1 first shows smoothed lines for the average time spent on UCW (solid lines) or market work (dashed lines) in hours per week for each of the seven countries in Asia and the Pacific. Market work includes time spent earning wages, but also time spent working for a household enterprise or farm, even if the person did not receive wages for this work. Such unpaid family workers in market-based enterprises are already considered market workers in many statistical

systems, and their production is imputed in the existing national accounting framework. The market work estimates also include time related to market work, such as commuting time or time spent looking for work. This time is usually not paid but is required for work or job search and is therefore not available for other activities such as leisure, self-care, or education. It also effectively reduces the hourly wage that the worker receives.

The UCW estimates (solid lines) include the time spent on direct and indirect care. As already defined, indirect care includes general housework such as cooking, cleaning, laundry, household maintenance and management as well as errands such as shopping for goods or using household services. Direct care includes caring for children or adults or caring for the community through volunteer work or caring for non-household members. As mentioned in the methodology discussion, only primary activities are included.

Each country's TUS has a specific age limit for children below which children's data are either not collected from them or are collected through a second-hand report from an older household member. For the purposes of this analysis, it is assumed that children in these unobserved age groups produce no work at all. For some of the countries studied here, this will be very inaccurate, but without further data this is a necessary simplification. Collecting accurate time-use data for younger children is possible and shows that children are doing a lot of work in some contexts, both UCW and paid work or work in family-owned farms and businesses (Morrow and Boyden 2018). However, these data collection methods differ from the available TUS data used here.

In several of our countries (Bangladesh, Mongolia, Türkiye, and Viet Nam; and the ROK at the oldest ages) we see age groups where people spend as much time, if not more, producing UCW as they do produce market work. However, in India, Thailand, and working-age in Mongolia and the ROK, market work is greater, but a large amount of UCW is still produced in these age groups. This finding is important because it shows how the "invisibility" of UCW affects both official statistics such as labor force participation and people's perceptions of work. A large proportion of the work people do become unimportant because it is not included in official definitions of work.

In the oldest age groups, UCW is generally higher than market work. In countries where market work declines more with age—in other words, in countries where retirement from market labor, or at least a significant reduction in working hours, is common with age—UCW time remains at a similar level from working ages onward. Again, we can imagine the impact of the "invisibility" of UCW, given how much of it is done by older people. We tend to think of withdrawal from the labor market as the end of older people's work lives, but these UCW patterns show us that if we count all work, our working lives continue.

With the exception of Bangladesh and India, it is common to see a double hump shape in the solid line indicating the UCW time. In general, the first peak follows age groups that are in the most time-intensive phase of bearing and raising young children. Slightly older age groups experience a trough as children grow and require less care and then begin to leave home. Then age groups 10 to 20 years older than the trough experience another peak. As we will see later, some of these are grandparents caring for grandchildren, some of it is caring for an aging spouse in poor health. Some of this is due to indirect care work, which takes longer due to lower productivity from an aging body.

In contrast to the double hump shape of the UCW, market work generally has the shape of a single hump, and in India and Bangladesh both the UCW and market work have a single peak. With the exception of Bangladesh and Türkiye, none of the countries appear to have the same

age group that spends the most hours on market work and UCW. Instead, the age groups of peak work intensity differ by type of work, possibly indicating workload sharing practices between age groups in families.

Some caution is needed in interpreting these figures and comparing the differences between countries before proceeding. One obvious issue in interpretation is that the TUS data available for each country comes from different years. Most are recent and come from a fairly concentrated number of years, but India is an important exception. For many years, the 1999 survey was the only comprehensive, nationally representative TUS in India. That has certainly changed now, although we can at least note that female labor force participation in India has not increased since 1999, and has actually decreased.

Data from a new time-use study conducted in 2019 was available after the initial publication of this paper. The results of this more recent data are presented in the Appendix and the results are compared with those of 1999. Consistent with lower female labor force participation, we see in these results that women do less market work and much more unpaid care work in 2019 compared to 1999 in most age groups. So, the more recent picture of India shows a greater gender segregation of labor, not less. New data from 2019 has also become available for Mongolia since the initial publication. However, compared to the 2015 results described here, the picture in Mongolia from 2015 to 2019 is very similar. Details can be found in the Appendix.

Apart from the fact that samples are coming from different years for different countries, part of the variation from figure to figure for different countries could be due to different types of surveys in different countries or different understanding of the survey instrument in different cultural settings. Therefore, it is a more reliable approach to evaluate whether internal patterns of differences within each country—by age, gender, type of work—vary across the sample of seven countries than to look at the absolute differences in point estimates of a particular age and/or gender group between two countries.

2. Gender Differences in Work Time by Type

As mentioned earlier, part of what we want to understand about UCW is how it fits into the gendered economy—the system of norms, laws, preferences, and any other social or political institutions that differentiate the participation of men and women and girls and boys in economic life. This means that we need to set aside notions of the “average” person and look at the patterns of men and women separately.

Figure 2 shows the same information as in Figure 1, but with each black line for average work by age divided into a blue line for men and a red line for women. Market work is still a dashed line and UCW is a solid line. The breakdown of the work lines by gender shows that the economies in the seven countries are very different. We have examples such as Bangladesh, where men and women are very similar in terms of working hours by age, but in exactly opposite sectors. This is also the case in Türkiye. Then there are countries like Viet Nam, where the genders are more similar in terms of their working lives by age.

Figure 3 illustrates the gender differences by plotting the difference between the male and female lines for each type of work. The differences are expressed as female minus male estimates. Lines above zero thus indicate that women do more of this work than men, while lines below indicate that men do more than women.

The lines in Figure 3 for UCW (solid green) are generally above zero at all ages (there is a tiny exception for the oldest Vietnamese individuals), showing the broad pattern of female specialization in UCW. The lines for market work (dashed green) are generally below zero at all ages, indicating male specialization in market work. The solid black line is the gender difference in total work and is the sum of the lines for UCW and market work.

Gender differentiation is highest at ages 20–40 and lowest at the youngest and oldest ages, which is consistent with the life cycle process of childbearing and child rearing triggering the greatest demand for UCW. This is a significant finding to keep in mind when trying to understand older people and work: while the magnitude of the gender difference in work is smaller in the oldest age groups compared to peak working age, these older people are likely to have spent their adult lives in a world that was much more gender-segregated and will therefore still feel the effects of the gendered economy, even if the actual differences in work are smaller.

The gendered economy of female specialization in UCW and male specialization in market work is remarkably consistent across countries, but the extent of gender differentiation varies. Bangladesh, India, and Türkiye show the greatest magnitude of differences between men and women and thus also the highest degree of gender-specific specialization by sector. In Mongolia, Thailand, and Viet Nam, the differences are much smaller; the ROK is in the middle. If we look at the largest gap between UCW and market work as an indicator of gender segregation in economic life, the seven countries in order of greatest to least segregation are India, Bangladesh, Türkiye, the ROK, Mongolia, Thailand, and Viet Nam. However, some of the largest gender gaps in total work in Figure 3 (the solid black lines) are in Mongolia and Viet Nam, suggesting that a lack of gender segregation is not associated with an "advantage" of less total work.

What Figures 2 and 3 seem to show are in fact three different gender systems for work. In Bangladesh and Türkiye, one could say that the picture is symmetrical but segregated: women perform almost as many UCW hours as men in the market in terms of age, and men perform as many UCW hours as women in the market. The gender difference in total work is small in Bangladesh, with women doing slightly more total work on average than men at a young age, but this reverses as they get older. In Türkiye, women's higher total work performance is more consistent across all age groups. It may be worth nothing that these two countries have the characteristic of being predominantly Muslim, with a historical legacy of cultural practices that favored gender separation for those not living in the same family.

In Mongolia and Viet Nam, we see a "second shift" pattern where market work looks more gender-equal, but UCW is quite unequal. These two countries have the characteristic of communist regimes currently or historically that emphasized gender equality in market labor force participation, but did not seem to stress the role of worker equality within the household with the same vigor. Similar patterns have been documented in former communist countries in Europe, such as Slovenia and Hungary (Sambt et al. 2016).

Finally, in Thailand and India, we see a pattern consistent with growing economies that are more willing to let women work in the marketplace, but still have very traditional ideas about what work is appropriate for men. Thus, in these two countries, women's work lives seem to be more evenly divided between UCW and market work, while men's working lives are almost completely segregated to market work. The ROK also appears to fall into this category, as women in many age groups spend roughly the same amount of work hours on UCW and paid care work, while the lines for men are highly differentiated and men do very little UCW. It is interesting to find the

ROK in this group because it is the wealthiest and most highly industrialized of the countries included and yet has gendered economic patterns that follow more traditional lines, at least for men.

Note that in the updated images for Mongolia, there is a great deal of consistency between 2015 and 2019. However, the 2019 image of India looks more like Bangladesh, while the 1999 image of India more closely resembled to Thailand. See the Appendix for more details.

It is interesting to note that the fertility rates of individual countries in the year of the TUS are not related to the degree of economic gender segregation. Certainly India's total fertility rate (TFR) of 3.38 children per woman in 1999 is the highest in this group of countries and is consistent with its high gender segregation, but Mongolia is the second most fertile country with 2.64 children per woman, but has a far lower economic gender segregation than Bangladesh with a lower TFR of 2.24 (India's TFR is 2.11 in 2019). Türkiye's TFR of 2.07 is close to Viet Nam's TFR of 1.96, but the gender segregation is quite different. Thailand, with a TFR of 1.51, has a relatively low fertility for the group, but a similar gender segregation to Mongolia with its higher fertility. The ROK has the lowest fertility of the group of seven at 1.20, but the degree of gender differentiation at work is roughly comparable to Türkiye, whose fertility is in the middle of the group. (Fertility rates are from the World Bank's World Development Indicators database [World Bank 2017] and the fertility shown is for the TUS year for each country.) This suggests that gender differences at work are not biologically determined, as our role in fertility is the most biologically determined aspect of our lives. In other words, the gendered economy is not driven by biological aspects of childbearing and childrearing, otherwise it would look the same in countries with the same fertility. While the general nature of gender specialization is the same in all seven countries—women do more UCW than men and men do more market work than women—there is wide dispersion around this central tendency, resulting from the different history and culture, as well as the different policy choices each country has made that affects firms, households, and individuals.

If we focus on the lives of older people, we find that older people in all countries spend less time working than those at their peak working age, but still do considerable amounts of work. In most of the countries in this sample, the majority of work for people aged 80 and older is for women doing UCW. The exception is India, where we see men doing substantial market work at these ages (this is true for the earlier 1999 picture and is generally still the case in 2019), and in Viet Nam the UCW of men and women in the oldest groups is roughly equal. We also see that the concentration of work by sector is shifting away from market work and toward UCW for older people. This is another reminder of the impact of the invisibility of UCW—the invisibility of the economic reality of older people. When considering gender differences in work in older age, it should be noted that the shift in working life toward more UCW is a greater change for most aging men than for most aging women. In some contexts, men may perceive this change as negative if their culture has strict expectations of what is acceptable work for men.

3. Including Consumption and Transfers

We now include the consumption side of the care economy in Figure 4, which shows the age patterns of production, consumption, and net transfers of UCW. The blue production lines in Figure 4 are the same as the lines for UCW in Figure 1, but we now include estimates of who consumes these UCW services by age. (The scales of the two figures also differ because net transfers can be negative, so the UCW production lines do not look exactly the same.) The consumption line is shown in green.

Since we make the simplifying assumption that UCW is consumed at the same moment that it is produced, the difference between the production and consumption lines equals the net transfers of UCW, shown by the dashed purple line. This is a distinguishing feature of the UCW economy compared to the market economy: in the market economy, there are instruments that ensure that the time of production does not have to be the same as the time of consumption. We can take out loans to consume today, but repay them with the earnings at a later date. We can produce today and store that production through physical or financial resources and use these resources for consumption at a later date. UCW services, however, are generally consumed at the moment they are produced—we eat the meal immediately after it is cooked. Certainly there are small time differences, such as consuming a clean house after it has been cleaned, but generally the service is consumed near the time of production, and there is no way to save or borrow UCW except through informal obligations to transfer it to other people.

A look at the green consumption lines shows that children are the largest consumers of UCW, but the level of this consumption varies from country to country. (Note that the green consumption line converges with the purple transfer line at the youngest age, as children do not produce any care themselves. Their total consumption is a transfer from people of older age.) Vietnamese and Korean infants are estimated to consume more than 60 hours per week of UCW, while Bangladeshi infants consume just more than 20 hours per week. This is partly due to the mathematics of consumption imputation; the care work produced in a household is divided among the people in that household, or the children in that household if childcare is involved. More potential consumers per household, as is the case in countries with higher fertility and more young children, therefore lead to smaller shares for each person. So household structure overall will have a significant impact on consumption estimates, but this is not just artifactual. Households are the main structure through which private transfers flow from net producers to net consumers. Larger household sizes and more household complexity are partly a strategy to share resources, not just a mathematical fact.

From the age of about 15, the consumption curves flatten out in most countries. In Mongolia, the ROK, Türkiye, and Viet Nam, UCW consumption is slightly higher in the older age groups than in working ages, but there are no major differences in the other countries.

It is important to distinguish between consumption and transfer. Age groups that consume care but produce about the same amount will not make net transfers to other age groups. Individuals in these age groups may transfer a large amount of UCW services to others, but if net transfers are zero, they may produce about the same amount of UCW that others provide for their consumption. Children are the only significant recipients of net transfers in all figures. Net transfers are slightly positive for the oldest individuals in all countries (the dashed purple lines go from positive to negative for the oldest age groups). This means that the oldest people in each country receive net transfers, but the size of these transfers is much smaller than the transfers to young children. A final observation on transfers is that adults aged 20–40 are the largest net producers of UCW time, with their dashed purple line having the largest negative values.

So what this picture tells us is that children are much more costly in terms of UCW time than older people. This is not because older people consume so little care. In fact, they consume about as much as working-age adults, or at least not much more. Instead, older people in the UCW economy are so different from children in the UCW economy because they produce about as much as they consume during the UCW period, so that on average only small net transfers are required at the oldest ages. This finding does not support the idea that an aging society is heading

for an impending “care crisis,” Nor does it support the idea that the oldest people in these countries are massive users of care services.

However, these conclusions are very tentative. Such a result should be carefully examined and needs much replication before it is accepted as fact. Other explanations must be ruled out. For example, it could be that caring for older people is much more difficult to measure than caring for children. This could be the case if adult children classify activities such as telephone calls or visits to older relatives as social or leisure activities, even though they are also caretaking activities, such as cleaning or doing household chores for an older person, or simply checking on their well-being and condition of the household. Ideally, we would want to be able to include the secondary care activities associated with the primary activity of socializing, but many surveys do not include this type of data.

Another important qualifier on these results is that they are averages for age groups, which can hide large differences between groups within the average. This has already been discussed in relation to gender: the “average” person does not really exist in a context where so much population-level variability is determined by the person’s gender. There are certainly other characteristics, such as the region or urban and/or rural status of the household or socioeconomic status, that can also mark sharp dividing lines in the shape of the care consumption age profiles.

4. Gender Differences in Transfers of Unpaid Care Work

In the previous section, it seemed that older people largely provided for their own care needs, at least on average. We now want to understand how this “average” is influenced by the gendered economy. Figure 5 shows the same line of net transfers as in Figure 4, but disaggregated by gender. What was the dashed purple line for the overall average in Figure 4 is now a dashed red line for women and a dashed blue line for men.

As a note of caution, the interpretation of gender-specific time transfers in Figure 5 must be qualified based on the limitations of the methodology. Recall that net transfers are the difference between production and consumption. The gender differences in UCW production come directly from the TUS, where we can observe how people spend their time, and we also know their gender from the survey data. The consumption estimates come from dividing all housework produced in the household equally among household residents of known age and gender, and from numerical methods that develop age- and gender-specific weights to divide direct care produced in the household among household residents. Therefore, these estimates are limited in detecting UCW when there are gender differences in care consumption among individuals of the same age within the household. They are also limited when there are types of care that are not recognized as “care” by survey respondents, such as the socialization with older people mentioned above.

Given these limitations, we must interpret the gender differences in net transfers as a “lower bound” on the true difference in transfers for men and women. Even with this limitation, however, we see in all countries that women make net transfers of UCW and that men receive them. Only in Viet Nam is there a notable age group of men who make net transfers of UCW to other age/gender groups. In most of the countries shown, older women make net transfers of UCW even to the oldest age group, or net transfers are zero, indicating that they produce as much UCW as they consume. In India, Mongolia, and Viet Nam, the oldest women receive low net transfers. In no country are there significant net transfers of UCW by older men. Note that these general

results also apply to the updated data from India and Mongolia, which are included in the Appendix.

The previous suggestion that there may not be a care crisis in an aging society because older people largely take care of their own care needs has therefore changed as a result of these findings: there may not be a care crisis because older women are providing much of the care for older people. This is a very important finding for aging societies. Population aging is certainly an indicator of many positive trends in reducing mortality and the ability to have as many children as you want, if you choose to. Given the role of older women as a major source of UCW, our ability to adjust the age structure of the population will succeed or fail to the extent that older women continue to provide care and experience that care as meaningful and rewarding work rather than an unending and exhausting burden, or that other age and gender groups take a greater share of caregiving, whether on a paid or unpaid basis. Another possibility is that older people will need less care in the future if their state of health leads to more years of healthy aging. But no matter how many of these years we gain, death is inevitable, even if we can postpone it. In the time before death, we will probably still need care.

Figure 6 shows the details behind Figure 5, breaking each line into transfers of direct versus indirect UCW. Direct care work is shown in the solid lines labeled as “care.” This consists of the time spent providing direct care to children, adults, or the general community. Indirect care work is shown in the dashed lines labeled “housework” and consists of cooking, cleaning, household maintenance and management, and other general activities. As in Figure 5, work time is shown in blue for men and red for women. All lines shown are net transfers, i.e., the difference between the production and consumption of UCW. Lines above zero indicate age and gender groups that are net recipients of UCW time. Lines below zero are net producers. We see in this figure that men are net recipients of housework services in all age groups, including the oldest, except for a small age group in Viet Nam. Women provide these net transfers at almost every age, with the exception of the oldest women in India and Thailand and a very small proportion in the ROK. Children receive the most net care, which is mainly provided by women aged 20–40. The largest of UCW transfers at older ages are due to the housework going to older men.

Viet Nam is the only exception to the gender segregation pattern, with men aged 20–30 providing a significant proportion of net care. While this result is intriguing, it comes from a small-scale survey and needs to be replicated in a larger sample to be considered a solid result. (Viet Nam is currently planning to include a time-use module in one of its large, nationally representative household surveys.)

Focusing exclusively on the solid lines for direct care, it is an intriguing result that the lines for men are so close to zero in all countries except Viet Nam. Not even at the age of 85+ do we see men and women on average require substantial net transfers of care at the population average level. As mentioned earlier, this finding raises the question of how care is measured: is our idea of what constitutes “care” so different for children than for older people that we cannot accurately measure it with our current tools? Or are older people generally much healthier and more self-sufficient than we think? If older people’s need for help is more focused on housework than direct care, then this could mean that it is easier for policymakers to fill any “care gaps” with market-based suppliers. It is cheaper to subsidize the provision of housework than help with more intimate activities such as bathing and dressing (Osterman 2017).

We all know stories from the media or from our own lives about older people who need constant care from family members, who manage their daily lives, who need professional care in the event of a health crisis and who are constantly assisted in the activities of daily living. These stories are compelling, but at the average population level, we see no evidence that this is a pervasive situation. What could be the reason for this? One set of questions already discussed is methodological: are these activities simply not coded as “care” by people who provide this type of care for older people? This hypothesis could be examined by comparing the results of the general TUS with those of specific surveys on older people such as the Health and Retirement Survey from the United States, the China Health and Retirement Survey, or the Japanese Study of Aging and Retirement.

The problem with this method is that these specialized surveys are generally only available in higher-income countries. For lower- and middle-income countries, one option is to use the same TUS analyzed here, but to look closely at the time use of household members who share a household with an older person. Do we see patterns of time use that may also be caregiving, such as social time spent with the older person or time spent using services that may be intended for the older person, but the time use instrument is not detailed enough to isolate these codes? This is an important starting point for future research.

5. Patterns of Direct Care by Type of Care Recipient

For this next set of results, the results for Viet Nam and Türkiye were not available because the microdata do not support separation between types of direct care with the necessary specificity, so only five countries are shown. Figure 7 is a two-part figure (A. Production and B. Consumption) showing the average production of UCW by type in the top panel and the consumption of UCW by type in the bottom panel. The results summarize both genders in an average line by age, with general housework shown in black and three types of direct care in the other lines: childcare in blue, adult care in red, and community care in green. “Community care” includes both volunteering activities that benefit community members in general and direct care activities that benefit individuals, but who are not co-resident household members and also have not been coded as specifically caring for children or adults.

Figure 7 clearly shows that indirect care/housework is the most important activity in UCW production, while childcare is less, but still visible. Adult and community care, on the other hand, is barely visible on average. As mentioned above, this could be a real finding, but it is also likely to be influenced by measurement differences. People may have a much clearer idea of childcare as a type of work, while adult care could also be combined with leisure activities. Eldercare is also likely to be less frequent than the daily duties of childcare, so eldercare measured in a survey will have a higher variance than childcare. Older people primarily consume and produce housework, with only tiny amounts of direct care consumed in the oldest age groups in India and Mongolia. Figure 7 and the large amounts of indirect care compared to direct care also call to mind the potentially large blind spot of this analysis, which may occur from not considering supervisory time. Much of the time spent on housework is also likely to be time spent caring for children. This complicates the conclusions we can draw when looking at the small amounts of direct care time.

Figure 8 shows the net transfers of direct care by type of care, i.e., the difference between the consumption and production lines in Figure 7, but also adds the dimension of gender. We see in all five countries that the size of net transfers for community care and adult care is tiny compared to transfers of childcare. We also see that women make net transfers for childcare well into old

age, although the amount of time transfers in these countries is certainly smaller in older age than in peak childbearing age. Nevertheless, it appears that grandmothers are likely to be an important part of childcare provision. In Mongolia and the ROK, men also seem to be making childcare transfers. However, this was obscured when these data were combined with indirect care, which men only provide to a small extent.

B. Projections of the Unpaid Care Work Economy

1. Changing Populations with Fixed Unpaid Care Work System

We have seen in the previous analyses how much time societies spend on UCW, as much if not more than they spend on market work. Given UCW's vital role in creating future human capital and sustaining society, well-being, and the market labor force, one of the main reasons to study it is to determine whether the supply of UCW will be sufficient in the future. One way to begin this study is to project the supply and demand of UCW into the future and take their ratio to see if there is a mismatch. If the supply of care in the future cannot meet the demand, , new sources of care must be found. If the supply of care in the future exceeds demand, there is an opportunity to use care time for other things or to provide more intensive care than we can today. From the exploration in the previous section, we know that demand and supply patterns are strongly influenced by age and gender. So a starting point for projecting UCW into the future is to project how our future populations will change by age and gender, combine this projection with our current UCW system and examine how projected demand and supply compare in this imagined future.

Before moving on to the demand and supply projections, we can briefly look at how the age distribution of the population in the seven countries considered here is likely to change over the next 50 years. Figure 9 shows the age distribution of the populations for 2020 (red) and 2070 (blue), according to the projections of the United Nations World Population Prospects 2019 (United Nations Department of Economic and Social Affairs 2019). Aging is forecast for all of these countries, as shown by the crossover in the blue and red lines. The crossovers all show decreasing proportions in the youngest age groups (red lines above blue lines) and increasing proportions in the oldest age groups (blue lines above red lines). For the countries that are further advanced in the aging process, the crossover is at an older age (the ROK, Thailand). For the youngest countries, the crossover takes place at a younger age (Bangladesh, India, Mongolia). As mentioned before, there is some evidence to support the United Nations assumption that fertility will decline to replacement levels in the long term, in the Korean chart, which shows about equal shares of newborns in 2020 and 2070. This is only possible if fertility stops its downward trend in the ROK over recent decades and fertility rises. It is debatable whether this is even realistic, but for the purposes of this paper, it should be noted that this implies stability in the proportion of young children over the next 50 years, which is highly speculative.

Figure 10 shows the UCW support ratios you get when different age- and gender-specific schedules of different types of UCW production and consumption are weighted by the projected population age distributions in Figure 9. (While Figure 9 shows a projection of the age distribution for one gender, there are also changes in the expected gender ratios, but these are much smaller than the changes in the age distribution.) The ratio calculations are performed for six different groupings of UCW types, which are shown in separate panels of Figure 10: all UCW combined, general housework only, direct care only, direct care of children only, direct care of adults only, and finally community care activities. Note that the detailed data on the subtypes of direct care

required to include Viet Nam and Türkiye in the bottom row of the graphs in Figure 10 are not currently available. All ratios are scaled to 1.0 in 2020 to better emphasize the relative change over time compared to the starting period.

A look at each of the six panels shows that different types of care production or consumption favor certain age groups and that these groups grow at different rates in the projected population. Recall that the per capita age/gender care schedules in these calculations remain fixed to the current "snapshot" estimated for each country in the most recent year in which data were available to calculate the NTTA estimates. Figure 10 is therefore a thought experiment: what if the care economy remained unchanged in terms of average production and consumption by age and gender, but the number of people in these categories changed? The ratio of production to consumption is a support ratio. An increase in the ratio indicates that a given level of consumption is easier to meet because more units of supply are available relative to demand. A decrease means that current per capita consumption patterns are not sustainable.

The overall UCW support ratio in Figure 10a is relatively stable over time in all countries, as shown by the relatively flat trends of all lines. Most countries show a slight increase, with the ROK being the only country to show an overall decrease. This overall UCW stability is achieved by the flat or slightly decreasing housework (indirect care) support ratios in Figure 10b combined with an increase in rates for direct care support in Figure 10c. The average leans more toward the trend for indirect care, as the majority of UCW time is indirect. The increasing support ratios for direct care means that it becomes easier to provide the necessary care over time. A comparison of the three parts of direct care in the three panels in the second row of Figure 10 shows us why. Figure 10d shows that in most countries there is more care available than is demanded by children, as children are very expensive in terms of UCW and the aging population has relatively fewer children over time. The ROK is the notable exception here, but this is due to the assumption built into the population projection of an increase in fertility toward replacement levels compared to the current very low levels. Figure 10e shows that over time it will become more difficult to provide the necessary care for adults, as the average age of adult care recipients is significantly older than that of adult care producers. However, because net transfers of UCW to adults are so much lower than to children, the overall UCW support ratio remains largely unaffected. Finally, we see in Figure 10f that the support ratios for community care are fairly flat. This is because both the consumption and production of this type of care are shared across many different age groups, so the change in age distribution is not such a factor.

What is to be made of this result? Overall, it does not look as if the changing population age structure is putting a strain on the care system, but this is only the case if childcare and care for older people and adults can be substituted for each other. In other words, direct care support ratios are only flat because the time projected to be "freed up" by increasing the childcare support ratio is greater than the additional time adults and older people will need in 2070, which cannot be supplied if the care economy remains as it was in 2020.

This type of calculation, which combines childcare with other types of care, makes the implicit assumption that all direct care is fungible for all care recipients. This is a strong assumption. NTTA estimates have shown that women in their peak child-rearing age are the main suppliers of care to young children. Will the young women of future generations be willing to shift their care supply from the young children they "did not have" to the older parents they do have? These young women will certainly have more education than previous generations of women, with smaller gaps

compared to their male peers. They will also likely have more similar career goals than their male peers, which could mean higher female labor force participation and less time spent on caregiving.

This is an achievement that should be celebrated because it represents the great efforts of many countries, families, and individuals in educating girls and women and should certainly not be seen as something to attempt to reverse in terms of policy. However, it does mean that the UCW labor supply of women, long taken for granted, should not be. While there does not appear to be an overall mismatch between demand and supply, policymakers and those concerned with the well-being of older people would do well to keep an eye on the data on caregiving for older people. New suppliers of care may be needed, be they men who would take on a greater role in UCW or paid caregivers.

2. The Unpaid Care Work System of the Future under "Quantity–Quality Trade-off"

The previous section dealt with a thought experiment in which the UCW economy remains unchanged and only the population changes. We now turn to a scenario in which the UCW economy could change along with population change. What if fertility declines and instead of shifting their childcare to other types of care, parents maintain the same level of care but spend more time with each child? This dynamic is related to a theory of fertility behavior called the "quantity–quality" trade-off, in which parents choose between child quantity, in which more children are more expensive, and child quality, in which more effort is given to each child, which also makes them more expensive. In some cases, parents may choose to increase child quality, which means they have to spend more on each child. They then also choose to have fewer children because there is a budget constraint that limits how much quantity and quality a household can afford (Becker 1993). We have empirical evidence that this dynamic occurs both for market goods and services and over time when we compare countries cross-sectionally (Vargha and Donehower 2019). When comparing countries, we find that spending on market goods and services and on UCW time for all children in a household together is on average about the same, relative to the income level of the respective country. This means that parents in countries with fewer children spend more on each child.

How can we model this kind of dynamic in the form of unpaid care support ratios? We keep the projected production of direct childcare produced by each caregiver constant, but allow the projected consumption of direct childcare to change so that the aggregate childcare produced equals the aggregate childcare consumed. In this scenario, the aggregate consumption and production of childcare are therefore always the same at the beginning of the projection period, but the endowment per child changes.

Figure 11 shows the results of this scenario, the thought experiment of population aging that allows greater per capita investment in children without increasing the overall demand for or supply of unpaid childcare. This scenario implies that the UCW support ratio for childcare always remains constant. Thus, if we scale the support ratios to 1.0 in 2020, we see in Figure 11d a horizontal line at 1.0 throughout the projection period. In this scenario, population aging does not help to reduce the pressure on the care economy by freeing up time in less childcare. Therefore, the greater mismatch between the demand and supply of eldercare over time as shown in Figure 11e has a greater impact on the overall direct care support ratio in Figure 11c. However, as can be seen, direct care is still a much smaller part of the overall UCW economy than indirect general housework activities. Thus, we still have the overall effect on the projected UCW economy in Figure 11a that does not seem to be an impending crisis or coming time crunch in the overall

UCW economy, even without the substantial time savings that could be realized from population aging reducing the relative demand for childcare.

What level of care time increase might children see under a quantity–quality trade-off scenario? Figure 12 shows how much the age profile of childcare consumption would change for ages0–18 over time if the dynamics of the quantity–quality trade-off were followed given the projected population change. The blue line shows the age profile of unpaid childcare consumption at the start of the period for each country; the red line shows what this profile would look like halfway through the projection period in 2045 if it were equal in aggregate to the projected production of childcare; and the green line follows the concept through to 50 years later in 2070. The extent of the care increase in childcare demand under this scenario varies from country to country. In Mongolia, childcare hours would increase significantly by 2070, on average by more than 1 hour per day. In Thailand and India much less and in Bangladesh hardly any increase by 2070. It is noteworthy that the average consumption in the ROK would actually decrease. This is due to the assumption that fertility increases. This assumption in the quantity–quality trade-off scenario implies that Korean parents would choose to have more children on whom they would spend less time each, although the same amount of time in total.

This quantity-quality trade-off scenario, in which caregivers maintain fixed per capita care schedules but the time per child varies, would be one way of achieving a different kind of demographic dividend than is usually discussed in the case of declining fertility. The more common notion of the demographic dividend is that during the demographic transition from high to low mortality, the fertility age structure temporarily shifts in favor of age groups with higher market productivity, increasing overall productivity and economic growth without needing changes to the underlying technology or market (see United Nations Department of Economic and Social Affairs 2017 for a discussion). This is often referred to as the first demographic dividend, but there is also the idea of a second demographic dividend, where population aging shifts toward age structures with greater savings and wealth, which increases the supply of capital and encourages productivity-enhancing investments that make future workers more productive. A quantity–quality trade-off in UCW investment can work in a similar way if the greater UCW time per capita that children receive makes them more productive when they eventually enter the market labor force.

Of course, it is not certain that more time with children means higher child quality. As with any investment, there must be diminishing returns at some point, and time spent with more children at the same time does not necessarily mean that each child receives less. However, this points to another way in which population change can affect other outcomes. This type of demographic dividend, which arises from increased nonmarket investment in children's human capital, is generally ignored in the literature. It is paid in time rather than money, and should be investigated further for its potential to ameliorate some of the growth-depressing dynamics of population aging on the market economy.

This discussion of UCW support ratios offers one way to examine a kind of demographic dividend in UCW, but there are other scenarios that could be investigated. The "freed-up time" created by relatively fewer time-expensive children can only be spent in three ways: more time spent for market work, more time for nonwork, or an increase in time investment per child (as in the quantity–quality trade-off). All would improve well-being, but specific tools are needed to assess what the optimal outcome might be and what policy levers could be developed to achieve a particular outcome.

IV. CONCLUSIONS

A. What We Have Learned

This work was mainly descriptive, with the aim of understanding the production and consumption of UCW in a group of countries in Asia and the Pacific. The following points summarize what the descriptive work revealed and the general patterns and findings of the work.

(i) UCW is a large part of the economy and a substantial part of all work performed by people. Leaving this type of work out of economic observation and analysis obscures much of how people spend their productive time. This is particularly true for older people, for whom market work decreases with age, while UCW increases.

(ii) Although both men and women perform UCW and market work, in all countries observed women perform the majority of UCW and men the majority of market work, and this is true for most age groups. However, there are large differences between countries in the extent to which the economic lives of men and women are segregated by market and household sectors.

(iii) Children are by far the largest consumers of UCW time. With the tools and data used here, we see no evidence that the average adult or older person spends anywhere near as much UCW time as the average child.

(iv) In most countries, older people spend on average about the same amount of UCW time on average compared to those in working ages. However, there are significant concerns about the ability of existing TUS to measure UCW time spent by older people in a comparable way to UCW time spent by children.

(v) Older women provide much of the care consumed by older people and transfer a substantial amount of UCW time to younger family and community members.

In addition to documenting current patterns, a further analysis speculated on whether these current patterns of care demand and supply would be sustainable in a future in which the age structure of the population is likely to be much older than it is today. The conclusions from this exercise are as follows:

(i) The current per capita level of care demand is sustainable with the projected aging population under two conditions:
   (a) The methods used here are capable of accurately measuring the care consumption of older people.
   (b) The time spent producing UCW for children, which will not be needed in the aging future, can be used to care for the oldest age groups, who will have a greater need because they will make up a larger proportion of the total population.

(ii) Even if the production of UCW for children does not decline, there may only be a small shortage of UCW for older people. This conclusion is also contingent on the fact that UCW consumption by older people, which is not measured in the TUS data, is not very high. It also depends on older women continuing to make UCW transfers to their older husbands.

B. How This is Relevant to Policy

One of the key messages of this work is quite simply that policymakers need to become aware of the role of UCW in their economies and societies and allocate resources to measuring and understanding UCW. For too long, UCW has been invisible in policy. It has been taken for granted as something that is always somehow done by families, and especially by women, at no cost to the state and needing no support from or monitoring by the state. Population aging is doing much to change this picture, as policymakers in low-fertility countries worry about the role of UCW demands that may prevent people from having as many children as they want. The potential care needs of aging societies around the world are also bringing UCW into the policy spotlight.

The work discussed in this paper was able to shed light on many of these issues, but only for the countries with high-quality TUS. The more surveys that are conducted in more countries, especially low-income countries where these surveys are less common and less frequent, the more we can shape a discussion based on facts rather than speculation. Policymakers also need to support data collection and research specifically focused on the care needs of older people so that we can be sure we are not underestimating the scale of potential need.

Policy concerns related to UCW often also focus on issues of gender equality and child welfare. The analysis undertaken here is certainly relevant to these areas and suggests that the main question for policymakers addressing care issues in Asia and the Pacific is the role of older women in the provision of UCW. That older women are at the center of UCW provision for older people is both a question of equity—is it fair that older women do this kind of work at a much higher rate than older men, and a question of welfare—is this kind of work compatible with a good quality of life? In many countries, older men do as much market work as older women do UCW. The system may be "fair" on the basis of total hours worked by men and women, but this ignores potential asymmetries between the two types of work. There may be compensating asymmetries, as market work has some advantages and some disadvantages over UCW. For example, the greater dangers of market work compared to UCW may be compensated for by access to money, and UCW may provide social standing and satisfaction to the same extent as market work in certain cultural contexts.

One of the biggest potential problems is that older women's UCW production may leave them vulnerable to a lack of resources for themselves once their older husbands pass away. If women specialized in UCW all their working lives, they would not have access to pension income. Policymakers would then need to know whether survivor benefits adequately protect widows after the death of their husbands. Changing family systems, where there may be more divorces today than when the policy on survivor benefits and inheritance was formulated, could also leave older women unprotected. Aside from the issue of access to income, who will look after older women when they reach the oldest age groups and need care themselves? At the very least, policymakers should discuss how they can monitor the well-being of this vulnerable population and ensure they receive support when needed.

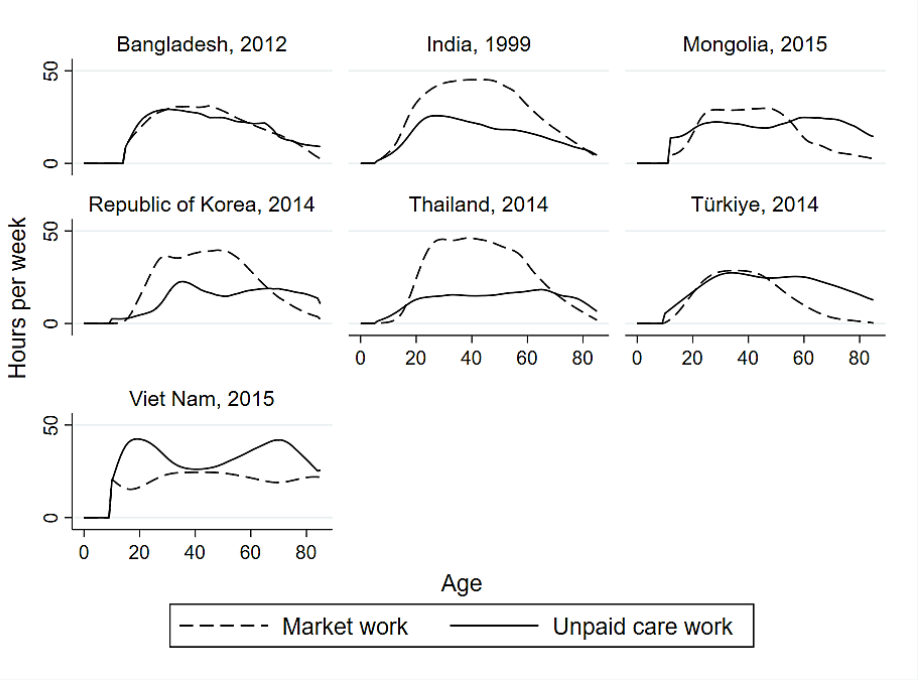
If we consider UCW to be truly productive work, then the men and women who produce UCW are an important part of the labor force. This role should be recognized and supported, and programs that support caregivers can be understood as productivity-enhancing, not just welfare-enhancing. Looking at the specific case of older people, while the empirical estimates discussed here have not shown a huge demand for eldercare that could swamp supply in the future, health policies

that reduce the disability rate of older people will enable them to contribute more to social functioning, productivity, and well-being in the future.

There are many directions that can lead this work to more informative and potentially more useful results. In modeling the care support ratios, other scenarios than those already discussed here are certainly possible to imagine, given the tools created in this work. Future research may be able to consider scenarios of changing disability prevalence and/or disability-related care needs for older people; changing participation in paid work; or changing policy around pensions, retirement, and support for market or family caregiving.

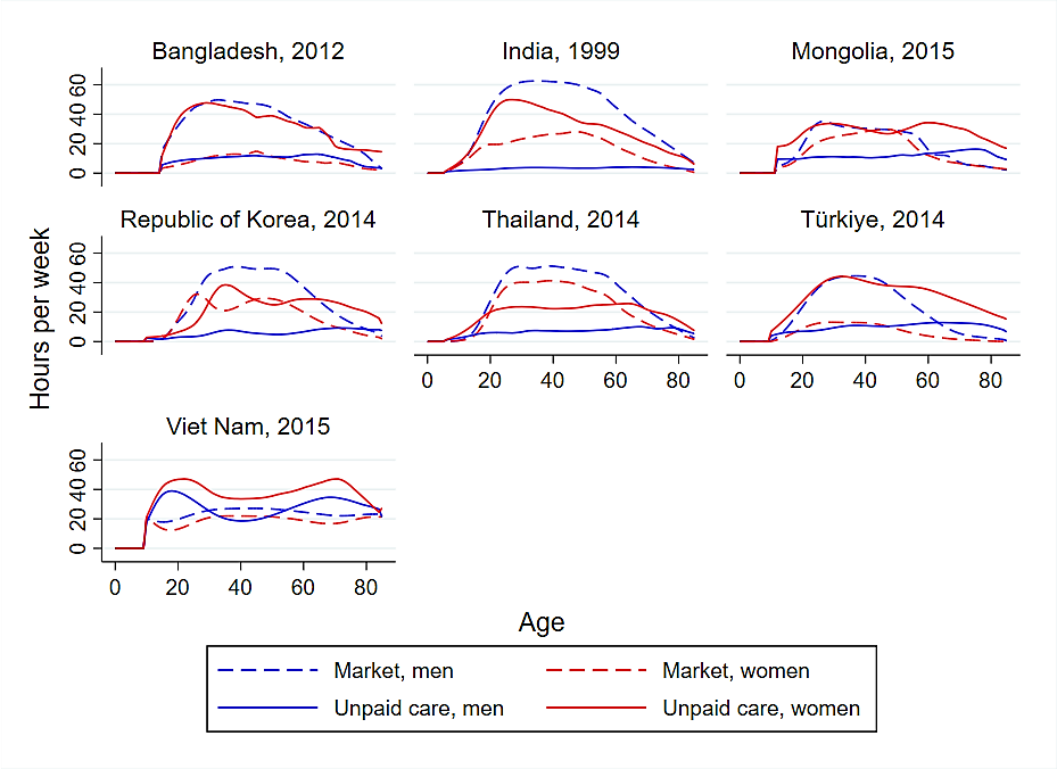
FIGURES

Figure 1: Average Time Spent Working at Each Age by Type of Work (hours per week)



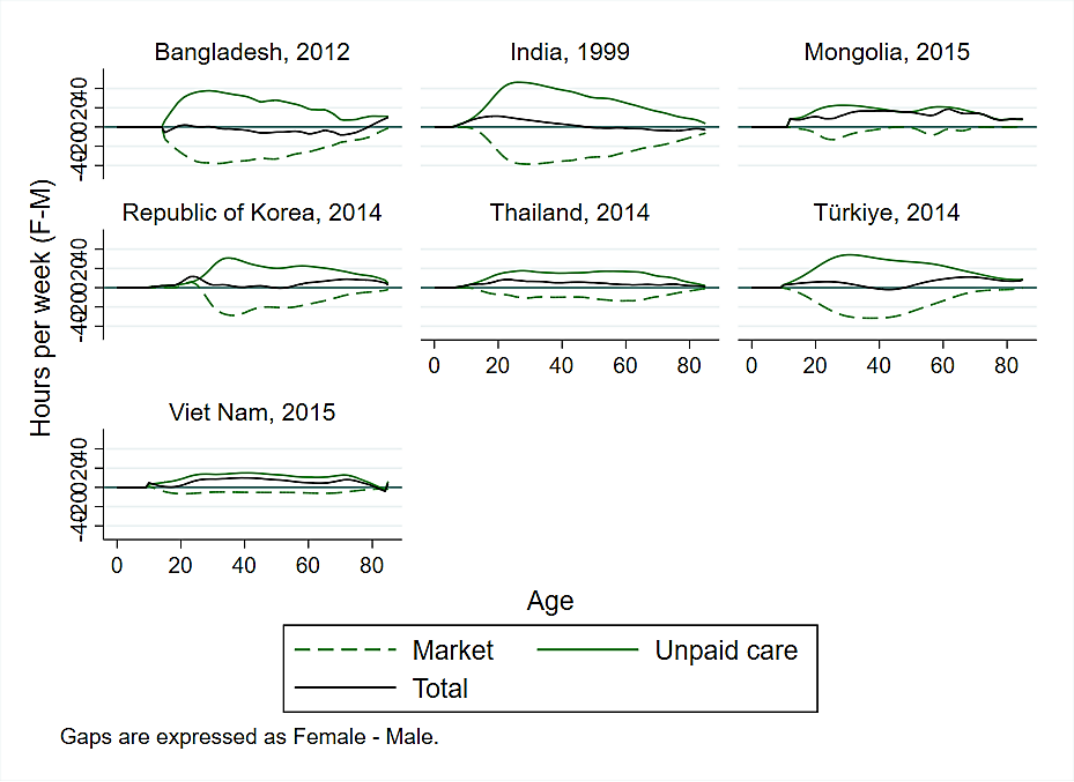
Note: Time use survey source details are in the Appendix.
Source: Author's calculations based on Counting Women's Work online database. www.countingwomenswork.org.

Figure 2: Average Time Spent Working by Type of Work and Sex (hours per week)



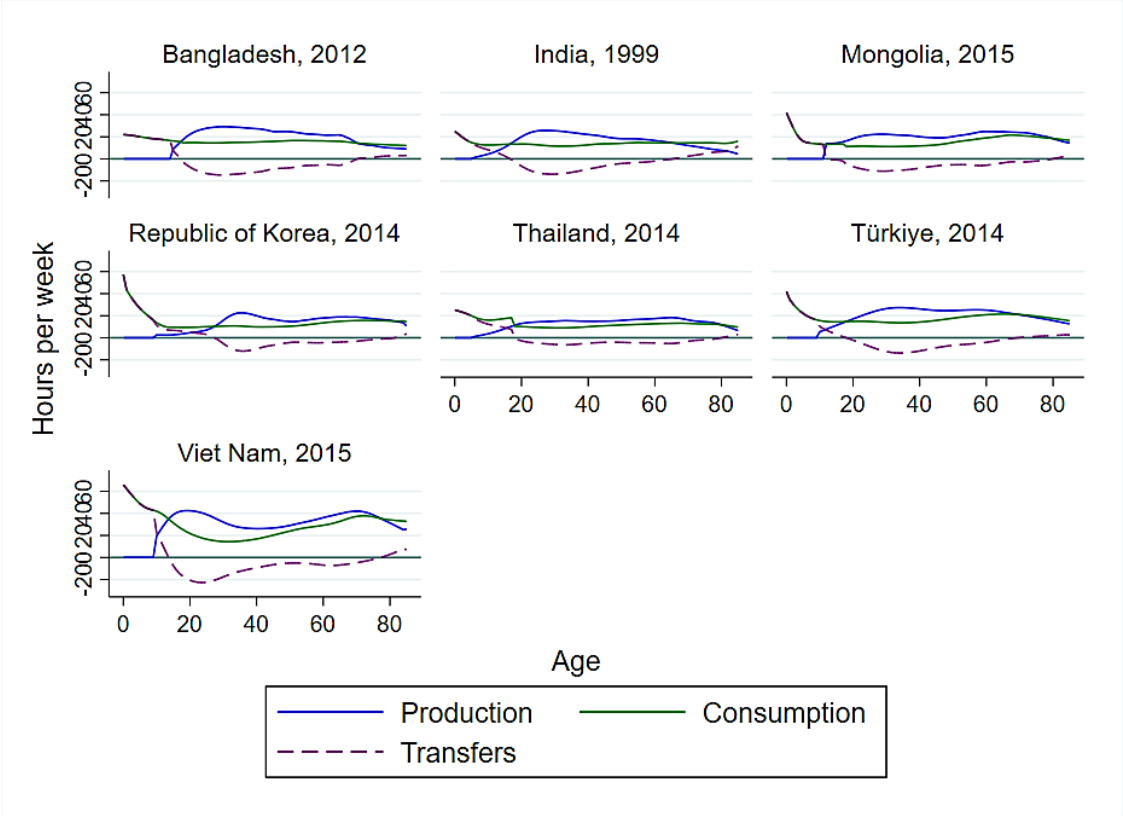
Note: Time use survey source details are in the Appendix.
Source: Author's calculations based on Counting Women's Work online database. www.countingwomenswork.org.

Figure 3: Gender Differences in Average Time Spent Working at Each Age by Type of Work (hours per week for females minus males)



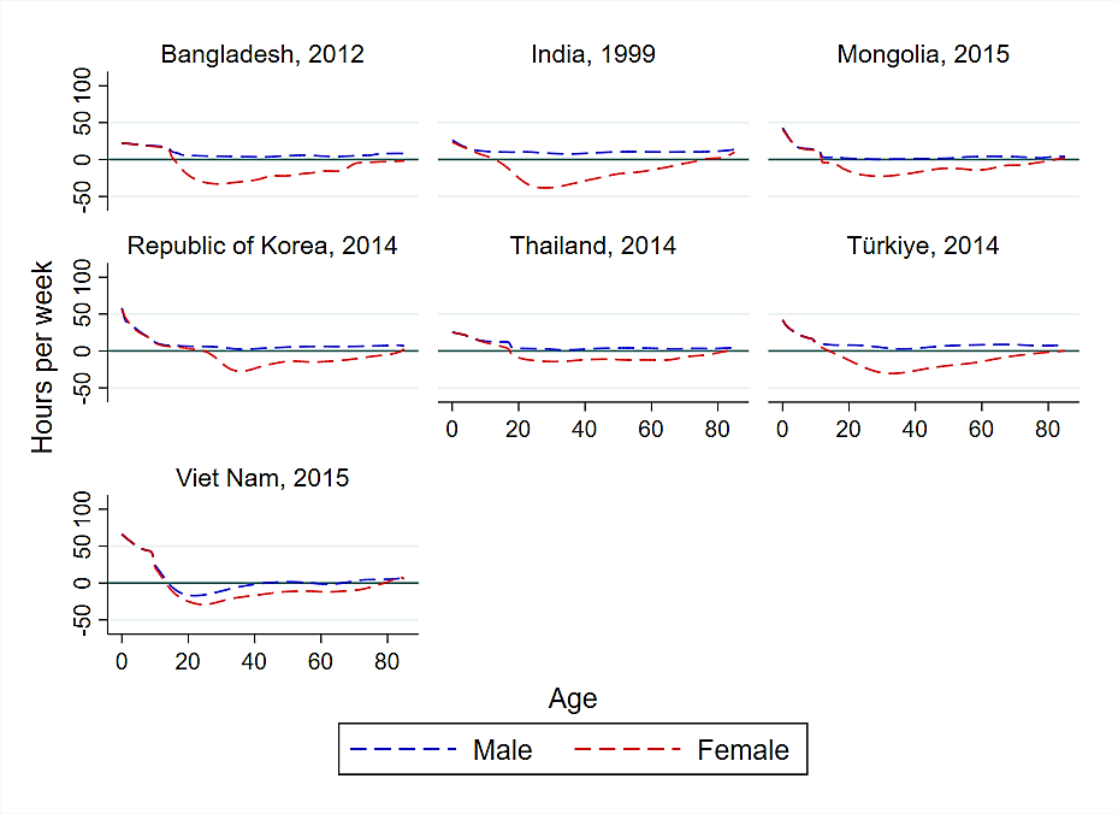
Notes: Values above zero indicate greater time spent by women, below zero greater time spent by men. Time use survey source details are in the Appendix.
Source: Author's calculations based on Counting Women's Work online database. www.countingwomenswork.org.

Figure 4: Age Profiles of Production, Consumption, and Transfers of Unpaid Care Work
(average hours per week)



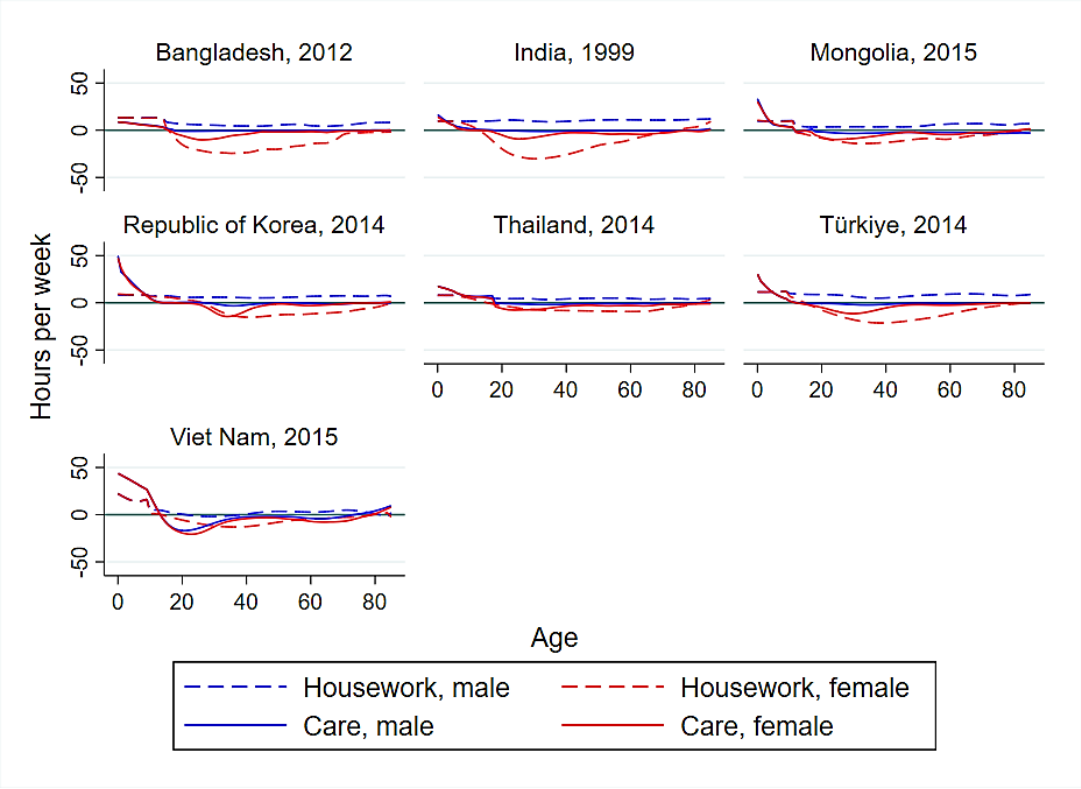
Notes: For time transfers, values above zero indicate that the age group receives net transfers, below zero that they make net transfers to other age groups. Time use survey source details are in the Appendix.
Source: Author's calculations based on Counting Women's Work online database. www.countingwomenswork.org.

Figure 5: Age Profiles of Net Transfers of Unpaid Care Work by Gender (average hours per week)



Notes: Values above zero indicate that the age/gender group receives net transfers, below zero that they make net transfers to other age groups. Time use survey source details are in the Appendix.
Source: Author's calculations based on Counting Women's Work online database. www.countingwomenswork.org.

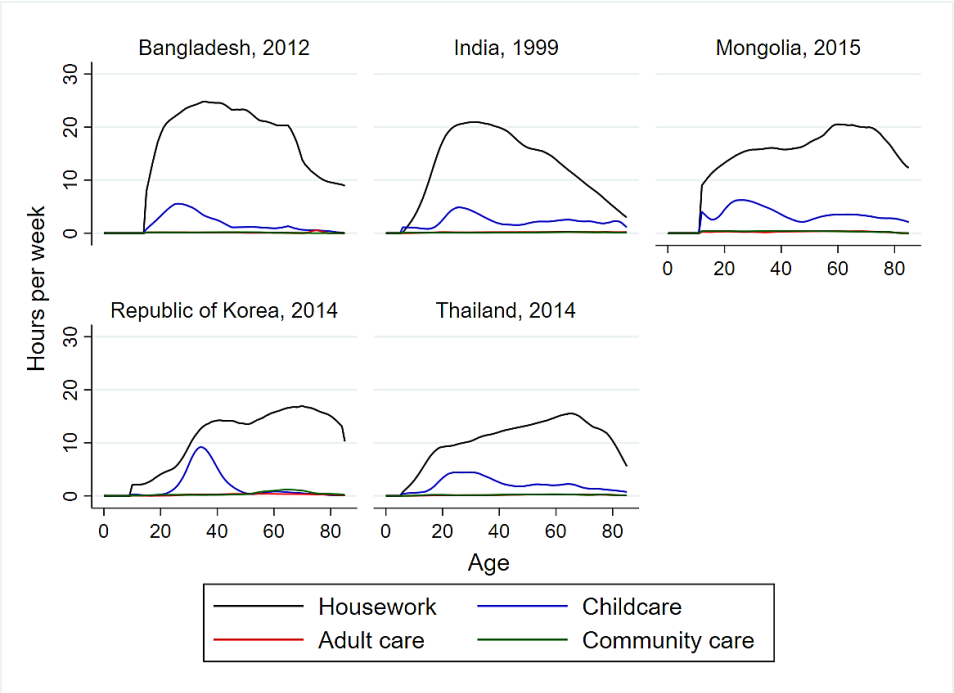
Figure 6: Age Profiles of Net Transfers of Unpaid Care Work by Type and Gender
(average hours per week)



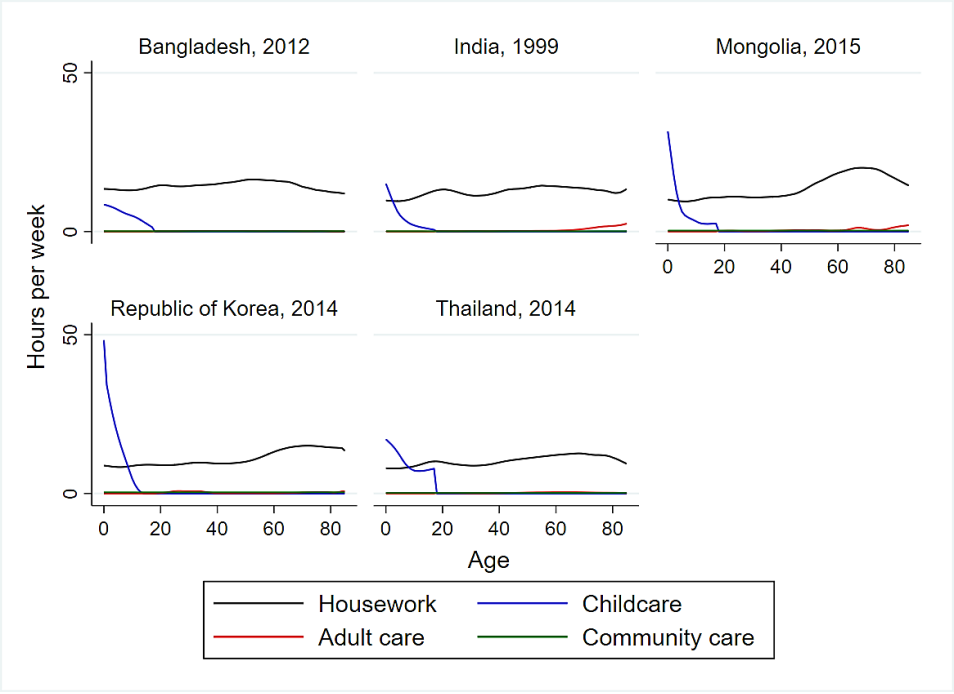
Notes: Values above zero indicate that the age/gender group receives net transfers, below zero that they make net transfers to other age groups. Dashed lines are for general housework activities, solid lines for direct care of people. Time use survey source details are in the Appendix.
Source: Author's calculations based on Counting Women's Work online database. www.countingwomenswork.org.

Figure 7: Age Profiles of Production and Consumption of Unpaid Care Work by Type
(average hours per week)

A. Production

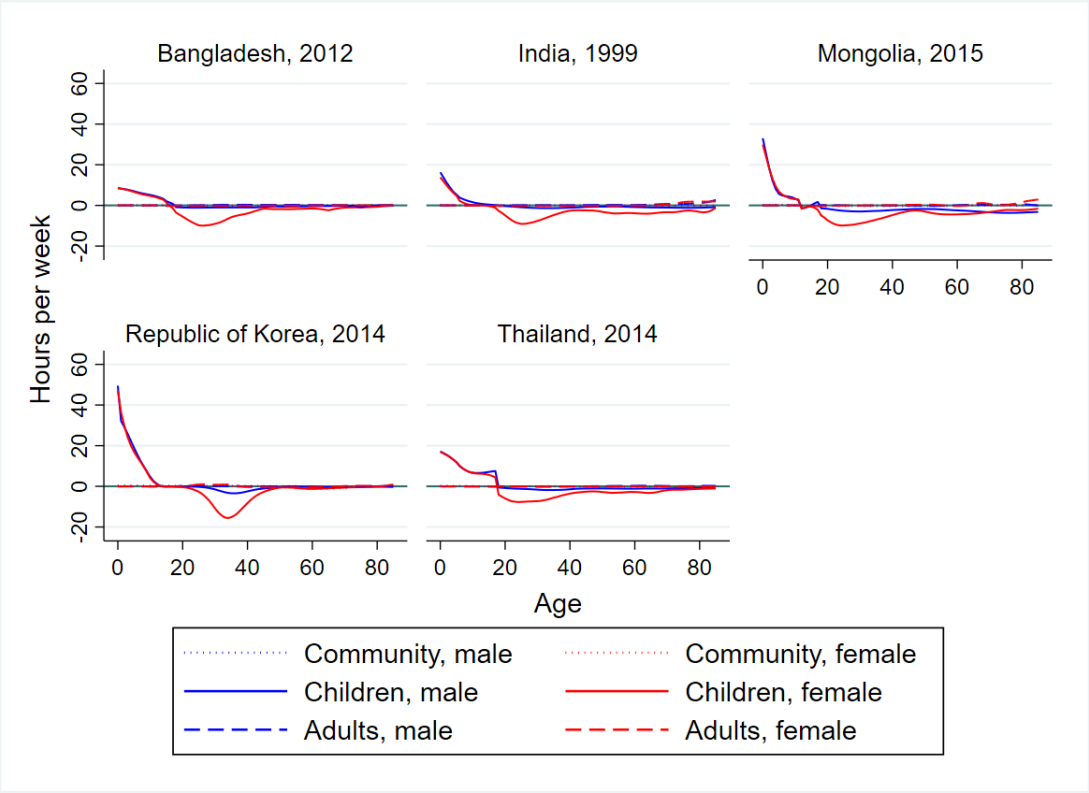


B. Consumption



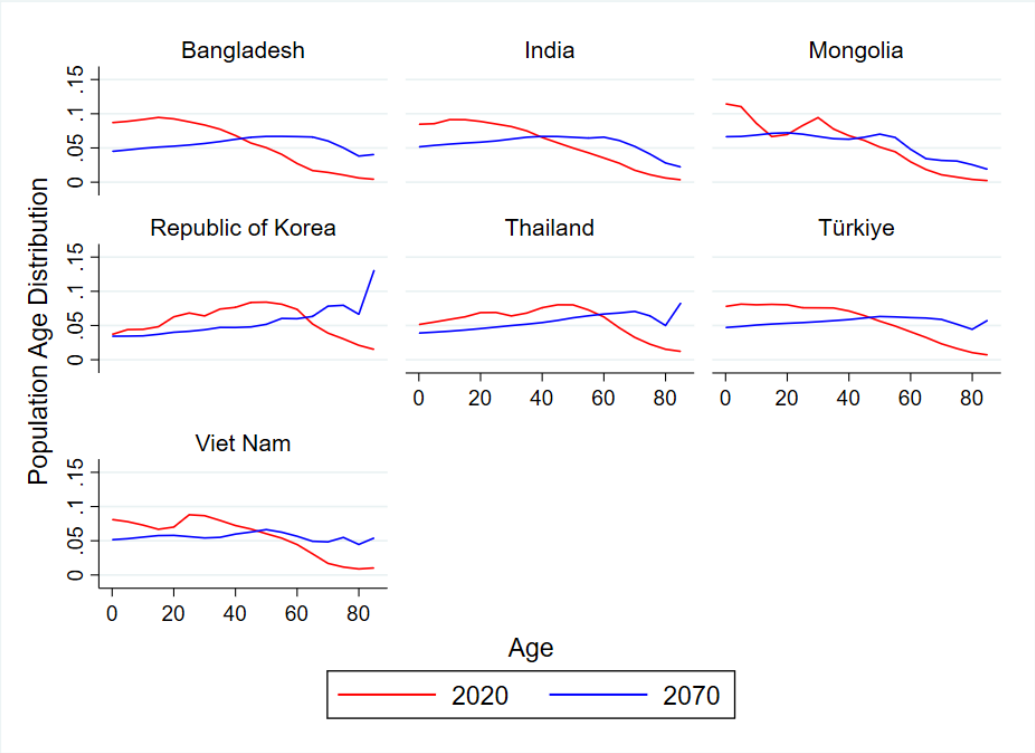
Notes: Indirect care (housework) is shown in black, while direct care is divided into three types by the type of care recipient (childcare in blue, adult care in red, community care in green). Time use survey source details are in the Appendix.
Source: Author's calculations based on Counting Women's Work online database. www.countingwomenswork.org.

Figure 8: Age Profiles of Net Direct Care Transfers by Gender and Type of Care Recipient



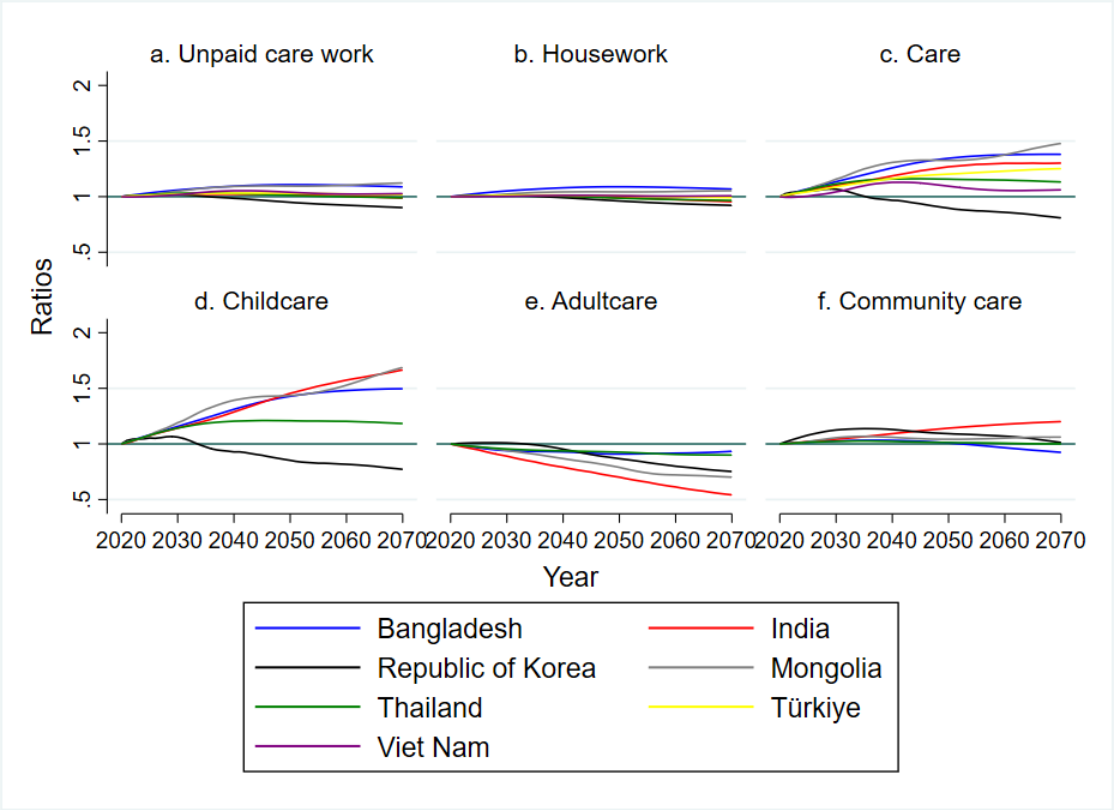
Note: Time use survey source details are in the Appendix. Values above zero indicate that the age/gender group receives net transfers, below zero that they make net transfers to other age groups.
Source: Author's calculations based on Counting Women's Work online database. www.countingwomenswork.org.

Figure 9: Population Age Distributions, 2020 and 2070



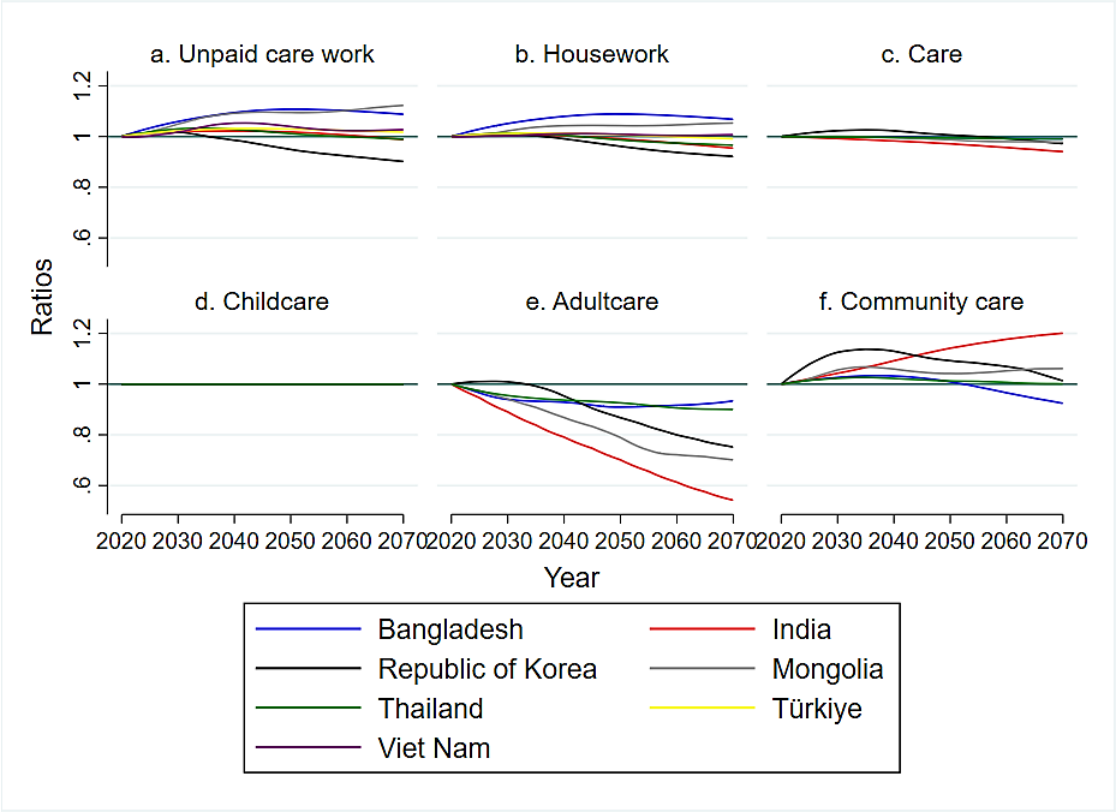
Source: Author's calculations from United Nations World Population Prospects (United Nations 2019).

Figure 10: Unpaid Care Work Support Ratios by Country and Type of Unpaid Care Work



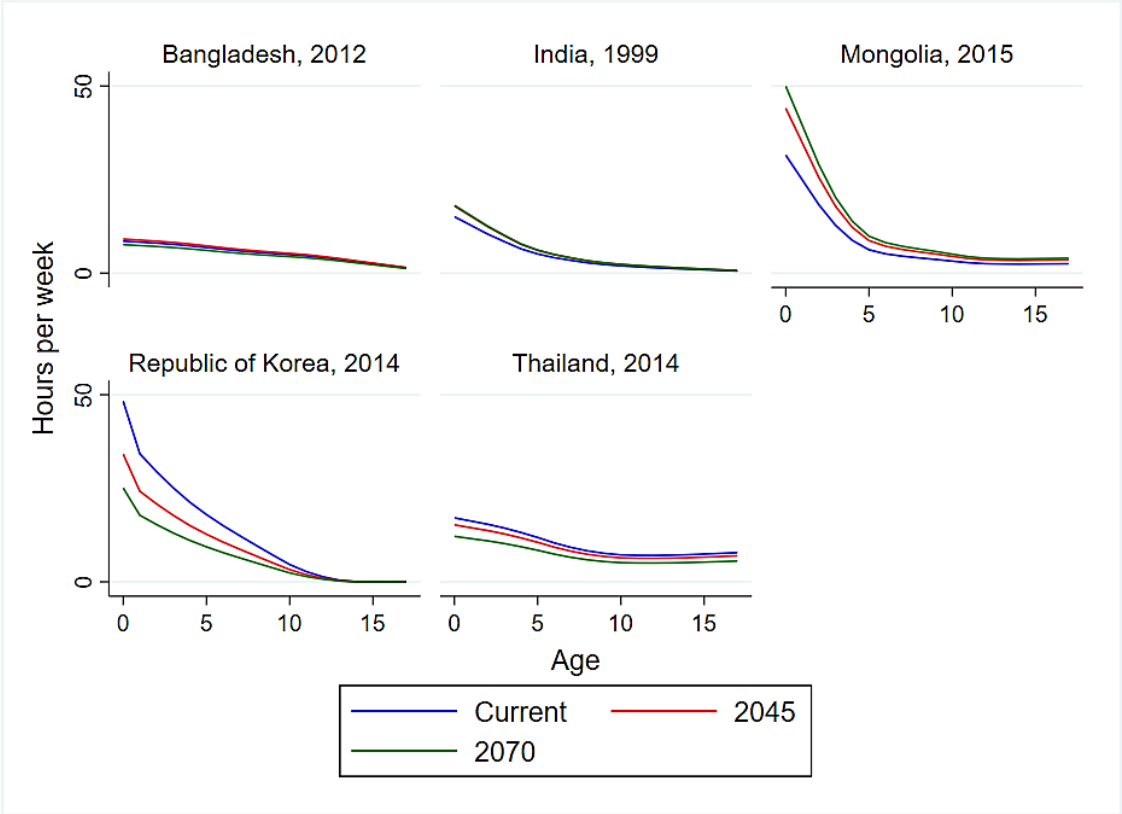
Note: Ratios are projected units of unpaid care work production per unit of unpaid care work consumption.
Source: Author's calculations.

Figure 11: Unpaid Care Work Support Ratios by Country and Type of Unpaid Care Work



Note: Ratios are projected units of unpaid care work production per unit unpaid care work consumption, allowing per capita childcare consumption to shift so that it matches aggregate childcare production. Y-axis ranges are different than Figure 10.
Source: Author's calculations.

Figure 12: Average Consumption of Unpaid Childcare, Aged 0–18



Note: Imputed childcare consumption if per capita childcare consumption shifts so that it matches current aggregate childcare production.
Source: Author's calculations.

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Mapping the Unpaid Care Work Economy in Asia

This paper explores the methods for answering some of the empirical questions about unpaid care work using National Time Transfer Accounts, which show that older people, mainly women, are far from being the main source of unpaid care demand, but are making net time transfers to other age groups. National Time Transfer Accounts are also combined with population projections to create care projections. For the group of Asian countries analyzed here, the projections show (i) no shortfall in potential childcare, (ii) some projected shortfall in adult and eldercare, and (iii) a potential surplus of indirect care in the form of housework.

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