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QUANTIFYING CARE: DESIGN AND HARMONIZATION ISSUES IN TIME-USE SURVEYS

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Quantifying Care:
Design and Harmonization Issues in Time-Use Surveys

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Lead author: Nancy Folbre.

Mexico City

E-mail: cegs@unwomen.org

Manthra Comunicación · info@manthra.ec · www.manthra.ec

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Nancy Folbre

LIST OF ACRONYMS AND ABBREVIATIONS

ADLs	Activities of Daily Living
ATUS	American Time Use Survey
CAUTAL	Classification of Time-Use Activities for Latin America and the Caribbean
GDP	Gross Domestic Product
HETUS	Harmonized European Time Use Survey
IADLs	Instrumental Activities of Daily Livin
ICATUS	International Classification of Activities for Time Use Surveys
ICLS	International Conference of Labour Statisticians
INMUJERES	Instituto Nacional de Las Mujeres
MICS	Multiple Indicator Cluster
OXFAM	Oxford Committee for Famine Relief
PSID-CDS	Panel Study of Income Dynamics Child Development Supplement
SNA	System of National Accounts
UNICEF	United Nations Children's Fund

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1 INTRODUCTION

The time has come to seriously consider improvements to time-use survey design.

Estimates of the amount of unpaid care work performed by women and men now garner international attention, but while analysis of existing surveys has yielded important insights, it has also revealed significant limitations. Because unpaid care work has not traditionally been considered "work," the wording of survey questions designed to capture it is often problematic. Most surveys evolve over time, and the advent of new digital technologies makes this a particularly opportune moment to consider possible improvements in methods of measuring time devoted to family care.

International commitments to the regular administration of nationally representative time-use surveys emerged partly as a response to the complaint that much of women's unpaid work was rendered invisible by conventional labor force statistics. This response has proved remarkably effective: a wealth of data now documents the quantitative significance of the time that women devote to unpaid work in general and the care of dependents in particular. Many multilateral organizations, including UNWomen (2015), the International Labour Organization (2018) and the Organization for Economic Cooperation and Development (Ferrant et al. 2019), have called attention to these dimensions of work and their relevance to economic development.

The now-famous UN conference of 1995 in Beijing passed a resolution encouraging the development of "suitable statistical means to recognize and make visible the full extent of the work of women and all their contributions in the unremunerated and domestic sectors." These statistical means are required for monitoring achievement of the United Nations' Sustainable Development Goals, specifically Goal 5, "Achieve gender equality and empower all women and girls" focuses on the necessity to "Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate" (UN 2016).

Support for these goals helped encouraged the development and administration of time-use surveys in developing countries as well as elsewhere (Charmes 2020). In theory, cross-national comparisons could illuminate the impact of specific policies and development strategies on unpaid work. In practice, national surveys differ considerably in their design and implementation, yielding estimates that are not always comparable. As researchers dig into existing data sources, they often unearth conceptual and methodological concerns relevant to future survey design. These concerns are particularly salient in the measurement of direct care for dependents, which entails not only specific activities, but specific responsibilities fulfilled while engaging in other household-centered activities. Adults need to provide supervisory, "on-call" or "passive" care for young children and for older children and adults who are seriously ill, disabled or simply frail.

The amount of time devoted to active care of family members who cannot care for themselves is typically lower than the time devoted to indirect care activities such as preparing meals, doing laundry or cleaning house. Supervisory care, however, is often

conducted simultaneously with these indirect care activities, and its constraints heavily influence time allocation. A person who takes responsibility for remaining in proximity to another is likely to choose productive activities that can be conducted close by.

Technological innovations that improve the productivity of cooking, laundry or cleaning are unlikely to lead to a reduction in time devoted to these tasks—and may actually lead to an increase—if spatial constraints limit access to other productive activities. Caregivers confined to the home may choose to prepare more complex meals or meet higher standards of cleanliness, even if they would prefer to obtain paid employment. By the same token, provision of childcare or eldercare services outside the home may reduce the amount of time devoted to housework more than that devoted to direct care because it reduces supervisory constraints and facilitates wage employment.

Unfortunately, most time-use surveys devote scant attention to time constraints that do not take the form of specific activities. Growing interest in "light diaries," survey instruments that could be less time consuming and more cost effective than the longer, more detailed surveys administered to date, heightens the importance of this measurement issue. Light diaries could potentially hybridize diary-based surveys that ask questions focused on activities such as "What did you do in this time period?" and activity-list surveys that ask more general questions regarding supervisory responsibilities. Like the diary-based surveys, light diaries focus on continuous time slots (usually from the previous day); unlike diary-based surveys, they offer respondents a choice of activities or responsibilities from a relatively short list to choose from (Chatzitheochari et al. 2018). In this context, the list of activities or responsibilities—and the way they are worded—assume enormous importance. If these lists are not comparable across surveys in different countries and regions, they will not prove very useful.

This paper addresses problems of comparability across surveys, detailing the difficulties of accurately measuring direct unpaid care for dependents, including both active and supervisory care. Part I provides a detailed review of the relevant research, while Part II provides an in-depth comparative analysis of two surveys from each of three major regions of the developing world: East Asia (South Korea and China), Africa (South Africa and Ghana) and Latin American (Ecuador and Mexico).

The choice of surveys for detailed analysis was largely dictated by practical considerations. While many countries now administer nationally representative time-use surveys, relatively few provide easy access to digital files containing microdata or the metadata documenting decisions made in its tabulation and presentation. The surveys singled out here are all relatively accessible surveys that illustrate the impact of both large and small differences in design. The resulting comparisons are by no means comprehensive, but they powerfully demonstrate the need for improvement and harmonization of time use survey instruments. They also offer valuable opportunities to learn from specific design successes and failures.

2 RESEARCH ON MEASUREMENT ISSUES CENTRAL TO DIRECT CARE WORK

The conceptual and technical issues at stake in the quantification of direct care reflect the socially contested categorization of women's unpaid work. Historically, this work has been described as the fulfillment of moral obligations or biological imperatives rather than part of the "the economy."

The brief review presented here of shifting conceptualizations of work, dependency and care sets the stage for a summary of research that has problematized the issue of direct care measurement, with particular attention to distinctions among different types of time use (primary activities, secondary activities and supervisory care) and contextual variables such as "who else was present." Differences in activity coding and survey wording have particularly clear implications for cross-national comparisons of care time and point to priorities for empirical research that inform the subsequent discussion, in Part II, of empirical findings from six countries.

CONCEPTUAL CHALLENGES

Time-use surveys aimed at measurement of social constructs such as "work," "leisure" and "personal care" have revealed ambiguities in the definitions of these terms, partly because the social organization of these activities is changing over time. Women's increased participation in paid employment alters patterns of family care, and new digital technologies expand paid employment activities (such as email and texting) well beyond the standard workday. The complex, layered process of multi-tasking or simultaneously fulfilling several different responsibilities is difficult to capture with a standardized questionnaire. Cultural and linguistic differences further complicate the picture. Time-use surveys must confront the fundamental problem of construct validity, "the extent to which an observed measure reflects the underlying theoretical construct that the investigator has intended to measure," a problem central to larger issues of survey quality and reliability (Andrews 1989: 393; Lyberg and Stukel 2017).

DEFINING WORK

National surveys, including censuses, have long provided a focal point for disputes over the meaning and definition of work. Throughout much of the twentieth century, economists defined work primarily as directly remunerative activities, motivated primarily by pecuniary goals. The concept of unpaid work was, for a time, considered an oxymoron, and housewives, in particular, were deemed "unproductive" (Folbre 1991). The international System of National Accounts (SNA) developed over the last fifty years (and still evolving) formalized a distinction between goods produced for own consumption, which were placed inside the production boundary, and services provided for own consumption, which were not.

This boundary was weakened by early twentieth century time-use surveys, which adopted a criterion advocated by Margaret Reid and others, defining work as any activity that someone could, in principle to paid to perform. As time-use surveys proliferated, evidence of the amount of time that women, in particular, devoted to unpaid

work accumulated, raising questions regarding the SNA "production boundary." Time-use provide crucial supplements to labor force surveys that focus almost entirely on work destined for the market (Hirway 2017).

In 2013, an influential organization, the International Conference of Labour Statisticians, proposed a new definition of work as "any activity performed by persons of any sex and age to produce goods or to provide services for use by others or for own use" (ICLS 2013). This definition clearly encompasses unpaid work. At the same time, the ICLS narrowed the definition of "labor force," narrowing its definition to those engaged in production for pay or profit (see longer discussion in Folbre 2020). In other words, those who engage in unpaid work are not considered part of the labor force.

This evolving controversy helps explain why the wording of most international surveys (not just time-use surveys) remains inconsistent. For instance, the International Social Survey Programme still includes the following item, which respondents are asked if they agree with the following statement: "A pre-school child is likely to suffer if his or her mother works." In this context, differences in respondents' definition of work confound the survey's intent, which is to assess attitudes toward maternal employment (Pennell et al. 2017: 188). As feminist activists have long insisted—and the ICLS has confirmed—taking care of children and other dependents IS work; virtually every mother is a working mother.

Measurement of the extent of unpaid work in households and communities provides insights into gender inequality and enables imputation of the market value of non-market services (Budlender 2010). Time-use surveys also offer a way to supplement assessments of participation in informal market work (a particularly important source of income in many developing countries) and the value of production of goods for own consumption, which not all national statistical offices measure accurately despite the SNA recommendation that it be considered part of Gross Domestic Product (Hirway 2017; Floro and Komatsu 2011). It is difficult to assess the economic impact of public investment in physical infrastructure (such as water and electricity provision) or social infrastructure (such as health and education services) without accurate data on time allocation.

Unpaid care work informal sector work and production of goods for own consumption are typically easier to combine with one another in overlapping and/or flexibly sequential ways than formal employment. Households in general and women in particular engage in forms of joint production that affect their supply of labor to the market. Women are more likely to devote time to unpaid services such as meal preparation and laundry and to unpaid production of goods for household consumption such as gardening or milking when they are constrained to remain close to home to provide supervisory care for dependents; informal market work may also afford mothers more flexibility for such care (Folbre 2020).

DEFINING CARE

Responsibilities for the care of others are deeply embedded in gendered social norms. For much of human history, women have been particularly likely to combine directly productive tasks such as gathering food with the hands-on care and oversight of those

unable to care for themselves. As directly productive activities become more specialized, intensive, and socially scheduled, they also become more difficult to combine with care responsibilities. The concept of care as a specific work activity—and the notion that it can be measured in labor hours—is a relatively modern construction, sometimes resisted by caregivers themselves.

Growing interest in care work has been accompanied by proliferation of definitions. Sometimes care work is equated with all unpaid work done on behalf of family, friends and neighbors. Sometimes it is defined more broadly to include both paid and unpaid work that involves close personal interaction and emotional connection: care as work whose quality is likely to be affected by concern for the wellbeing of the care recipient (Folbre 2012; ILO 2018). Unpaid or non-market care work can be divided into two major categories: direct care of others (including children, the sick, individuals with disabilities and the frail elderly) entails close personal interaction, sometimes described as relational or nurturant care. Indirect care consists of domestic services such as cooking, cleaning, shopping, laundry, etc., which are often more easily outsourced or delegated to others and may be provided for oneself or for others (regardless of dependent status).[1] The line between direct and indirect care is often blurry, since even seemingly impersonal tasks can have personal valence.

Direct care work can benefit anyone. In this analysis, however—in conformity with accepted practice in most time-use surveys—direct care work is defined more narrowly as care for those needing assistance, such as children individuals suffering illness or disability, and the frail elderly. Also, direct care work is subdivided here into two categories, active care and supervisory care responsibilities that are not necessarily "activities," but responsibilities for being "on call," available to provide physical assistance or emotional support (Budig and Folbre 2004; Folbre et al. 2005).

This latter category has often been overlooked by surveys based on time diaries asking respondents to describe their *activities*. While some surveys designate a category of "passive care" the concept of a passive activity is inherently contradictory, even when designated as a secondary activity. Even a casual examination of international time-use statistics on childcare brings home the disjuncture between care as activity and care as temporal constraint: In affluent countries, the number of hours per day that mothers of young children under 5 (with or without a partner) devote to active childcare averages about 3 hours per day (Craig 2007: 49). By modern employment standards, this would be considered a part-time job.

Few mothers experience it this way, because they take primary responsibility for the supervision of children, as well as their active care. On call responsibilities are also salient in the care of household members suffering illness or disability. In many countries, reliance on outpatient medical care and quick hospital discharges puts family caregivers on duty. Dependents in need of care may be supervised by more than one family member at a time, but the design of diary-based surveys that include diaries for all household members makes it possible to sort out such possible overlaps. Questions such as "who else was present" enable analysis of the density of care activities, or the ratio of caregivers to care recipients such as young children (Suh and Folbre 2016). Time use researchers have not entirely ignored issues of responsibility. In a classic article concerning time-use methodology the Norwegian Dagfinn Aas

1 Not all researchers use this nomenclature. For instance, Jayoung Yoon (2018) uses "indirect care" to refer what this paper labels supervisory care.

(1982) proposed a typology focused on constraints: necessary time (e.g. sleeping, eating, bathing), contracted time (e.g. paid work), committed time (e.g. unpaid work), and free time (leisure). But while he argued that social context and physical location matter as much as activity, Aas never fully unpacked the notion of committed time (committed by whom?) and insisted that "concrete and observable behavior … must always be given priority when classifying the behavioral unit" (of activity) (1982: 126). Care constraints are not always concrete or directly observable. Aas also failed to examine the boundary between "necessary time" and "committed time" where the care of dependents is at stake—if activities such as sleeping, eating and bathing are necessary for self-care, aren't they also necessary for dependents who rely on others for assistance with them?[2]

Supervisory responsibilities make it difficult for many caregivers to work outside their homes, especially during night shifts or on weekends. In the United States, as in many countries, leaving a child younger than age ten without adult supervision, even when that child is asleep, can be legally construed as neglect. The on-call responsibilities often neglected in time use surveys are commonly recognized in paid employment. In 2008, the International Conference of Labour Statisticians' resolution on the measurement of working time explicitly mentioned these responsibilities.[3] The U.S. Department of Labor stipulates that employment covered under the Fair Labor Standards Act includes all time that the employee is required to be at the employer's home and all time that the employee is required to be "on call" in the course of his/her duties.[4] Time that paid nannies spend supervising children in their employers' homes—even while they are asleep—is covered by these rules.[5]

The attentive supervision necessary for the safety and welfare of young children is often hard for families to provide, particularly if they are vulnerable to poverty. UNICEF, the United Nations Children's Fund, defines one indicator of inadequate supervision as children under the age of 5 left alone or in the care of another child under 10 years

2 Direct care is sometimes referred to as "nurturant care." See Duffy (2011).

3 See https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/normativeinstrument/wcms_112455.pdf

4 According to the U.S. Department of Labor, "An employee who is required to remain on his or her employer's premises or so close thereto that he or she cannot use the time effectively for his or her own purposes is working while on-call. Whether hours spent on-call is hours worked is a question of fact to be decided on a case-by-case basis. All on-call time is not hours worked. On-call situations vary. Some employees are required to remain on the employer's premises or at a location controlled by the employer. One example is a hospital employee who must stay at the hospital in an on-call room. While on-call, the employee is able to sleep, eat, watch television, read a book, etc. but is not allowed to leave the hospital. Other employees are able to leave their employer's premises, but are required to stay within so many minutes or so many miles of the facility and be accessible by telephone or by pager. An example of this type of employee is an apartment maintenance worker who has to carry a pager while on call and must remain within a specified number of miles of the apartment complex." U.S. Department of Labor website at http://www.dol.gov/elaws/esa/flsa/hoursworked/screenER80.asp, accessed June 20, 2013.

5 One U.S. website providing information regarding nanny taxes includes "all hours on duty, including meal time if the employee is required to remain at the premises during meals, nap time, and time when children are in school IF nanny is required to be 'on call' for any emergencies such as early dismissal, child sick at school, etc."See the 4 Nanny Taxes site at http://www.4nannytaxes.com/index.cfm/faq/nannyhousekeeper-faq-list/nanny-minimum-wage/, accessed June 24, 2013.

old for more than an hour.[6] Their Multiple Indicator Cluster (MICS) surveys measuring its incidence show that it is particularly high in low-income countries and that within countries, is far more common in lower wealth quintiles.

Unlike indirect care tasks such as laundry, housecleaning or meal preparation, which can often be postponed or shifted to different types of day, supervisory care demands can be inflexible if substitutes are not available. They are also likely to encroach on leisure time. Analysis of Australian data shows that women are far more likely than men to report leisure as a primary activity combined with secondary activities minding children (Bittman and Wajcman 2000; Craig 2006). The need to mind children influences the choice of compatible leisure activities.

Lack of attention to supervisory care has important policy implications, helping explain why public provision of childcare often has small—sometimes not even discernible—impacts on the time that parents devote to primary childcare activities (Hook 2006; Hallberg and Klevmarken 2003; Bittman et al. 2004). Most diary-based time-use surveys combine travel time associated with an activity with time directly devoted to that activity. Transporting children to day care or school, for instance, is typically coded as childcare. Consider the following unintended consequence: when surveys measure care-related travel activities but ignore supervisory time, utilization of paid childcare services can actually increase reported time in childcare activities, because the activity is measured but the responsibility is not.

Many salient care activities, such as bathing, dressing and feeding children, can be conducted before or after hours of employment. Evening meals often provide precious opportunities for family socializing and socialization. Reading aloud to children—another important activity—often takes place at bedtime. Supervisory responsibilities are more extensive and diffuse. Even when young children are in out-of-home care or school, their needs conflict with school schedules (daily ending time, summer and holidays) and can be unpredictable as a result of illness. Likewise, adults suffering illness or disability that prevents participation in normal activities of daily living often require supervisory as well as active care.

Supervisory time constraints may be less binding in countries where extended family households remain common and productive work takes place not far from home. Older children—especially girls—keep an eye on younger children. Parents often benefit from the direct and supervisory assistance of elder household members. Grandmothers—whether co-resident or living nearby—play a particularly important supervisory role (Craig and Jenkins 2016; Gray 2005). When working-age parents migrate in search of employment, grandparents and other family members often take over child care responsibilities (Chen et al. 2000; Dankyi et al. 2017). Countries of the global South are not unique in their reliance on intra-family assistance. In many Eastern European countries such as Bulgaria, public policies put in place before 1989, combined with post-transition economic stress, have encouraged intergenerational sharing of care responsibilities (Ghodsee and Bernardi 2012).

6 The question (EC3) is worded as follows: "Sometimes adults taking care of children have to leave the house to go shopping, wash clothes, or for other reasons and have to leave young children. On how many days in the past week was (name):[A] Left alone for more than an hour? [B] Left in the care of another child, that is, someone less than 10 years old, for more than an hour? See Questionnaire for Children Under Five (4 June 2018) at http://mics.unicef.org/tools?round=mics6

Community-level features also shape the care economy. In rural areas where families have close relationships with their neighbors, reciprocal oversight may be easy to organize. Because urban areas often entail greater exposure to strangers, they require more vigilance. In both rural and urban contexts, increased spatial separation between home and work requires new supervisory strategies. In the absence of public policies designed to address such problems, the demands on women's time likely intensify (Folbre 2020).

A potential quantity/quality trade-off also comes into play: paid employment reduces the time parents can spend with children, they may compensate by engaging more actively and intensively for shorter periods of time on weekday nights and weekends. This dynamic could help explain why time devoted to active childcare in Europe is higher in countries with higher levels of GDP per capita and also why it has increased over time in the United States (Bianchi 2000; Bianchi et al. 2006, Folbre and Yoon 2008).

The difficulty of capturing the complex dimensions of direct and supervisory care has led some researchers to conclude that time-use surveys should always be accompanied by qualitative, observational and participatory inquiries (Lentz et al. 2018). But while mixed-methods research could offer invaluable insights, existing time-use survey methodology could also be substantially improved.

SURVEY DESIGNS

A small but growing body of research exploits differences in survey designs to interrogate the categorization and quantification of time devoted to care. Efforts to capture simultaneous activities and supervisory responsibilities are particularly relevant to the care of dependent family members (see, for instance, Mukherjee 2017b). Variations in survey design and administration render cross-survey comparisons difficult. At the same time, these variations yield insights into best practices.

Since Alexander Szalai pioneered their large-scale administration the 1970s, time-use surveys have focused on the activities of respondents, asking either "what were you doing?" at a specific time or "how much time did you spend doing X"? The results tell us that answers to such questions depends in part on how respondents interpret them. It has long been recognized that people are often do more than one thing at once, leading to distinctions between primary, secondary, and, in some cases, tertiary activities.

Dependent care is not the only temporal demand that is difficult to pin down. Studies focused on multitasking suggest that it comprises as much as a third of total activity time (Kenyon 2010). Many domestic activities, including cooking and laundry, entail periods of standby (for instance, in order to turn off the stove or unload the washing machine). Care of domestic animals and pets involves both activities and availability (milking a cow twice a day, walking the dog and letting the dog outside to relieve itself). None of these supervisory constraints, however, are as quantitatively significant as those involving small children.

The impact of time devoted to certain activities is mediated by sequence and priority, as well as intensity (Adam 1995). People's subjective experience of time stress is not

always determined simply by the quantity of time devoted to specific activities, but also by its quality. Some tasks are easier to perform quasi-simultaneously (flipping back and forth) than others. Some activities are more active (and easier to remember and report) but not necessarily more important than others. Responsibilities for dependent family members may entail short periods of intense activity, such as feeding, bathing or dressing them, combined with long periods that require physical proximity but no direct expenditure of energy or attention. Survey respondents are unlikely to report such constraints as an "activity" unless specifically prompted by questions regarding supervisory or passive care. Considerable evidence, reviewed below, suggests that respondents are quite sensitive to the ways in which questions regarding passive or supervisory care are worded—if they are included at all.

SIMULTANEOUS ACTIVITIES AND CHILDCARE

A number of international studies warn that time devoted to the care of children is significantly underestimated.[7] Multitasking and childcare go together, especially for women (Floro and Miles 2003; Craig and Bittman 2005). The 1997 Australian Time Use Survey made a concerted effort to capture supervision of children both as a primary and as a secondary activity. It included an activity code designated as "minding children" or caring for children without active involvement, including monitoring children playing outside or sleeping, preserving a safe environment, being an adult presence for children to turn to in need, supervising games or swimming activities including swimming lessons. Passive childcare." (Budig and Folbre 2004: 59). The survey instrument itself offers passive childcare as an example of a secondary activity.

Whether as cause or effect of this survey design, Australian researchers were the first to call attention to the temporal complexity of childcare. Duncan Ironmonger showed that childcare in Australia was particularly likely to be reported as a secondary activity, and that primary activity measures captured no more than 25% of total time devoted to childcare (2004). Another analysis of the 1997 Australian survey found that an hour of maternal work outside the home reduced active childcare by only 3 minutes. In other words, women who worked outside the home for 8 hours a day spent, on average, only 24 minutes less on direct childcare than those who were not employed (Bittman et al. 2004).

Analysis of the 1997 Australian data also showed that activities that women reported as leisure were far more likely to include work-related secondary activities such as minding children: background care responsibilities were far greater from women than for men (Bittman and Wajcman 2000). Subsequent research shows that mothers' childcare responsibilities take a different form than those of fathers. In addition to devoting more time to direct care, they also follow a more rigid timetable, and engage in more multitasking, more physical labor, and more time alone with children (Craig 2006).

7 Specifically, Norway (Kitterod 2001), the U.S. (Folbre et al. 2005), Korea (Yoon 2005), much of Sub-Saharan Africa (Budlender 2008: Charmes 2006:58), and, more recently, for Columbia, Ecuador, the Philippines, Uganda and Zimbabwe (Rost 2018).

In a compelling comparison of results between the 1997 Australian Time Use Survey and a carefully designed intensive survey of 188 new mothers in 2004-2005, Smith and Craig (2009) found that the larger national survey did not effectively capture time spent breastfeeding infants and emotional care time such as caring and holding infants. Their analysis of "who else was present" data from the national survey showed results similar to the smaller survey: new mothers spent virtually all their time in the company of infants, and their responsibility for them preempted other time allocation decisions. However, the smaller intensive survey, which provided new mothers with an electronic device that allowed them to press a button designating the activities they were engaged in whenever these changed, revealed 15 hours of week of breastfeeding and 5 hours per week of interrupted or delayed sleep that was not recorded in the national survey.

Lack of explicit attention to time devoted to breastfeeding of infants in national surveys is disturbing for two reasons. First, strong medical recommendations that mothers nurse their infants to the age of 6 months are based on findings of positive health effects for both infant and mother. Second, the System of National Accounts should, in principle, assign a market value to breast milk as an item produced for family consumption (a "good" as well as a "service"). Australian researchers have shown that exclusive breastfeeding of infants for a six-month period is more time consuming than use of purchased formula and requires more frequent interruption of other activities (Smith and Forrester 2013). When assigned a market value based on the cost of medical purchases for infants, breast milk constitutes a far greater contribution to an extended measure of Australian Gross Domestic Product than the purchase of infant formula (Smith and Ingham 2005).

Survey results for both primary and secondary activities are sensitive to survey wording and interviewer prompts (Folbre and Yoon 2007; Mullan and Craig 2009).

Even where childcare is recorded as a secondary activity, it should not necessarily be regarded as such. While it may require less expenditure of effort than a simultaneous activity such as cooking dinner or doing laundry, if often represents a higher priority: the respondent might not cook dinner or do laundry at home were it not for the need to supervise children there. Analysis of Ireland's 2005 pilot time use survey shows that when reported secondary childcare was designated instead as primary, the estimated national average of time devoted to care work doubled (McGinnity et al. 2005). Unfortunately, concerns regarding respondent burden and survey cost have inhibited efforts to elicit accurate responses regarding simultaneous activities and secondary time.

CONTEXTUAL VARIABLES

Another strategy for improving measurement of childcare activities exploits the contextual questions included on some diary-based surveys, such as "who else was present?" and "for whom?" this activity was conducted (Harvey and Spinney 2012; Gershuny and Sullivan 1998; Stinson 1999; Hirway 2008); When accounts of who else was present include both children and adults, the results offer a measure of time spent in physical proximity to children (Budlender 2007); The results also make it possible to construct measures of the ratio of adults to children, an indicator of the density/intensity of supervision (Folbre and Yoon 2007); Answers to this question, however, are

influenced by how proximity is defined—in the American Time Use Survey, it is restricted to "in the same room," wording that yields considerably lower estimates than surveys lacking this restriction (Mullan and Craig 2009).

While "for whom?" questions are seldom included in surveys, evidence suggests that they can be revealing. For instance, reporting of activities such as "using the phone," "sending emails" or "searching the Internet" does not reveal their intent; often time spent in such communication is related to paid employment (Harvey and Spinney 2011). However, for parents, such activities are often related to childcare—time spent arranging daycare or school arrangements, medical appointments, or leisure activities specifically for children.

Some time diary surveys—notably the national surveys of the U.S., Canada and the United Kingdom, and several community-level surveys administered by OXFAM, include specific questions regarding supervisory childcare time, as distinct from active care (Folbre and Yoon 2005; Folbre et al. 2007; Rost 2018). Measures of supervisory and in-proximity time are relatively close in some Canadian surveys (Fedick et al. 2005), but they often diverge. Analysis of U.S. data based on these measures definitively show that hours devoted to supervisory care swamp estimates of both primary or secondary childcare activity (Folbre and Yoon 2007). Here too, much depends on how questions regarding supervisory responsibility are framed, and, in particular, whether they include time when either or both household children and adults are sleeping.

The relationships among childcare activity time, time spent in proximity with children, and supervisory time have been explored in some detail in pooled data from the American Time Use Survey (Suh 2014). Over the 2003-2012 period mothers, on average, spent 2.1 hours in active care, 3.8 hours per day in social time, and 7 hours per day in supervisory time apart from time when children go to sleep at night and wake up in the morning (Suh 2014). In surveys that adopt different definitions, the ratios between these types of care differ substantially. Mullan and Craig argue that time diary data on proximity to children often provides reasonable estimates of supervisory time (2009). Yet such proximity measures remain underdeveloped, especially in developing countries.

CARE OF THOSE SUFFERING ILLNESS OR DISABILITY

On average, the quantitative demands of childcare far exceed those of other dimensions of unpaid direct care. However, the measurement problems outlined above also bear on time spent tending to family members and friends suffering illness, disability, or frailty. As life expectancy increases, so does morbidity. Average age is increasing in many national populations, and individuals over age 75 are particularly likely to require both active and supervisory care.[8] In some developing countries, HIV-related illness has significantly increased family care demands.[9]

8 Randel, Judith, Tony German and Deborah Ewing. 2017. The Ageing and Development Report. New York: Routledge.

9 See, for instance, Chiwaula et al. 2016.

Many surveys designed to measure care needs in the U.S. rely on categorical assessment of ability to engage in Activities of Daily Living (ADLs), which include eating, bathing, getting dressed, toileting, travelling and continence and Instrumental Activities of Daily Living (IADLs), which include activities necessary for self-maintenance such as cleaning house, managing money, moving within the community, preparing meals, shopping for groceries and necessities and taking prescribed medications. Such checklists are typically used to assess eligibility for publicly financed assistance, both in nursing homes and in community/home settings. While ADLs and IADLS provide useful indicators of dependency, they understate the temporal demands of care for those who require constant supervision, such as those with brain injuries or cognitive deficiencies such as Alzheimer's or dementia (Levine et al. 2003).

The distinction between ADLs and IADLs echoes the more general distinction between direct and indirect care outlined above. in most time-use surveys, helping a household member eat or go to the toilet is classified as direct care, while cooking for them or helping shop or pay the bills would be treated as housework or household management (i.e. indirect care). When such indirect care activities are performed for a non-household member such as an elderly parent, however, it is often presumed that the beneficiary must be unable to perform it. In the American Time Use Survey, this presumed dependency leads to the classification of all help for non-household members as direct care. Men are more likely to provide this form of assistance than any other, and the practice of coding it as a care activity increases estimates of men's direct care hours (Suh 2014).

Physical disability and impairment are not limited to the elderly. In the U.S. only about half of all adults requiring home or community-based assistance are over age 65 (Kaye et al. 2010). In developing countries, the low level of public health and care infrastructure means that families take on especially large responsibilities for care of the sick and disabled (Watermeyer et al. 2019). Care of children with disabilities is often an overwhelming responsibility for parents (Sandoval 2005; Breslau 1983). A time-use study of father-mother pairs with a disabled preschool child in the United Kingdom that included a qualitative component found that parents used terms like "trapped at home" and "twenty-four/seven caring" to describe their responsibilities (Thomas 2011: 108).

Michael Bittman offers a poignant example from a focus-group discussion with Australian respondents: A mother reported using a vacuum aspirator to suction mucus out of her profoundly disabled daughter's throat on a regular basis to prevent her from choking. The activity itself required only about five minutes out of every hour, but the schedule made it virtually impossible for the mother to leave her home, even for shopping (Bittman, personal communication).

IMPLICATIONS FOR ACTIVITY LISTS VERSUS TIME DIARIES

Surveys based on time diaries asking respondents to describe their activities the preceding day have often been described as the methodological gold standard (Bittman and Wajcman 2000; Budlender 2010). However, many surveys (including most of the

national surveys conducted by Latin American countries) rely on stylized activity lists, asking respondents how much time they devoted in the preceding days (typically a week, distinguishing between weekdays and weekends) to specific activities. Both types of surveys are vulnerable to problems of concept validity and measurement error.

Some researchers simply assume that the diary-based measures provide an accurate and objective standard by which to assess activity-list results (Bonke 2005). However, time diaries may fail to capture simultaneous activities even when measures of secondary time are included. These limitations become particularly salient with consideration of supervisory constraints, which most people (like most researchers) do not think of as activities. Several time-use researchers have noted that answers to stylized questions such as "How much time did you spend providing care for your children last week?" yield larger estimates than time diaries simply because they ask a broader question (Budig and Folbre 2007: 60). Juster, Ono and Stafford note that, in this context, "many respondents apparently go so far as counting time "on call" to attend to the child as childcare time" (2003: 29).

In this case, however, responses to stylized surveys may be more accurate.

Spanish time-use researcher Maria Durán forcefully argues that time diary surveys often miss the forest for the trees (Durán 2007: 65; see also discussion in Aguirre and Ferrari 2014). A general retrospective question regarding "time providing care" prompts more attention to background responsibilities, constraints and/or intermittent activities. Disjunctures in reported care time between stylized and time diary surveys have been widely observed, and the gap is often (but not always) greater for women than for men (see review in Kan 2008).

A few studies directly compare results from activity lists with those from comparable time diaries applied to similar or even identical samples (Kan 2008; Parker and Gandini 2011). Diary-based surveys, however, tend to query the preceding day while activity-list surveys tend to query the preceding week, hampering accurate comparisons.

Differences in time allocation to unpaid domestic work as measured by the two approaches appear smaller in Nordic than in other countries and are clearly affected by cultural and institutional context (Press and Townsley 1998; Bonke 2005).

Social desirability bias could help explain this pattern. Where family care is considered an entirely feminine responsibility, women may overstate their commitments to it. Yet it seems likely that supervisory responsibilities also come into play, because the presence of children in a household increases the gap between activity-list and time diary measures (Press and Townsley 1998; Kan 2008). These inconsistencies explain why Sustainable Development Growth Indicator 5.4.1, which measures the percentage of time people spend on unpaid care and domestic work by sex, rather than the absolute amount, is useful. Nonetheless, as later discussion will show, ratios and percentages are also affected by differences in how direct care is defined.

Inconsistencies across the two major survey types are heightened when activity-list-based surveys explicitly include supervisory care for children and people suffering disability or illness, as in most of Latin America. The Mexican Instituto Nacionál de Las Mujeres sponsored a particularly detailed methodological comparison of survey types, pairing a time diary survey with an activity list modeled on the Mexican national time use survey of 2009 (Parker and Gandini 2011). Both surveys were administered to

closely matched samples of the Mexican population. In order to eliminate one possible source of discrepancy, the activity list asked respondents to describe their activities for the previous day, rather than the previous week. This design had the additional advantage of offering comparisons with the earlier official survey based on inquiries regarding the previous week. Reports of time devoted to unpaid domestic work and family care were far larger in the activity list survey than the time diary, leading the authors to conclude that the time diaries were likely understating unpaid work time. Yet reports of other activities, such as paid work, were relatively similar across the two instruments.

Because most activity-list based surveys make no explicit allowance for simultaneous activities, they allow respondents to report time that adds up to more than 24 hours a day. The increased coverage of unpaid care time comes at the expense of easy comparability with time diary surveys that hold respondents to a 24-hour total and fail to collect extensive information on secondary activities. Both approaches are problematic: activity-list approaches overstate care time by allowing it to expand beyond any specific time constraint, while typical time diary activity measures understate it, allowing it to lie submerged under more salient activities.

ACTIVITY CODING AND SURVEY WORDING

International efforts to coordinate time-use survey wording have enjoyed only partial success. A recent report by a committee of time use experts notes that, "Currently there is no single approved international standard classification of activities that countries can use as a basis for the collection and dissemination of activity information in national time use surveys … The use of these different (but often similar) frameworks limits international comparability … " (UNECA 2015: 47). Respondents are clearly sensitive to differences in survey wording and coding and consideration of these reveals a number of avenues for improving both accuracy and harmonization.[10]

While most national statistical offices have developed surveys influenced by international standards, they seldom follow these to the letter. In activity-list based surveys, the designated activities are transparent, included in the survey instrument. In diary-based surveys, activity classifications are imposed on the raw data by a coding process: respondents describe activities in their own words, sometimes prompted by interviewers. In this case, the impact of activity codes is less clear. In both survey types, other design details come into play. When only one adult per household is surveyed, it is difficult to ascertain how care activities are shared among household members; unless all house-

10 As Jacques Charmes noted in a communication with me, "No one can be sure that the wording of questions is fully respected during the field survey. In particular in successive questions to a single member of the household or in a question asked to the various members of the household, it is likely that the interviewer will move to a shorter wording or even just mention the activity in question rather than repeat the whole wording."

hold members are surveyed, it is impossible to estimate the total amount of household care that a child or dependent adult receives.

The number of contextual questions also varies considerably. As noted above, some surveys collect data on secondary activities, but many do not. Where such data are collected, they are often of relatively poor quality, and sometimes go untabulated. A brief overview of international classification schemes and surveys helps illustrate the larger issues at stake.

General Classifications

The activity classifications used both in stylized activity lists and in coding respondent's individual time diaries have changed somewhat over time and are still evolving. Alexander Szalai and colleagues were among the first to develop a standardized set of activity codes, applied during surveys they reported on in the early 1970s (Szalai 1972: 562-566). Their codes did not describe "care to children" as work, and remained rather general, including, for instance "care to babies" and "care to older children" (see Appendix A for a full listing). "Care given to adults," if not included in household work, was categorized under "Private Needs, including meals and sleep."

The International Classification of Activities for Time Use Surveys (ICATUS), which builds on the original approach developed by Alexander Szalai, represents an ongoing international effort at standardization.[11] After consultation with experts, the United Nations approved a revised version in 2016, designed for consistency with recent resolutions by the International Conference of Labour Statisticians and the International Standard Industrial Classification of All Economic Activities. The classification creates a 3-tiered set of specific activity codes that can be used to categorize respondents' description of their own activities. ICATUS has not been uniformly adopted, but it has often served as a template for the design of national classifications. Its protocols for classification of unpaid care shape decisions made by survey managers, enumerators and coders, as well as survey design.

Two regional classification schemes have also had an important impact, the Harmonized European Time Use Survey (HETUS) classification developed by Eurostat (with participation by Belarus, Bulgaria, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom), and the Classification of Time-Use Activities for Latin America and the Caribbean (CAUTAL) (this acronym is based on the original Spanish).

These three international schemas have much in common. They all focus on activities. They all stipulate a clear distinction between paid and unpaid work. They all distinguish between unpaid care on behalf of household members and that on behalf of other households and assign help for other households to the same category as volunteer work for the community, a form of "helping" rather than "care." They all recommend that travel or waiting associated with specific activities (such as paid employment or unpaid care) be grouped with that activity, rather than tallied separately.

11 For more information on ICATUS, see https://unstats.un.org/unsd/statcom/48th-session/documents/BG-3h-ICATUS-2016-13-February-2017-E.pdf

Important differences, however, are apparent in the treatment of care activities. ICATUS acknowledges forms of care that are not necessarily "active," with categories such as "Minding children (passive care)" (code 416), "affective/emotional support for dependent adults" (code 424) and "passive care of dependent adults" (code 425) in own households. (see Appendix A for a complete listing of the subcategories of category 4). (Time devoted to "passive care" of non-household members is volunteer work). The current Harmonized European Time Use Survey (HETUS) activity codes are far less detailed, include supervisory care only in passing (alongside physical care), and do not include any mention of passive or supervisory care for adults (see Appendix A).

CAUTAL, the basis for most of the activity-list surveys administered in Latin America, leans heavily in the opposite direction from HETUS, explicitly listing supervisory care ("estar al pendiente") of children and adults who are sick or disabled, elaborating its meaning as follows: "being nearby and available to tend to them if necessary" (ECLA 2016: 23). A specific code for supervisory activities is included both for children and for dependent or disabled adults by age categories (see Appendix Table A.1). Unlike the other two schemas, the CAUTAL includes codes for the care of adults between the ages of 15 and 59 who are not necessarily ill or disabled. While it also places care for family members outside the household in the same category as volunteer work (category 5) it includes specific codes that allow care for family members to be disaggregated and combined.

Some empirical implications of differences in these three international classifications are clear. Countries following the HETUS abbreviated activity codes that do not call attention to all forms of supervisory care lower their estimates of total unpaid care time (all else equal). Countries following the CAUTAL convention including supervisory time, enlarge their estimates of total unpaid care time (further amplified, as aforementioned, by activity-list no period surveys. That invite respondents to report more than 24 hours in a day). Countries following the ICATUS practice of including "passive care" as an activity probably lie somewhere in between, but much depends on whether and to what extent the survey instrument and/or its administrators encourage respondents to report constraints that are not really activities. The potential to sort out the quantitative implications of these methodological differences is affected by many complex factors, best illustrated through an analysis of specific surveys.

SURVEYS IN AFFLUENT COUNTRIES

Some nationally representative and some smaller-scale surveys initiated in affluent countries over the last twenty years have devoted considerable attention to care responsibilities as well as direct care activities. As noted earlier, the Australian time use survey of 1997 included instructions to interviewers that gave passive care as an example of a secondary activity. Several national surveys adopted different, but related strategies, and at least one U.S. survey has examined time use from the point of view of children as care recipients.

As aforementioned, the HETUS does not include a separate code for supervisory care, but most countries applying it (all but Spain) included measures of secondary care time, and most (all but Finland and France) collected "with whom" responses that included a category of children under the age of 9. Microdata were not made available; until early 2019, however, aggregate statistics could be tallied using an on-line interface. One detailed study using this interface focused on differences in time devoted to children across these countries and included estimates of primary activity time, secondary activity time and "who with" measures that included a category of children under the age of 9 (Gauthier and DeGusti 2012).

Despite some methodological limitations, these international comparisons are valuable because they are based on closely harmonized surveys.[12] In the subsample for all households with married and cohabiting parents whose youngest child is under the age of 7 (excluding data for Finland and France, which did not include "with whom" questions) reported time in childcare activities came to 2.6 hours per day; for "time with" children under 9 (not counting primary activity time) 4.6 hours per day. The correlation between the two measures was .4.

By contrast, for full-time employed respondents with a full-time employed spouse, the (unweighted) averages were 2 hours and 3 hours respectively, with a correlation between the two measures of only .15.[13] In other words, the difference between all mothers in the sub-sample and mothers employed full-time (with a full-time employed spouse) was much greater for "time with" (in both absolute and relative terms) than for primary activity time, and the two categories of time use, for which mothers, were no longer strongly correlated. This finding provides strong support for the hypothesis that measures of active care time understate the temporal demands that children impose.

The American Time Use Survey (ATUS) conducted annually in the U.S. since 2003, and recent United Kingdom surveys include differently worded measures of "with whom" that can be used to measure time spent in proximity to young children (See earlier discussion of Mullan and Craig 2009). However, the U.S. surveys also include a supplementary, activity-list style question added to a time diary instrument, asking respondents living in households whether children were "in their care" during many activities. This question was added precisely in order to capture temporal responsibility for children that did not take the form of an activity (Horrigan and Herz 2004). The tabulated results apply very differently from time devoted to primary activities, as a response to interviewers' prompts. Statistics Canada's General Social Survey has adopted a similar stylized question, asking if individuals were "looking after children" (Fedick et al., 2005; Folbre and Yoon 2007a). These examples suggest that secondary childcare is best assessed by specific questions rather than—or in addition to—time diaries.

12 It is not clear from the analysis whether households in which other adults were present were included in the sub-sample, but in the absence of discussion it seems likely that they were. Limited access to the microdata restricts analysis to simple descriptive measures for a subsample of households including to married or cohabiting parents whose youngest child is under the age of seven. These are disaggregated into subsamples restricted to employed respondents, full-time employed respondents, and full-time employed respondents with a full-time employed spouse. The HETUS guidelines do not clearly specify how the "time with" variable was defined in terms of proximity, asking simply "Were you alone or together with somebody you know?"

13 Authors' calculations, based on Gauthier and DeGusti 2012, Table 2.

The New Zealand time use survey of 1998-99 survey used the "responsibility" criterion to record passive care of children, including time that children were sleeping. In a comparison of results with surveys from Australia, the United Kingdom and the United States, Matt Jones of Statistics New Zealand argued that questions regarding responsibility—as opposed to activity or proximity—yielded the most accurate results, especially for young children just past the infant stage (Jones 2008). This assessment is consistent with findings from the Panel Study of Income Dynamics Child Development Supplement (PSID-CDS) conducted in the U.S. in 1997, 2002/2003 and 2007/2008 in order to explore the determinants of child outcomes.[14]

The PSID-CDS time-use survey module is unique, asking children (or, in the case of very young children, their caregivers) who (if anyone) cared for them during the course of a day. A detailed analysis of the 1997 data shows that children under 13 received about 59 hours per week of active care (including care from non-household adults such as teachers) and about 22 hours per week in activities when adults were "available," not counting sleep time (Folbre et al. 2005). Time that children spent sleeping amounted to 79 hours per week, on average (about one-half of all hours in the week). Exclusion of time that children are sleeping from estimates of care time leads to the misleading inference that infants require less time than older children simply because they are less likely to be awake at any given time.

Duncan Ironmonger has observed that one could calculate the demand for unpaid childcare by multiplying the age-specific needs of children times the number of children in specific ages and subtracting hours of paid care (Ironmonger 2004). The Office of National Statistics of the United Kingdom adopts this output-based approach. Rather than utilizing estimates of the amount of family time inputs into childcare, they estimate the minimum amount of care that young children of different ages require, subtract estimates of the amount of formal care time provided by the public sector or purchased in the private sector, and use the resulting residual as an estimate of family provided care (which they term "informal care"). As their 2013 reports puts it:

> By using a residual approach to estimate informal childcare we are accounting for all the time a child needs supervision. This supervision can be 'active' or 'passive'. Passive care includes the time when an adult may not be directly interacting with the child, but is still responsible for them. The important point is that if no unpaid carer were available, a third person would have to be paid to take their place. Therefore passive care is part of the productive role of households and is included in our estimates. One simple way of distinguishing between passive and active childcare is to look at waking and sleeping time. If we assume a child under 5 sleeps for twelve hours, we can say that 50% of their childcare is passive, and so on (ONS 2013: 1).

14 For more information regarding the PSID-CDS, see https://psidonline.isr.umich.edu/Guide/FAQ.aspx?Type=2

The ONS use of the term "passive care" to include the time required to be on call when children are asleep differs from the conventional use of this term in the time-use literature. It certainly dramatizes the quantitative issues at stake in the measurement of unpaid care.

SURVEYS IN DEVELOPING COUNTRIES

Less attention has been devoted to date to methodological issues in the measurement of care time in developing countries. However, many small-scale surveys administered by agencies other than national statistical offices have taken advantage of opportunities to combine qualitative methods such as interviews and focus-group discussions with more standardized surveys. The Canadian International Development Research Centre has sponsored a number of such mixed-method studies in developing countries (Folbre 2018). A recent community-level study recently administered in Malawi adopts a similar approach (Lentz et al. 2018). OXFAM has administered a number of community-level Household Care Surveys in developing countries that were explicitly designed to explore broader measures of care burden (Rost 2018). These surveys, conducted in small communities in Colombia, Ethiopia, the Philippines, Malawi, Uganda and Zimbabwe, were not nationally representative, but nonetheless offer important methodological innovations.

The OXFAM survey instrument is a time diary for the previous day that asks about primary and secondary activities on an hourly basis and also includes two specific stylized questions: 1) "Were you responsible for looking after a child (<18 years) during that hour?" and 2) "Were you responsible for looking after a dependent adult during that hour?" The results clearly document the importance of both secondary care activities and supervisory care across all surveyed countries in all three survey years. Their inclusion of primary care time approximately doubled the estimated amount of time that both women and men devoted to family care (Rost 2018: 4). Higher levels of multitasking were apparent among women than others, particularly related to care provision. The 2017 surveys explicitly asked children about their care provision, yielding higher estimates than those that had been provided by parents regarding children's care provision in earlier years. The surveys also asked about time use during normal sleeping hours to capture work that might interrupt sleep, such as breast feeding.

Clearly there is little international agreement on the best definition of direct or supervisory care, much less the most accurate way of measuring it. Yet many possible directions for progress in this arena are evident. More detailed analysis of the consequences of differences in survey design and administration outlined above could inform efforts to improve existing surveys without threatening comparability with those conducted in the past.

3 LESSONS FROM DEVELOPING COUNTRIES

Both accuracy and comparability in direct care time measurement can potentially be improved through analysis of the survey instruments and empirical results of recent time use surveys in developing countries.

An overview of harmonization issues sets the stage here for an in-depth comparative analysis of two surveys from each of three major regions of the developing world: Latin America (Ecuador and Mexico), Asia (South Korea and China) and Africa (South Africa and Ghana). The choice of country surveys for detailed analysis was largely dictated by practical considerations. While many countries now administer nationally representative time-use surveys, relatively few provide easy access to digital files containing microdata or the metadata documenting decisions made in its tabulation and presentation. Subject to on-line access, the surveys singled out here were those that potentially illustrated the impact of large and small differences in design. The resulting comparisons are by no means comprehensive, but they powerfully illustrate the need for improvement and harmonization of survey instruments. They also offer valuable opportunities to learn from specific design successes and failures.

The first section below provides an overview of methodological concerns related to both harmonization and accuracy. The second section presents and discusses a checklist of survey characteristics relevant to unpaid direct care. The third section presents three intra-regional comparisons from, respectively, Latin America, Asia and Sub-Saharan Africa, with some consideration of interregional contrasts. The conclusion outlines some recommendations regarding potential for harmonization, best practices for survey design and possibilities for further research.

METHODOLOGICAL CONCERNS

All national survey designs must confront tensions between prioritizing national concerns and reaching for international comparability. Regional influences are significant. As their name indicates, the Harmonized European Time Use Surveys designed by Eurostat administer almost exactly the same survey instrument in many different countries. Such harmonization is unusual. While many countries in the Latin American region adopt a similar design (one that is quite distinct from that commonly applied in other regions) small but significant variation in details is evident. Asian and African surveys reveal common influences but have not achieved regionally harmonized designs.

True harmonization of surveys requires consistency in both design and administration that can be costly and contentious to achieve, and the understandable desire for consistency with previous national surveys also creates resistance to change. Still, methodological audits can establish the potential benefits of design harmonization and yield strategies for post-hoc adjustments. Either way, the intent to harmonize raises a larger question: Which designs are best candidates for development of a common template?

The most significant methodological divide separates surveys based on respondents' time diaries for the previous day from surveys in which respondents report time spent in a specific list of activities during the previous week (common in Latin America).

Activity-list surveys allow for simultaneous activities, and as a result, total time reported can add up to far more than 24 hours of activity time per day. In theory, time diary surveys that allow respondents to designate a variety of different simultaneous activities (described as primary, secondary or tertiary activities) could yield comparable results (especially if applied to the same recall period). In practice, however, reporting of secondary activities tends to be incomplete and unreliable unless accompanied by specific prompts. The methodological dilemma is easily summarized: activity-based surveys are likely to overreport secondary activities, while diary-based surveys likely to underreport them.

This dilemma would be easier to countenance if activities listed as secondary or tertiary were similar in level and distribution to those listed as primary. If this were the case, estimates of time allocation including simultaneous activities would offer more detail and texture without significantly altering the big picture. However, as aforementioned, considerable evidence from Australia and other countries suggests that supervisory care of dependents, typically shows up as a secondary rather than a primary activity, for the simple reason that it seldom constitutes an "activity" at all.

Nor is it clear that questions directed at measurement of supervisory time actually capture its full extent. Respondents are far more likely to be aware of on-call constraints when they pose a significant opportunity cost. If they perceive few alternatives to remaining home, constraints go unnoticed. Also, supervisory responsibilities may be widely shared among family and community members, with older siblings, co-residing adults such as in-laws or grandparents or neighbors informally providing oversight. Time-use surveys that collect data from only one or two household members and ask only abbreviated questions concerning care of non-household members provide a very incomplete picture.

Most empirical analysis of time-use data has focused on calculating the average amounts of time that men and women devote to paid employment, unpaid work (including direct care) and leisure. These categories, however, can overlap to a considerable extent. For instance, men and women who engage in production of goods for sale or own consumption at or close to home can combine these activities with both active and supervisory dependent care. Wage employment, however, typically discourages such simultaneous activities. Family members often engage in leisure activities together, but the duration, continuity and quality of leisure is shaped by care responsibilities.

The most serious obstacle to assessment of time-use survey accuracy is the difficulty of obtaining independent benchmarks for verification. It is virtually impossible to distinguish the quantitative effects of differences in survey design between countries from real underlying differences in time allocation resulting from economic, demographic, and cultural factors that cannot be easily operationalized. Where care of young children is concerned, however, one can compare reported household totals of care time provided with what might be considered minimum levels required for health and safety. The temporal demands imposed by household members suffering from illness, disability or infirmity are smaller and far more variable, and relatively few surveys collect detailed information on them.

SURVEY CHARACTERISTICS

The distinction between time diary and activity-list surveys, alluded to above, has significant implications for any and all cross-survey-type comparisons.[15] The narrower issue of primary interest here concerns differences in the ways in which the temporal requirements of direct care are designated and recorded. Time diaries give respondents freedom to report their own activities, and while interviewers may influence the accounts provided, it is seldom clear if or how they do so. Likewise, the process by which the diary entries are coded as specific activities typically remains somewhat opaque, though most statistical agencies take pains to ensure a uniform and consistent process. For diary-based surveys, the list of specific activity codes is most telling, and differences among these codes can hinder cross-survey comparisons.

Results from activity-list surveys are more transparent because they reduce the discretion of interviewers, respondents and coders. The survey instruments themselves list specific activities. Interviewers ask respondents whether they participated in them, and if so, for how long. As a result, differences in the survey instruments themselves are the most significant source of comparability problems. While the influence of interviewing and coding practices is likely smaller than in the case of diary-based surveys, it nonetheless remains significant. As aforementioned, this mode of data collection forecloses distinctions between primary and secondary activities. However, because some activities typically considered secondary in diary-based surveys (such as supervisory care) are often included on activity lists, they provide a valuable indicator of the relative magnitudes of supervisory and active components of direct care. Likewise, otherwise diary-based surveys that include one or more specific activity-list questions regarding supervisory care provide some leverage.

Many researchers and policy makers rely on official tabulations of time-use data rather than analyzing the micro-data. The scope for variation in tabulations is large and includes the level of detail provided (e.g. number and complexity of cross-tabulations), differences in the aggregation of subcategories, treatment of missing or extreme values and format of presentation. National statistical offices seldom publish detailed information regarding their practices in this regard, much less metadata such as statistical code specifying exact algorithms. As a result, it is not always possible to closely replicate their official tabulations, an issue discussed later in more specific instances.

These caveats help explain the focus here on the implications of conspicuous differences in survey design and activity codes for measurement of direct care time among activity-list surveys, among diary-based surveys, and (to a lesser degree) between activity-list and diary-based surveys. A list of specific characteristics of six time-use surveys, two each from Latin America, Asia, and Africa, provides an overview (see Table 1).

15 These issues include differences in the period of time that respondents are asked to recall and social desirability bias, which may have a greater effect on activity-list interviews. It is also important to note that, once time diary responses are standardized according to activity codes, it is impossible to retrieve original responses without essentially recoding all the primary data. I know of no instances in which this exercise has been performed.

The inconsistencies documented here are sufficient to illustrate needs for harmonization. The first category of characteristics in Table 1 concerns type of survey, as discussed above. The next category, number of household members surveyed, is key to efforts to link the number of dependents in a household to the amount of direct care provided. If the survey is administered to only one or a subset of household members (as in the South African case) it is impossible to determine the total amount of direct care provided. This information is also relevant to analysis of the gender and age division of labor in extended families and complex households.

Demographic parameters are also a high priority. Because economic development is associated with increased schooling and concomitant decreases in the time young people devote to paid or unpaid work, more affluent countries tend to define children as those under 18. In developing countries, however, children tend to be defined in a narrower age range. This tendency is reflected in the minimum age specified for participation in a time-use survey, which is considerably lower in some countries than in others. Many surveys also specify a separate definition of children when questions regarding time devoted to childcare are conditional on the presence of children of a certain age in the household. For instance, the difference between the 2014 Mexican survey, which set its cutoff at 14, and the 2012 Ecuadorian survey, which set its cutoff at 12, biases comparisons of total childcare.

While "care for elderly" is often included, the elderly are seldom explicitly defined in terms of age. Of the six surveys included in Table 1, only Mexico explicitly defined elder care as care for persons over age 60. Sometimes, as in the South African case, care of elderly family members is combined with care of those who are ill or disabled. Care for non-household members is included in all the surveys, but, as in the Korean case, may be limited to non-household members who are also kin.

All of the surveys in Table 1 explicitly or implicitly allowed reporting of simultaneous activities. The activity-list based surveys of Ecuador and Mexico simply asked how much time people spent in various activities without imposing any limit on the total time reported; the diary-based surveys of South Africa allowed respondents to describe up to three activities and in Ghana up to five activities (in a given time slot, with varying levels of success); both the Korean and Chinese surveys asked respondents to report secondary activities, but in the Korean case, the reports were so low that they are not considered very useful. The Korean survey is the only one that failed to explicitly ask about supervisory time devoted to children, but the South African survey combined supervisory time for children and adults needing care, making it difficult to compare with measures for other countries.

Most surveys of affluent countries define care as services provided to those who cannot effectively care for themselves; South Africa followed this convention in its 2010 survey, but the five other countries included care for spouses and other adult family members. The South African survey is the only time diary survey that prompted respondents to include supervisory or passive care that may not have been spontaneously reported (both Ecuador and Mexico included direct questions regarding supervisory care on their activity lists).

Contextual time-use variables apply primarily to diary-based surveys, which sometimes ask "with whom" or "in whose presence" an activity was conducted and encourage respondents to list the age and family relationship of such individuals. In addition to

providing information about social interaction within households, such questions can provide a proxy for supervisory care. If, for instance, adults report engaging in a leisure activity with a very young child present, it can be inferred that they are supervising that child. However, as aforementioned, research indicates that the way in which this question is framed has significant consequences for its measurement. The Korean survey of 2014 specified "with whom" as those *engaged in the same activity*. As a result, the "with whom" question elicited relatively few responses. (By definition, an adult could not be engaging in childcare "with" a child unless that child was also engaged in the same activity, i.e., providing childcare).

All the surveys considered provide some information regarding the characteristics of participants in the survey, such as level of education, family income, time spent in indirect care (e.g. housework and household maintenance), time in hours of paid employment, hours of informal work, participation in a family enterprise, or production for own consumption. Some include information on utilization of domestic servants or public services such as childcare and education. Such variables are less relevant to direct comparison of descriptive results than to statistical assessment of the possible determinants of time devoted to direct care, which can, in turn shed some light on comparability of results. Virtually all the differences categorized in Table 1 have implications for quantitative comparisons. Some are susceptible to post-hoc harmonization, and some are not.

COMPARATIVE CASE STUDIES

The task of drawing inferences from comparative analysis is strategically complex; some surveys, obviously, are more comparable than others. Assessment of the quantitative implications of design differences is easiest when comparing countries that share common economic and cultural characteristics, especially where survey instruments vary only in minor details. The best way to assess more global aspects of survey accuracy would be to compare and calibrate results from different types of survey instruments or to employ qualitative research methods such as participant interviews, observation or focus group discussions. In the absence of adequate resources for such efforts, the best remaining option is to examine results for internal consistency and, where possible, compare them with what might be considered physiological or social requirements, such as time required for sleep or supervision of very young children.

While official tabulations of time use provide important—and relatively comparable—measures of the relative amounts of time that adult men and women devote to direct activities, they do not shed much light on the temporal burden of direct care on the household level, an important issue for public policy. Even measures of time devoted to direct care activities conditional on participation in those activities can be misleading, because of differences in the time periods utilized by different surveys, ranging from one week to 10 minutes. The longer the time period, the greater the likelihood of participation in any given activity. Even differences between a survey based on two

diary days (such as the Korean and South African surveys) and one diary day (such as the Chinese and Ghanaian surveys) can be significant in this respect, particularly if the two-diary days surveys are more likely to capture a weekend.[16]

Access to adequate micro-level data allows for comparisons based on the presence of individuals likely to require direct care within households. We apply a standardized template for empirical description to all six countries. Since direct care responsibilities vary considerably with the age structure of the population, consideration of the age and gender of household members provides a good starting point. While many persons provide care to non-household members, the bulk of direct care time is devoted to household members. Note, however, that the focus on households (typical of most time-use surveys) ignores the institutional population, including members of the armed forces (predominantly men), and a significant proportion (as much as 8% in some European countries) of the population over age 80, who are living in nursing homes (Peeters et al. 2013). Homeless persons and migrants in temporary housing are also underrepresented.

In general, women are more likely than men to live in households with probable dependents, which we define conservatively here as a) children under the age of 10, b) elderly 75 and over and c) individuals suffering illness or disability (reported in some, though not all surveys). The age brackets are chosen to convey the likelihood of care dependency, including the need for supervisory care, and are narrower than age brackets typically chosen for financial dependency or dependency on public assistance.[17] While children under the age of ten have fairly predictable needs for care, the needs of elderly household members are very heterogeneous, so the 75+ category provides only an approximate measure of probably care dependency. In examining household care dependency ratios, we omit consideration of youth between the ages of 10 and 17 because they are likely to be both providers and receivers of household care.

The results, tallied for each of the six countries under consideration, reveal significant gender differences in residence with someone likely to require care. These demographic snapshots motivate a descriptive analysis of average individual time devoted to care of household and non-household members, with a focus on women and men with co-resident dependents. The total amount of care provided by all household members can be estimated from five of the six surveys we analyze. Because the South African survey of 2010 only collected data for up to two adults per household, we restrict our attention there to households with up to two adults, providing parallel estimates with this restriction for other countries to supplement those for larger households.

16 A simple comparison between a weekly and a one-day survey illustrates this problem. Consider the possibility that some activities, like shopping, are unlikely to be conducted every day. Suppose that everyone shops at least once a week, so the probability of participation in a week is 100%. Suppose that the average time spent conditional on participation is 2 hours. Also suppose that the probability of shopping on a specific day is 1/7, and that the time spent conditional on participation is the same, that is, 2 hours. A survey collecting responses based on the preceding week would show that the weekly time conditional on participation is 2 hours. Converted to a daily basis, this would be 2/7 hours per day. However, a survey based on a single diary day would show the time conditional on participation to be 2 hours. The higher probability of participation in the longer time period dilutes the time conditional on participation. Unconditional times are comparable across single day and weekly surveys, on the assumption that days of the week are randomly sampled.

17 Relatively little research addresses this issue; most attention has focused on other dimensions of dependency. See for instance Sanderson and Scherboy (2015).

Household-level estimates are particularly valuable because they provide a picture of the average total indirect and direct care provided to dependents, which can be assessed relative to standards of need for direct care of children. These estimates also clearly reveal the extent to which co-resident household members supplement the parental care of children, in particular. Household-level estimates, however, obscure the differences between women and men in total work hours. In order to examine these, we construct ratios of the average time that adult women compared to adult men spend on total work, paid work, and disaggregated care activities for each country.

Multivariate analyses of the determinants of women's time devoted to the care of household dependents offer a way of isolating the effects of certain demographic and economic variables while controlling for others. The discussion of these results emphasizes the impact of different types of productive activities (wage employment, informal sector work, unpaid work in a family enterprise and production for own consumption) on women's time devoted to indirect care, direct active care and supervisory time. These subcategories of "productive" work as defined by the System of National Accounts are often clubbed together in tabulated data, but have different implications for direct care work, since wage employment is less complementary with supervision of children than the other categories.[18]

Due to differences in survey design, the basic empirical template is not entirely consistent across countries, but nonetheless provides a useful comparative framework. The country-by-country descriptions are embedded within a regional context, followed by attention to cross-survey comparisons that yield both substantive and methodological insights, particularly regarding the supervisory component of direct care time.

East Asian Examples

Two East Asian countries, South Korea and China, were chosen for analysis based on availability of research assistance for help with translation as well as access to data. Economic differences between the two countries are significant. Korea's per capita income in the survey year, 2014, was estimated at $27,811 in U.S. dollars, compared to $8,827 for China in the 2017 Inner Mongolia University Survey of China. Both countries have total fertility rates below replacement level, about 1.2 births per woman in Korea compared to 1.6 births per woman in China.[19] Literacy rates are above 95% in both countries.

Korea is one of the few Asian countries that has mainstreamed time-use surveys in its national statistical system (ILO 2018a: 9). Since 1999, the Korean Statistical Institute has conducted a diary-based national survey at approximately 5-year intervals. Research published in English utilizing this data is limited, and does not offer many methodological details (An 2010; Choi 2011). The National Bureau of Statistics in China conducted a survey in 2008 that has been extensively analyzed, and we summarize some findings

18 Were it not for the rather arbitrary SNA distinction, production of goods for own consumption should and would be combined with production of services for own consumption (indirect care work), consistent with a recent recommendation by the International Conference of Labour Economists (Folbre 2020).

19 GDP and total fertility rate estimates derived from Google search results based on World Bank data.

based on it (Dong and An 2015). However, this survey did not include data on the age composition of households, a crucial variable for our analysis. A more recent National Bureau of Statistics survey was administered in 2018, but we were unable to gain easy access to it. We turned our attention instead to a nationally representative diary-based survey of 29 provinces conducted by Inner Mongolia University in 2017, covering 12,471 households and 30,591 individuals.

This Chinese 2017 survey resembles the Korean 2014 survey in some respects (see Table 1). It collected time use data on all household members, though only on one diary day. It, too, set out to capture secondary activities, with greater success: About 63% of respondents ages 18+ reported a secondary activity, mostly leisure activities such as talking to others, watching television or smoking. Only 16% of those reporting a secondary activity described it as indirect care, and only 7% of those reporting described it as direct care.[20] As aforementioned, the Chinese survey did not limit the contextual variable "with whom" to household members engaged in the same activity. It devoted special attention to shopping activities, treating this as a category distinct from other forms of indirect care. The classification of care activities includes care of "family members" (under age 18) and also (separately) care of underage relatives who may live outside the household.

The most distinctive feature of this survey is its inclusion of family members ages 3 and above, with adults asked to fill in details for children too young to respond. As a result, detailed information on participation in preschool and kindergarten, as well as school, is included. The activity list indicates that time young people spent in educational activities was recorded in considerable detail. It also includes a specific code for supervisory care, translated as "Looking after children who are playing indoors or outdoors, keeping them in a safe environment and supervising them when playing games, etc." Codes for "taking care of adult family members" and "taking care of adult relatives" do not explicitly include supervisory care. The individual questionnaire includes assessments of individual health and physical handicap. This survey also includes a number of stylized questions that follow the time diary, including one that ask about sleep interruptions to take care of children or other family members.

The 2008 Chinese survey has been criticized for its lack of attention to supervisory constraints (Dong and An 2015: 556). The 2017 survey could potentially offer greater insights due to its attention to "looking after" activities and sleep interruptions, as well the inclusion of time diaries for children ages 3 and above. While detailed analysis of this aspect of the survey is beyond the scope of this paper, it offers promising opportunities for future research.

The South Korean Time Use Survey of 2014

The South Korean 2014 survey collected data for two diary days (a weekend and weekday) from all household members ages 10 years and older in a nationally representative sample administered at different points in time in order to account for seasonal

20 All tables for China 2017 in this document are based on primary activities alone.

variations. The coded results did not include an explicit category for passive or supervisory care, although this could have been reported in the category of "other care." In principle, the survey collected data on secondary time use. However, the low level of reported secondary activities—and the extremely infrequent reporting of childcare as a secondary activity—strongly suggests under reporting (An 2010).

The survey included the contextual category "with whom," but restricted this question to others who were engaged in the same activity. Almost by definition, this restriction excludes or at the very least underestimates supervisory care for both children and adults. Only activities such as talking together, preparing a meal together or watching television together would qualify. One recent analysis of this survey utilized the "with whom" to tally the amount of time in leisure and socializing in the company of children, reporting that women devoted significantly more time in this context than men (Yoon 2019). This measure, however, omits consideration of time women spent with children while performing housework (and other activities we include under indirect care) because in this instance, children were not engaged in the same activity.

Other notable features of the South Korean 2014 survey include the definition of care or help to non-household members, which is restricted to family members. In practice, this restriction may matter little, but it represents a small discrepancy with the other surveys reviewed here. A separate set of codes under "participation and volunteer activities" (distinct from explicitly care-related activities) includes helping friends and other non-household members who are not family members. Codes for direct care for spouses and parents in the household are included, whether or not they are ill or disabled. In this respect, the Korean survey resembles the Mexican and Ecuadorian surveys discussed later. Neither the American Time Use Survey nor the Harmonized European Time Use Surveys code services for working-age, healthy adult household members as direct care.

Korean demographics shape the basic contours of direct care responsibilities. Only 19% of Korean households surveyed included a child under the age of 10 (see Table 2, Column 1). Almost all such households included a woman (likely a mother) between the ages of 18 and 74—only 1% did not. A relatively large percentage also included a man in the same age group (likely a father)—only 5% did not. The history of rapid fertility decline explains why the percentage of households including a person 75 or older was relatively high, at 13%. About 60% of such households did not include a woman 18-74, and about 71% did not include a man in that age range, suggesting that many of those 75+ were living alone. These doubtless included married couples providing spousal care.

Levels of participation in direct care activities show the imprint of household structure (see Table 3, Column 1). (Participation is defined as reporting any time in the activity on either of the two diary days). Relatively high paternal coresidence with children in Korea leads to relatively high paternal participation rates in direct care of children (though still far lower than those of women, especially in households that include a child under the age of 10). Not surprisingly, presence of a child under 10 has a marked impact on participation in care of household children. However, presence of a household member 75 or older is not associated with high participation in elder care, indicating that age is not a strong indicator of care dependency.

The average amount of time women and men devoted to direct care activities (not conditional on participation) varies considerably by household structure, both in absolute levels and as a percentage of total care time (including indirect care). Women

in households with a child under the age of 10 reported an average of 186 minutes per day (slightly more than 3 hours) in care of household children, and men reported 51 minutes (slightly less than an hour) (see Table 4). These are likely underestimates for women in particular, since time devoted to supervisory or passive care was not explicitly measured. Averages for other direct care activities—care of non-household children, household elderly, sick or disabled, and care of non-household adults were quite small in terms of minutes per day.

Measures of total household participation in care activities (defined as participation of any member) are provided in Table 5. These participation rates were consistently close to 100% in the Korean survey, again, perhaps as a result of its coverage of two diary days.

As indicated in Table 6, column 1, the average amount of household time devoted to direct care of household children in all households with at least one child under 10 was 235 minutes per day (slightly less than the sum of average women's and men's time); in the subset of households that included no more than two adults, the average was only slightly smaller, reflecting the predominance of two-adult families.

Average daily household time devoted to direct childcare in households with at least one child under 10 in South Korea exceeded that of every other country survey except that of China, at 235 minutes per day (or slightly less than 4 hours) (see Table 6, column 1). Applying the residual approach developed by the United Kingdom's Office of National Statistics (discussed earlier), it is possible to use both 24-hour and estimated waking hours benchmarks as proxies for total direct care need. Taking the 1440 minutes in a day, then subtracting the average amount of direct care provided by household members (235 minutes), leaves a total of 1205 minutes (or 20 hours) that one or more children were not receiving care. Subtracting the average time that a child under the age of 10 spends sleeping (11.95 hours) leaves about 488 minutes or a little more than 8 waking hours per day unaccounted for by household care. Attendance at school or after-school academies makes up a large part of this deficit, but since the survey does not contain information on the average hours that children under 10 spend in childcare or school activities, it is impossible to determine whether household-level direct care time for children was underreported or not.

The ratio of women's average to men's average time in all activities and in supervisory care (where it is measured) varies considerably by type of activity, but, as later discussion will show, does not vary in entirely consistent ways across countries. In South Korea, the ratio of women's to men's time is higher in indirect care (at 4.5) than in direct care (at 3.3) (see Table 7, column 1). Our multivariate analysis of the determinants of women's indirect and direct care performed by women, following the standard model described above, is presented in Table 8. These estimates are not intended to test causal hypotheses, but rather to increase the specificity of cross-country comparisons by controlling for a wide range of variables. The control variables for South Korea are similar to those for other countries, with two exceptions. No data was collected on presence of a domestic servant (as in South Africa, Ghana, Ecuador, and Mexico), and the survey distinguished between residence in a city or a town rather than designing a rural/urban distinction.[21]

21 The definition of rural versus urban varied across surveys, presumably in ways specific to individual countries. This comparability issue lies beyond the scope of this analysis.

Since most women in Korea living in households with young children are mothers (about 91%) we focus on the results for mothers (identified by their relationship to household head). An additional child under the age of 5 is associated with an increase of about 52 minutes per day in a mother's active childcare, while an additional child between the ages of 6 and 10 is associated with reductions in active childcare of slightly more than 10 minutes. An additional child of any age or gender is associated with increases in mothers' indirect care time of 14-15 minutes. The presence of a woman over age 18—such as a grandmother—is associated with a reduction of mothers' active care of about 51 minutes, of indirect care by about 37 minutes.

Additional minutes that mothers spend in formal employment are associated with small reductions in both indirect and their direct care of. 25 and .23 minutes respectively, totaling a reduction of .48 minutes. In other words, an additional minute of paid work was associated with a reduction of less than 50% in unpaid work, and therefore, with an increase in the total length of the workday. Unpaid time devoted to a family business was associated with smaller, but also negative effects; time spent in subsistence farming was associated with larger negative effects on time spent in active care.

Residence in a city rather than a town was associated with a slight reduction in indirect care time and an increase inactive care time by about 20 minutes. Educational attainment is associated with greater time devoted to active care: mothers with no schooling report more than 90 minutes less active care relative to a high school graduate, and those with some schooling but no high school degree about 48 minutes less. A college degree is associated with an additional 24 minutes of care relative to a high school graduate. The effects of education on indirect care reveal a different pattern: they are negative for low-education mothers but also negative (though small and not always statistically significant) for high-education mothers.

Monthly household income, in broad categories defined by their relationship to the median, is also heavily patterned. Mothers in households with income less than 50% of median income spend about 18 more minutes on direct care than those in the middle-income group, while those at the top of the distribution spend less. As will be seen from later discussion, the inverse correlation of household income with direct care time is unique to South Korea; it may be related to differences in ability to purchase childcare or afterschool services, which are widely used in South Korea.

The Chinese Time Use Survey of 2017

Like South Korea, China is on the low end of the countries considered here in its percentage of surveyed households with at least one child under 10, at 22% (see Table 2). The percentage of these households lacking a man between the ages of 18 and 75 is also quite low, at 2%. About 17% of households include a person 75 or older, and about 37% at least one probable dependent. The participation rate of women 18 and older in indirect care activities was 87%, only slightly lower than that of Korea, but the participation rate of men was quite low, at 44%, relative to 66% for South Korea (see Table 3). A similar pattern is evident for direct care of household children: Less than 9% of all Chinese men engaged in this activity on the diary day, compared to 17% in South Korea. The differences for men may partly reflect the effect of a one-day versus a two-

day survey design. The differences among women in the two countries were smaller, 22% in China compared to 26% in South Korea. Again, these results may partly reflect the 2-day structure of the South Korean survey.

In households with at least one child under 10 (and no child over 10 and under 18) rates of reported participation by adult women and men in direct care of household children are strikingly low by comparison with all other countries, not just South Korea: about 56% for women (and mothers) and 29% for men (and fathers) (see Table 3). In households with at least one household member 75 or older, rates of participation in the care of an elderly or disabled family member are lower than in other countries, at 3% for women and 2% for men. Participation rates for care of non-household adults are negligible in both countries. It seems likely that elder care activities were interpreted differently in China than in other countries in ways not revealed by the coding schema. If not, and these results for China are accurate, the population ages 75 and older is largely caring for itself.

Since daily averages for population subgroups are derived by multiplying individual participation rates by the time reported conditional on participation, the average time spent by women on a diary day for China in direct care activities is also low relative to those for South Korea (see Table 4). The contrast is most striking for mothers of at least one household child under the age 10, for whom the totals come to 150 minutes for mothers, compared to 190 for South Korea. There is far more similarity in direct care time performed by men and fathers in the two countries. This pattern may reflect higher rates of female labor force participation in China.

Other household members could be taking up the direct childcare load, though the household participation rate in active care of children in households with at least one child under the age of 10 in China was only 56% and participation in supervisory care, only 28% (see Table 5, column 2). As indicated in Table 6, column 2, the active childcare minutes reported for Chinese households with young children come to 250 minutes, compared to 235 minutes in South Korea. The differences are reversed when the sample is restricted to households with only two adults in the lower panels of Table 6.

The gender division of labor in China differs from that of South Korea in terms of ratios of women's to men's time in many activities (see Table 7). Women's time in paid employment is .6 that of men, compared to .5 in South Korea. The ratio of women's to men's time in indirect care is far lower in China, at 2.8 compared to 4.5, and in care for household adults reported elderly, sick, or disabled, is 1.3 compared to 2.4. The gender ratio for direct active care of household children, however, is similar in both countries, at 3.7 compared to 3.3.

The multivariate analysis of determinants of time that women and mothers spent in three different types of care (indirect, direct, and supervisory) in China offers some insight into the possible effects of structural economic differences with South Korea, such as the effects of rural residence, household income, and educational levels, even though these variables are not defined in entirely identical ways (see Table 9). The previous discussion of results from South Korea in Table 8 showed a positive relationship between residence in a city and mothers' direct care time (about 20 minutes) and strong effects for no schooling (90 minutes less than that of a high school graduate). In China, however, the effects of all comparable variables are much smaller and less significant, though living in a household with less than half the median income was associated with a small negative effect of 16 minutes on mother's daily active care of children (a very different pattern than in South Korea).

South Africa 2010 and Ghana 2009

We chose surveys conducted in South Africa and Ghana for methodological analysis because microdata are available online and documentation in English is easily available. The two countries have followed very different historical and economic trajectories, and differ considerably in per capita GDP (7,275 U.S. dollars per capita in South Africa in 2010, compared to 1,087 U.S. dollars in Ghana).[22] The total fertility rate in South Africa in that year was also far lower, at 2.6 births per woman compared to 4.3 in Ghana.[23] While South Africa has a literacy rate over 95%, Ghanaian literacy rates are relatively low—slightly below 80% for men and 70% for women.[24]

Statistics South Africa conducted a time diary based survey in 2010, similar to one conducted in 2000, including diaries for two persons over the age of 10 in surveyed households based on 30-minute intervals. A diary-based survey conducted in Ghana in 2009 followed similar protocols regarding simultaneous activities but interviewed all household members based on 60-minute intervals (see Table 1). Both surveys encouraged respondents to report several activities within the time slot and reported both "simple" (constrained to 24 hours) and "simultaneous" time in specific activities. In the South African case, respondents could report up to three activities and were directly asked if their activities were sequential or simultaneous. The results, however, were coded distinctively—each simultaneous activity was assigned an equal share of the thirty-minute time slot. In other words, if two activities were reported in a one slot, each was assigned a total of 15 minutes; if three were reported, each was assigned a total of ten minutes (Statistics South Africa 2010: 7). The Ghanaian survey allowed up to five activities to be reported in each 60-minute slot. They also asked whether these activities were simultaneous or not but did not always apply consistent procedures (see Appendix B).

The South African Time Use Survey of 2010. The exceptionally well-documented South African survey restricted direct care to the care of dependents—working-age adults were considered recipients of care only if they were sick or disabled. Direct care of persons in the household "includes looking after children, the sick, the elderly, and the disabled members of the household" (Statistics South Africa 2010: 6). As this wording indicates care of healthy, able adults is not included.

Special attention was devoted to accurately capturing childcare time. Respondents were asked whether they had children under the age of 7 and/or under the age of 18 living with them in their household. The official tabulations show that surveyed women were far more likely to live with own children under the age of 7 than men were—30% compared to 19%. After the diary was completed, respondents were asked if they might have omitted any reporting of childcare time. To check the results, time that was reported "spontaneously" was coded differently from time that was prompted, revealing differences between spontaneous and prompted reports of time devoted to all forms of childcare. The effects, however, are extremely small: Prompting increased men's reporting of total childcare by 5.4%, of women's reporting by 3.7% (Statistics South Africa 2010: 36).

22 Google search results based on World Bank data.

23 Google search results based on World Bank data.

24 See https://countryeconomy.com/demography/literacy-rate/ghana, accessed October 26, 2019.

The small size of these prompting effects partly reflects the practice of dividing up the time slots when activities were reported as simultaneous, in order to constrain total time reported to 24 hours for most of the tables in the official report. The more likely an activity is to be listed simultaneously with others the more likely time devoted to it is understated if it is truly simultaneous. Direct childcare is particularly likely to fall into this category. This partitioning also helps explain why the total amount of time reported as childcare in the South African tabulations was relatively low by international standards. Mothers of children under the age of 7 are estimated to spend an average of 85 minutes per day providing direct care for household members, including children (Statistics South Africa 2010: 33).

Our analysis of the microdata compares the time reported in these activities, conditional on participation in them, when activities were constrained to 24 hours and when they were not.[25] It shows that time devoted to direct care (both active and supervisory) remains low even when the 24-hour constraint is lifted (see Appendix Table A.2). The difference between average minutes per day in all households (conditional on participation in the activity) is 6% for women, and 5% for men in indirect care. By contrast the estimates for direct childcare show a difference of 10% for women, and 20% for men. Among mothers and fathers in households with at least one child under the age of 10, the difference is 11% for both. Direct care activities are particularly likely to be conducted in a simultaneous fashion, but the adjustments remain modest, especially when converted to average times that are unconditional on participation. In sum, prompting seems to have had little effect.

Since the South African survey did not collect information on "who else was present" it is difficult to determine whether young children were typically present and being cared for during housework and leisure activities, although that is almost certainly the case. A code for where the activity was performed is available, but in this case, adds little information, since many housework and leisure activities, as well as supervisory care, take place at home.

Low reported time in direct care of children is particularly surprising given South African demographics. Household structure is quite distinct from that in South Korea and China, typified by relatively high child dependency burdens and significant gender differences in co-residence with dependents (see Table 2). About 49% of all households surveyed included at least one child under the age of 10; among these households, 22% lacked any adult man in the 18-74 age group, but only 2% lacked an adult woman in that age category. Only 8% of households included a person 75 or older; among these, 36% lacked an adult man 18-74, and 25% lacked an adult woman in that age category. The percentage of households with at least one likely care dependent (including a very young, very old, or an ill or disabled household member) was 54%. Among these households, only 5% lacked an adult woman under 75; 24% lacked an adult man under 75.

These patterns partly reflect a legacy of apartheid that encouraged gender-specific migration and have obvious implications for relative levels of participation in care activities. Participation rates in indirect care activities for all adult women are identical to those for South Korea at 93%, but slightly higher for men, at 72%, perhaps because

25 We were able to exactly replicate minutes spent on detailed activities conditional on participation when activities were constrained to 24 hours. The official tabulations do not show results that are based on conditional time when activities are not constrained to 24 hours, though their data files allow us to construct the latter measure (Statistics South Africa, 2013 p. 7).

more men are living on their own in households without women (see Table 3). Most striking is the low level of participation of all adult men in direct care of household children—only 5%. Even in households with at least one child under the age of 10, only 14% of men reported any direct care of household children. Yet participation of women in these activities is also quite low, at 56%. Participation is somewhat higher for mothers and fathers in these households, at 72% and 19%, respectively, but still remains low. While this pattern may partly reflect large households in which many members help provide both active and supervisory care, it also suggests underreporting.

Adult women's participation in direct care of elderly adults is lower in South Africa than in South Korea, at 5%, but adult men's participation is about the same, at 3%. In households with at least one member 75+, adult women's and men's participation rates are 4% and 3%, respectively. In sum, participation in care of non-household children and adults is consistently close to zero across all household types on the diary day.

The average minutes spent in specific care activities presented for South Africa in Table 4 are constrained to a 24-hour day for purposes of comparability with other countries. On average, women over 18 reported 103 minutes of direct care of household children, compared to men's 4 minutes per day, or approximately 8 times as much. These patterns were similar for men and women living in households with young children: among men living in a household with a child under 10, average minutes of direct care for household children came to 10 minutes, compared to 120 for women; differences are less extreme when these estimates are limited to individuals designated fathers or mothers of household children: 14 minutes a day for fathers compared to 82 minutes for mothers (the ratio of mother's to father's time is almost 6 to 1).

In South Africa, direct care for household children is the largest category, by far, of direct care work. In households with at least one dependent (a child under 10, adult over 75, or members suffering illness or disability), care for household children represented 86% of women's average direct care time (only 48% for men, but their total direct care time was only 4 minutes per day). Time devoted to indirect care was substantially higher: adult men and women over 18 averaged 131 and 234 minutes per day, respectively, in these activities. Overall, indirect care represented 89% of men's and 75% of women's total care time. In households with a child under the age of 10, the averages were lower for men, but higher for women, at 126 and 244 minutes per day. Restricting attention further to fathers and mothers of household children, the averages are largely unchanged for men but higher for women, at 125 and 255. Even in these households, indirect care represented 73% of women's total care time. Across the board, the relative demands of direct care represent a smaller share of total care than in any of the other countries included in Table 4.

As in the official tabulations, the levels of direct care reported for household children are relatively low. Summing the averages for fathers and mothers yields an average total of 96 minutes of day of direct care for household children in households with a child under the age of 10. These results are slightly overstated, since supervisory time for children was combined with supervisory time for adults needing care; reports of supervisory time were, however, generally quite small.

Consideration of household participation rates—the percentage of households in which any person reported engaging in direct care—suggests significant underreporting. While 98% of households with a child under 10 reported engaging in indirect care activities such as cooking and cleaning, only 69% reported engaging in direct active

care of household children, and only 4% reported engaging in supervisory care (see Table 5). In other words, a quarter of all households with up to two adults and at least one child under the age of 10 reported no childcare activity at all on the diary day.

Since the survey collected data from only two household members, the total amount of household care devoted to children cannot be calculated. However, restricting the universe of households to those with only one or two adults (in which, in principle, all adults were surveyed) and a child under the age of 10, the household total for direct active care is 81 minutes per day, and supervisory care, 2 minutes per day, for a total of 83 minutes of direct care for all household children (see Table 6, column 3). Even in households with only one child under the age of ten, a total of 1.7 hours a day of direct care appears quite low. As in the case of South Korea and China, we calculate a lower bound for child time during waking hours unaccounted for by subtracting average sleep time of 11.95 hours or 717 sleep minutes from the total minutes in the day (1440), then subtract total direct care time of 83 minutes. By this calculation, 10.7 waking hours are unaccounted for. These numbers should be interpreted with caution because these households, restricted to two adults, were not representative of all South African households.

The ratio of women's average time to men's average time in indirect care is 2.3, lower than in any other country (see Table 7, column 3). Relative time in direct care, however, is high, at 5.8, driven largely by high female specialization in active care of household children, where the ratio is 10. Women also spend about three times as much time as men in direct care of household adults who are elderly, ill or disabled. Supervisory care, by contrast, is relatively gender-neutral, with parity between women and men.

Multivariate analysis of the determinants of average minutes women devote to indirect care of housework compared to direct active care of household children in households with at least one child under 10 provides some insights into these patterns (see Table 10). Supervisory care was not included here because participation reported in it was so low. We present ordinary least squares estimates of the effect of the independent variables included in our basic model in South Africa in Table 9. Underreporting of direct childcare doubtless reduces the size of estimated coefficients. Nonetheless, the number of children under age five is strongly and positively related to time that women and mothers devote to direct care: about 30 minutes for each additional child in that age category. Children between the ages of 6 and 10, by contrast, are associated with a modest, but significant positive effect on indirect care time, and a slight reduction in direct care for mothers slightly more than 5 minutes). Male children between the ages of 11 and 17, unlike female children in that age category, are associated with slight increases in time devoted to indirect care, but both male and female teens with slight reductions in maternal time in direct active care. The total number of women over 18 in the household is associated with reductions in indirect care by close to 30 minutes per day, with smaller effects on direct care.

Time spent in other work—whether market employment, non-formal employment, or production for own use—is associated with significant reductions, though less than one-for-one, in indirect care work. Formal employment has the largest effect: each additional minute devoted to this activity is associated with reductions of indirect care by .4 minutes and effects are larger for mothers than for women in general. This implies that formal employment of 8 hours reduces indirect care work by about 3 hours—with the net effect of lengthening women's total workday. The effects of non-formal employment and production for own use are smaller, but nonetheless

significant, suggesting that these activities are more complementary with indirect care. By contrast, time spent in these forms of work has much smaller effects on direct active care time, and negative effects for mothers are statistically insignificant. This pattern of negligible substitutability suggests that direct active care time represents a basic requirement for mothers that may be re-arranged, but not reduced by other work activities.

Other characteristics exert a much stronger effect. For instance, living in a rural, rather than urban area, is associated with increases in time devoted to indirect care of more than twenty minutes for both women and mothers, but with decreases in time devoted to active direct care of 13 to 18 minutes. Reported presence of a paid domestic worker reduces indirect care by around one hour per day (65 minutes for women, 54 minutes for mothers) but reduces direct active care by less (5 minutes for women, 10 minutes for mothers). Level of education has non-linear effects, negative for all groups relative to the omitted category of completed secondary school education. These results may partly reflect the effects of low levels of education on survey responses. Monthly household income, categorized into three simple tranches relative to the median, seems to have only small, and largely insignificant effects on time devoted to indirect or direct active care.

Because participation in direct care activities in South Africa seemed so low, we applied a similar regression model to analysis of participation in active care as a binary dependent variable.[26] The statistically significant results that affected the probability of participation by at least 5% were these: presence of a child under the age of 5 (increased the probability that mothers would report participation in childcare in a household with at least one child under the age of 10 by 13%), female children 11-17 (-5%), other women 18+ (-6%), domestic worker (decreased probability by 14%), no schooling (-12%), primary school completed (-13%), secondary not completed (-6%). These results suggest that children five years and older receive less care, that responsibilities for care are widely shared among young and mature women, including domestic workers, and that completion of secondary schooling tends to increase reported participation.

The Ghana Time Use Survey of 2009. The most recent survey of time use in Ghana suffered from some problems in implementation that led to some incomplete responses (see Appendix B) but it nonetheless provides useful and important results. Its design parallels the South African survey in most, but not all respects. For instance, the Ghanaian survey included the specific category of "passive care" included here as a component of direct care analogous to supervisory care. Like the South African survey, the Ghanaian survey tallied reports of simultaneous activity in two different ways, constrained (Measure 1) and unconstrained (Measure 2). However, we omit any consideration of unconstrained measures, because our inability to come close to a replication of results reported for it undermined our confidence in its accuracy.

As in South Africa, more adult women than men were surveyed (3,821 compared to 3,107, or about 55% of the total). Also, similarly, about 51% of all households included a child under 10 (see Table 2, column 4). Among these households, 26% did not include a

26 We report the results based on the linear probability model using ordinary least squares here because they are easiest to interpret but both the signs and significance of estimates using tobit and logit models are consistent with these.

man between the ages of 18 and 75, but only 3% lacked a woman in this age category. Only 6% of households included a person 75 or older; among these, 74% lacked a man between the ages of 18 and 74, and 48% lacked a woman in this age category: persons of advanced age were slightly more likely than in South Africa to live alone.

Overall, reported participation in direct care of household children was greater in Ghana than in South Africa, at 48% for women and 15% for men, compared to 30% for women and 5% for men in South Africa) (see Table 3). Rates for participation in this activity in households that included a child under the age of 10 were also greater, at 79% for women and 39% for men, and 87% for mothers and 33% for fathers. In households that included at least one person over 75, a higher percentage of women than in South Africa reported caring for an elderly or ill/disabled person, 11% compared to 4%. Participation in direct care of non-household children and non-household adults was, as in all other surveys, quite low (never more than 1%).

On average, women over 18 in Ghana reported 107 minutes of direct care of household children, compared to men's 9 minutes per day, or approximately 5.8 times as much (see Table 4, column 4). As in South Africa, men reported negligible time to direct care of non-household children, household elderly, sick or disabled, or non-household adults. Among men living in a household with a child under 10, average minutes of direct care for household children reported by adult men in Ghana came to 9 minutes per day, lower than in South Africa, and time reported by adult women was also lower, at 52 minutes per day. Fathers of household children doubled their time in active care to 18 minutes, and mothers also reported more time, about 109 minutes. These comparisons suggest that households in Ghana tend to take a more complex, extended form, so that differences between adults and parents co-residing with children are greater; the presence of more co-resident adults may also explain why parental care time reports are lower.

In Ghana, as in South Africa, active care for household children is the largest category by far of direct care work. In households with at least one dependent (a child under 10, adult over 75, or members suffering illness or disability), care for household children represented 94% of men's average direct care time and 92% of women's. Even those who participated in care of an elderly, ill or disabled adult spent significantly less time on this task than those who participated in active childcare (about half as much, regardless of gender).

All household members were administered time diaries in Ghana, unlike in South Africa, and the reported household participation rate in care of household children (in households that included at least one child under 10) was 81% for active care and 11% for supervisory care (see Table 5). As in the South African case, this raises the question of who was tending to young children on the diary day.

Restricting the universe of households to those with only one or two adults and a child under the age of 10 (and no missing adult time diaries) provides a household total comparable to that calculated above for South Africa: the household total for direct active care is 102 minutes per day, and for passive care (which we treat here as a proxy for supervisory care) 8 minutes per day, for a total of 110 minutes of direct care for all household children. This is considerably higher than the constrained-to-24-hour total for South Africa of 83 minutes (higher even the unconstrained total of 92) and the difference cannot be accounted for by differences in supervisory time. Still, the higher reported level of direct care falls short: a lower-bound estimate of the waking time children under 10 that is unaccounted for (following the same assumptions as in earlier examples) comes to 10.2 hours.

Unlike in South Africa, the ratio of women's to men's average time in indirect care was similar to that in direct care (5.7 compared to 5.8) (see Table 7, column 4). The gender ratio for care of household children, at 6.1, was eclipsed only by the South African results. It was also higher for supervisory care, at 2.0. Multivariate analysis of the determinants of average minutes women devoted to indirect and direct care parallels the estimates above for South Africa, though differences in variable inclusion and definition make it impossible to estimate exactly the same model (see Table 11). Lack of information on household income leads us to substitute information on household consumption, and the definition of educational categories varies slightly. The Ghanaian survey results for time devoted passive care were sufficiently high to allow estimation of this additional dependent variable, although the low levels reported render the estimates quite small and rather inconclusive. By treating this category separately, we improve comparability with the South African survey, which did not explicitly code passive care. Nonetheless, it is impossible to determine to what extent differences in estimated coefficients between the two countries reflect differences in survey design and administration versus actual differences in the temporal demands of indirect and direct care.

In Ghana, the number of children under the age of 5 are associated with strong positive increases in mothers' reported active childcare time, about 46 minutes per additional child (compared to about 29 minutes in South Africa), and with a smaller, but also positive change in indirect care minutes. The signs, and often, the coefficients of demographic effects resemble those of in South Africa: children ages 6-10 are associated with increases in women's and mother's indirect care time, but reductions in their active care time; female children ages 11-17 are associated with reductions in adult women and mother's indirect care time, while male children are associated with increases; co-resident women over age 18 are associated with large declines.

As in South Africa, the effect of an additional minute in other work of adult women and mothers on minutes of indirect care work is negative, but much lower than one, indicating increases in the total length of the workday. The size of the coefficients for the three types of work (formal employment, informal employment, and production for own consumption) is generally smaller, but follows the same pattern, with formal employment showing the largest effect, a reduction of about 20 minutes of indirect care per hour of formal employment. The effects on maternal active and passive care time are negative but quite small—less than a tenth of a minute. The size of the effects for passive care time (small even with respect to the means for this variable) strongly suggest that it does not effectively capture supervisory time.

Though the size and significance of the coefficients for rural location are lower, the pattern is the same, showing increases in adult women's and mothers' indirect care time, but declines in their direct care time. Rural location is associated with reductions passive care time for adult women—almost 4 minutes per day. The presence of a domestic worker reported as doing housework reduces indirect care much more strongly than direct or passive care. As in South Africa, women lacking any schooling reported lower levels of indirect and direct care (both active and passive) than women with a secondary school education, whether as a result of under-reporting or greater participation in other forms of work. Women living in households with consumption levels lower than the median engaged in somewhat lower levels of indirect care, but slightly higher levels of direct active and passive care than those in the middle category. These results differ from the South African results on similar categories based on household income, rather than consumption. In both countries, the finding that "no schooling" reduces time devoted to care even controlling for an

approximate measure of household income or consumption strengthens the hypothesis that literacy affects survey reporting.

As with the South African data, we applied the same regression model to the probability of mothers' participation in active care to Ghanaian households with at least one child under the age of 10. The results were similar: the variables with statistically significant coefficients greater than 5% were children under 5 (+18%), female children 11-17 (-8%), other women 18+ (-9%), but domestic workers had a positive effect (+6%) and, surprisingly, higher education had a negative effect relative to secondary school (-12%).

Latin American Examples

While time diary surveys have often been considered the gold standard, activity-list surveys have a number of redeeming features, including greater specific attention to supervisory care. Since the 1990s, the number of activity list-based time-use surveys in Latin America has grown substantially (Aguirre and Ferrari 2013; Esquivel 2017). We chose to focus on surveys from Mexico (2014) and Ecuador (2012) primarily because micro-data and documentation was easily available online.[27] In order to sharpen the comparative angle, we also include some discussion of the official tabulations of two diary-based surveys of the city of Buenos Aires in Argentina.

Ecuador and Mexico administered their most recent surveys only two years apart. Both surveys build on the Classification of Time-Use Activities for Latin America and the Caribbean known as CAUTAL (CEPAL 2016). Comparisons of time devoted to direct care in these two countries are potentially useful because they share a similar cultural heritage but differ substantially in demographic and economic characteristics. The Gross Domestic Product (GDP) per capita of Ecuador in 2012 was about $5,702, substantially lower than that of Mexico in 2014, at $10,581.[28] Ecuador's total fertility rate was also somewhat higher at 2.5 births per woman in 2016, compared to Mexico's 2.2. About 36% of the Ecuadorian population is rural, compared to about 20% of the Mexican population.

Both surveys were administered to a representative sample of households, with activity list questions posed to all household members ages 12 and above concerning time spent in various activities during the preceding week, inviting separate responses for weekdays and weekends. Respondents could and often did report time in these activities to sum to more than 24 hours in a day, indicating the importance of simultaneous activities, discussed later in more detail. Methods of survey administration differed between the two countries. The Mexican survey was administered to each eligible member of the household separately, while the Ecuadorian survey was administered collectively to eligible members of the household, requiring complete answers

27 We were able to obtain metadata in the form of STATA code for the Ecuador, but not for Mexico.

28 Source: Google, based on World Bank data, accessed at https://www.google.com/publicdata/explore?ds=d5bncppjof8f9_&met_y=ny_gdp_pcap_cd&idim=country:MEX:BRA:CUB&hl=en&dl=en May 17, 2019.

before proceeding to the next question. This may well have resulted in responses made by those members present on behalf of those who were absent, possibly leading to undercounting (see Charmes 2019).

Available metadata made it straightforward to replicate official tabulations for Ecuador; we were unable to exactly replicate the Mexican tabulations but came quite close. The two surveys differed in some respects and the tabulations were presented in very different formats making direct comparison difficult. Both countries included questions regarding supervisory care (in Spanish, "estar pendiente de" or "be aware of" or "watch over") (see Table 1). However, the Ecuadorian tabulations did not include supervisory care activities in their total for unpaid care work, perhaps because of the conceptual ambiguities outlined above. The Ecuadorian and Mexican activity lists differed in a number of ways. Where the differences were small, we created approximate equivalencies for harmonization (see Appendix Table A.4).

One significant difference, noted in Table 1, is that the Mexican survey singled out time devoted to active care of adults 60 and older, but the Ecuadorian survey did not. Both surveys included measures of the care of adults 15-59, which deserves particular mention because care for non-disabled adults does not constitute care for dependents and could be better described as helping behavior (examples include driving household members to work or elsewhere).[29] For consistency with reports of total direct care time with time-use surveys from other countries, this category could be omitted and included with indirect care.

Also notable are distinct definitions of children in the two surveys. The Ecuadorian survey posed questions regarding time devoted to childcare to members of households with a member under age 12, the Mexican survey to members of households with a member under age 15 (see later discussion). Our comparisons, which focus on households with children under the age of 10, are not affected by this discrepancy, but it influences comparisons of the official tabulations.

The 2012 Time Use Survey of Ecuador

Ecuadorian households have, on average, a relatively high dependency burden: 44% of surveyed households included a child under the age of 10, and 10% at least one elderly person ages 75 or above. This burden was especially great for women: among households with a child under 10, 11% lacked an adult male (see Table 2, column 5). Persons over 75 were also significantly more likely to live with a woman 18-74 than with a man in that age category.

Almost half of all adult women (46%) participated in direct childcare during the survey week compared to 21% of men, and the average female participation in the care of an elderly, sick or disabled family member was 14%, the highest of all other countries in Table 3 (see column 5). Female participation in care of non-household adults, at 3%, was also higher than in other countries represented. Among households with at least one child under 10, the participation rates for women and men in direct childcare,

29 The amount of time devoted to this activity in Mexico, conditional on reported participation in it, was notably higher than in Ecuador, although the total amount of unconditional time reported in Mexico was negligible (less than 20 minutes per week).

respectively, were 82% and 45%. Among households with at least one person 75+, 25% of women and 10% of men reported participation in the care of a person who was sick, elderly or disabled.

The average amount of time that women in all households reported spending on direct care of household children exceeded that of any other country in Table 4 but for Mexico (see columns 5 and 6). The average for mothers in households with a child under the age of 10 was also the second highest. These comparisons reflect the fact that the Ecuador survey (like the Mexico survey), included explicit questions regarding supervisory care of children.

A more telling comparison is provided in Table 5, which compares total household-level care of household children, distinguishing between active and supervisory care time: the former amounted to 126 minutes per day and the latter, also 126 minutes, for a total of 241 minutes, or approximately 4 hours per day. Averages were not much different for households with no more than 2 adults (for calculations comparable with results from the South African survey).

Clearly, explicit questions regarding measurement of supervisory care in this survey lead to very different estimates of direct care time. However, they fall short of the total amount of direct care time that would be required if one assumes that children under the age of 10 require round-the-clock attention or supervision. The Ecuadorian survey provides particularly useful information for going beyond a tally of children's hours unaccounted for to estimate a supervisory care deficit because it records time that children ages 0-4 spent in out-of-home childcare in the past week. The time that children 12 years and older spent in school provides a plausible proxy (if anything, an over-estimate) of the time that children 5-9 years old spent in school. Restricting attention to the 3,887 Ecuadorian households in the survey with only one child under the age of 10 (and no additional children under 12) we find an average supervisory care deficit during children's waking hours of 364 minutes per day, or about 6 hours. Adding in average sleep time for children yields a total supervisory care deficit of 18 hours. (The results are quite similar if restricted to households with at most 2 adults).

The ratios of female to male time in distinct activities in Ecuador show slightly higher gender inequality in total work than in other countries, at 1.2 (see Table 7, column 5). It shows similar rates of specialization in indirect and direct care, 4.2 and 4.6 respectively. Also noteworthy is high gender specialization in supervisory care, higher than that in any of the other countries that collected data on this topic, at 5.3. This high number, in conjunction with a lower, but also relatively high number for Mexico, strongly suggests that stylized questions regarding supervisory care responsibilities (characteristics of both Latin American surveys) amplify measured gender inequality in care work.

The regression results presented in Table 12 for Ecuador show that an additional child under the age of 5 was associated with an addition of about 29 minutes a day to the active childcare time of women, and about 18 minutes a day to their supervisory childcare, with somewhat larger effects for mothers of household children. The difference in size of these effects confirm that supervisory childcare enjoys greater economies of scale.

The gender and age of other household members clearly affects maternal time allocation. An additional female child between the ages of 11 and 17 is associated with reductions in mothers' active and supervisory care (by about 8 minutes); male children in this age category are associated with slightly smaller effects. The presence

of another woman over 18 has particularly large effects on indirect care, reducing mothers' time by 45 minutes, active care by about 12 minutes, and supervisory care by about 18 minutes. An additional minute in market employment reduces mothers' indirect care by slightly less than 0.2 minutes but has negligible effects on time devoted to active or supervisory childcare. Time in own-use production shows a different pattern, slightly increasing time in all forms of care (these activities are almost certainly more likely to be conducted simultaneously). Residence in a rural area is associated with slightly lower levels of mothers' active and supervisory childcare time.

The presence of a live-in domestic servant exercises the largest impact on mothers' indirect care time, reducing it by almost 95 minutes, and on her supervisory time, reducing it by 44 minutes. The negative effect on direct care time is much smaller, at 5 minutes. This finding, in conjunction with the pattern above showing differential effects of other household members on supervisory time, strongly suggests that paid caregivers do little to reduce active maternal care, instead relieving pressures for supervisory care. As in estimates for other countries, measures of household income have little effect on maternal time in active or supervisory care, but educational attainment

The 2014 Time Use Survey of Mexico

The Mexican time use results show that 31% of households include a child under the age of 10 and (as in Ecuador) 11% of these households did not include an adult male under 75 (see Table 2, column 6). The percentage of households that included at least one elderly person was also about the same as Ecuador, at 11%, compared to 10%. Reflecting the differences in coresidence of young children, the percentage with a probable dependent was 49%, compared to 56% in Ecuador. It seems noteworthy that close to half of all households in both countries included a probable dependent.

About 49% of all adult women participated in direct care of household children, along with 38% of men (see Table 3, column 6). The participation rate of men is higher than in any of the other countries considered here and may largely reflect the high levels of supervisory care reported, as discussed later. Participation in direct care of children rates reached 90% and 76%, respectively, for women and men in households with at least one child under 10, and 96% and 86%, respectively, for mothers and fathers. Participation rates for both women and men in direct care of the elderly, sick, or disabled in households with at least one member over the age of 75 exceeded those for other countries in any other country in the table at 45% for women and 38% for men.

Similar patterns characterize the time devoted to these direct care tasks. Average daily time spend in direct childcare in all households was higher than in any other country in the table, at 140 minutes, and, for households with a child under the age of 10, 305 minutes (see Table 4, column 6). Here again, the reported averages far exceed those for Ecuador. As later discussion will show, differences between the two countries in reports of supervisory childcare are a major factor, but differences in active childcare reported are also rather large.

This is surprising, because the higher average fertility rate in Ecuador would suggest a larger number of young children in households. Small differences in the survey questionnaires offer a partial explanation. Children were defined as a larger category (under age 15) in Mexico than in Ecuador (under age 12). While the effect of this discrepancy is blunted by the focus above on households with at least one child under 10,

the presence of older individuals defined as children nonetheless inflates reports of total direct care (see additional discussion below).

Also, while the number of questions is almost the same (9 in the Mexican, 8 in the Ecuadorian instrument), the Mexican questions regarding physical care of children (feeding, bathing) focused on children under 5, which may have prompted higher responses, since children in this age category required more physical care. It also included putting children in this age category to bed, an activity not included among Ecuadorian survey questions and consuming a reported average of 50 minutes per day. Perhaps as a result, reports of physical care of children in Mexico by mothers were almost twice as high as in Ecuador among households with at least one child under 10. This wording may also have skewed the relationship between maternal care of children in households containing a child under 5 but no older children, and those containing a child under 10 but no older children, which was 13% higher in Mexico and only 8% higher in Mexico.

Disaggregating direct care of household children into active and supervisory care in households with at least one child under 10, Table 6, column 6 shows that active care time in Mexico averaged less than in Korea (164 minutes relative to 230 minutes) but the total of supervisory care provided, 349 minutes, boosts the Mexican average for direct care to 513 minutes. The portion of this table restricted to households with up to two adults shows a similar pattern, but affords a specific contrast with South Africa, which appears a particularly dramatic outlier at only 83 minutes for day of household-level direct childcare.

Gender ratios for specific care activities are lower in Mexico than Ecuador, though the gender ratio in paid work is about the same, with women performing .5 relative to men (see Table 7, Column 6). In particular, the gender ratio in active care of household children is 3.5 in Mexico, compared to 4.6 in Mexico, and in supervisory childcare 3.1, compared to 5.3. Similarly, the gender ratio in direct care of household adults reported elderly, ill, or disabled, is about 1.5, compared to 2.7 for Ecuador. The similarity in survey instruments utilized by both countries suggests that these may well be bona fide differences, but they may also be related to greater "capture" of supervisory care in Mexico.

The regression results presented in Table 13 for Mexico show that an additional child under the age of 5 was associated with an addition of about 65 minutes a day to active childcare, and 23 minutes the supervisory time provided by mothers. Older children had larger positive effects on indirect care and both girls and boys reduced their mother's time spent in both active and supervisory care. Older girls had particularly noteworthy effects on mothers' supervisory care (reducing it by about 18 minutes). Women over the age of 18 had the biggest effect on other women and mothers, significantly reducing the time they devoted to indirect and direct care across the board.

Every minute that women and mothers spent in wage employment reduced time in indirect care by .18 or .20 minutes respectively, with smaller reductions of .06 and .07 in active care and .10 or .11 in supervisory care. Extrapolated to typical daily employment hours, a mother in a household with a child under 10 employed for 8 hours reduces indirect care by about 1.6 hours, active care by 0.6 hours, and supervisory care by 0.9 hours. By contrast, time they devoted to production for own consumption had small but positive effects across the board.

Residence in a rural area increased indirect care slightly (9 minutes), had no significant effect on active care, but reduced mothers' supervisory time by 18+ minutes.

The presence of a domestic servant reduced mothers' indirect care time by about 37 minutes, but, surprisingly, increased their time in active and supervisory care. As in estimates for other countries included in the study, measures of household income have little effect on maternal time in active or supervisory care, but educational attainment is associated with greater time in both.

Further Comparisons Between Ecuador and Mexico

The distinctive features of the two Latin American surveys, including their explicit attention to supervisory childcare, invite further comparative attention to issues of survey accuracy and comparability.

Survey accuracy. In both Mexico and Ecuador, many respondents reported time in activities that summed to totals amounting to more than an average of 24 hours per day. Such reports are sometimes construed as a reflection of inaccurate reporting. Activity-list surveys impose a large cognitive burden on respondents, asking them to recall specific activities during the previous week with no restrictions on the total amount of activity time reported.

Activities that people engage in every day for approximately the same amount of time are more likely to be accurately reported than others. One such activity is sleep, and respondents on both countries report an average of 56 hours of sleep per week, or 8 hours per day. This basic consistency with physiological requirements/recommendation is reassuring. Almost every other category of time use, however, varies more from day to day, not just between weekdays, weekends, regular working days and holidays. This makes recall more difficult, and respondents may tend to exaggerate time in some activities, perhaps as a result of social desirability bias.

Nonetheless, a major determinant of high total activity time estimates is reporting of simultaneous activities. In both Ecuador and Mexico, women were far more likely than men to report activities summing to more than 168 hours per week. In Mexico, 43% of women and 32% of men fell into this category; in Ecuador, the percentages also showed a large gender differential, with 34% of women and 22% of men over the threshold. Much of this gender differential is related to the specific characteristics of direct care activities and responsibilities. When supervisory care alone is subtracted from the total activity time tallies, the percentage of women reporting more than 168 hours of activity in Mexico is reduced to 32%; for men, the reduction is more modest, to 28%, a considerable reduction in the gender differential. In Ecuador, the percentage of women overreporting is reduced to 30% when supervisory care is disregarded, and here too, the reduction is more modest for men, a mere percentage point.

Statistical analysis shows that time spent in supervisory care, direct active care and volunteer work had particularly large effects on reported time over 168 hours for both women and men in both countries (see Table A.3). These findings are consistent with the possibility that those who reported more than 168 hours per week were not overreporting but accurately reporting simultaneous activities. Dropping such observations from descriptive or statistical analysis of activity-list surveys would yield a profoundly biased picture of time allocation.

Still, the significant extent of reporting over 168 hours per week even after subtraction of supervisory care time leaves open the possibility that respondents are simply unable to accurately recall the exact time devoted to activities during the previous week. Respondents were just as, if not more likely to report time under a total of 168 as over it. In both countries, the average and median total times reported in all activities is below

the threshold of 168: an average of 161 hours (and a median of 157 hours) in Mexico, an average of 150 hours (and a median of 148) hours in Ecuador. The similarity between means and medians suggests that reporting errors are somewhat normally distributed; the low average in Ecuador, in particular, suggests that under-reporting of activity time is widespread. Differences in averages between the two countries cannot be attributed to differences in survey design, but may be related to differences in interviewing methods, training, or processing of microdata.

Comparability. That surveys from the two countries defined age categories for children differently is consequential, since questions regarding childcare were only asked of households with members in the designated childcare category. As aforementioned, the Ecuadorian survey posed questions regarding time devoted to childcare to members of households with a member under age 12, the Mexican survey to members of households with a member under age 15.

This implies that childcare provided in Ecuadorian households including children ages 12, 13, and 14, but no children under age 12, went uncounted. These households represented a sizable percentage—13% of households with children 14 or below. In Mexico, direct childcare in the 1, 095 households that fit this category averaged .6 hours of active care per week and 5.1 hours of supervisory care per week, for a total of 5.7 hours. Clearly, this difference in the definition of children helps account for higher totals of direct care of children in Mexico, but it is worth noting that the Ecuadorian survey may have applied a lower age limit because economic and cultural differences mean that children between the ages of 12 and 14 absorb less direct care there.

Another discrepancy concerns measurement of elder care time: The Mexican survey explicitly inquired after care for household members 60 and above and care for the disabled/ill. The Ecuadorian survey did not include the specific elder care question but did include the disabled/ill question. These two categories overlap, and it is not clear how Mexican respondents would have categorized care for household members 60 and above who were disabled or ill. The consequences can be illustrated by focusing on households with a member over 60 in both countries. Within this subgroup in Mexico, care of members over 60 comprised 35% of average individual direct care time, and care of disabled/ill members 7%. Within this subgroup in Ecuador, care of disabled/ill members comprised 29% of total direct care time. This comparison suggests that reporting of elder care in Mexico pre-empted and therefore reduced tallies of care for the ill or disabled.

Reporting of supervisory childcare varied considerably between the two surveys, despite virtually identical treatment in the two survey instruments. The unconditional hours for supervisory childcare were substantially higher in Mexico (10.4 hours per week for women compared to 4 hours per week for women in Ecuador). Differences in active childcare time between the two countries are smaller, 6.1 hours compared to 4.1 hours. Relative differences follow a similar pattern for men. and these large magnitudes powerfully influence differences in total direct care time, making Mexican direct childcare time loom much larger than that in Ecuador and also inflating gender time use differentials there. This difference may well reflect differences in survey administration or training in the two countries.

However, these results may also be partly generated by genuine differences between the care economy in the two countries. Because Ecuador has a more rural and less wage-based economy in which many children probably engage in the household economy at a relatively young age, there may be less need for explicit supervision of

them, and women engaging in high levels of production for own consumption and indirect care work at home may combine these activities with supervision of young children more easily than women who are employed for a wage. The survey data indicated that participation in paid employment was higher in Mexico (at 45% for women and 77% for men) than in Ecuador (39% for women and 69% for men) though average hours conditional on participation were similar. However, participation in production for own consumption was considerably lower among women in Mexico than among women in Ecuador, 25% compared to 44%. Average hours among participants in this activity, were rather low across the board, less than 7 hours per week. Still, women's greater participation in this activity could have eased supervisory constraints in Ecuador, especially in rural areas.

Measures of time devoted to activities that are considered within the production boundary of the System of National Accounts (SNA) (paid employment and production of goods for own consumption) are fairly comparable in both surveys in terms of number and wording of activity lists (they were also applied to the same universe, individuals 12 and older). These two subcategories of paid work are often clubbed together in tabulated data, but they have different implications for direct care work, since production for own consumption typically takes place close to home.[30]

However, participation in production for own consumption was considerably lower among women in Mexico than among women in Ecuador, 25% compared to 44%. Average hours among participants in this activity, were rather low across the board, less than 7 hours per week. Still, women's greater participation in this activity could have eased relative supervisory constraints in Ecuador, especially in rural areas

These comparisons illustrate the need for explicit harmonization efforts in analysis of data from these two surveys. They also invite at least one tentative generalization: Differences in the level and distribution of supervisory care between Ecuador and Mexico are major contributors to differences in the level and distribution of total direct care. While the impact of interviewer effects or unwritten prompts remains unknown, the survey instruments for measurement of supervisory childcare were virtually identical in both countries.

A Side-Note on Buenos Aires Survey of 2005 and 2016

No Latin American country to date has administered a nationally representative diary-based time use survey. The city of Buenos Aires, Argentina, however, has administered two such surveys, one in 2005 and one in 2016. The specific features of this survey are methodologically distinctive and instructive, bearing a close resemblance to surveys conducted in South Africa in 2000 and 2010 that were discussed earlier.

30 Were it not for the rather arbitrary distinction made in the System of National Accounts, production of goods for own consumption could be combined with production of services for own consumption (indirect care work), consistent with a recent recommendation by the International Conference of Labour Economists (Folbre 2020).

We describe this survey briefly, summarize tabulations from it that are sufficiently detailed to afford some insights, and explain why we decided against analysis of the micro-data.

The 2016 survey of Buenos Aires largely follows precedents established in the earlier survey, with one significant exception: the time slots in the later survey were shorter (10 minutes) than the earlier survey (30 minutes). The results of the 2005 survey have been analyzed in some detail (Esquivel 2010, 2012).

Both surveys have three distinctive features. First, they allowed respondents to list up to three activities in the allotted time period, without specifically designating them as primary, secondary, or tertiary. Second, it tabulated results in two different ways: 1) constrained to a 24-hour day by allocating time within the allotted slot proportionally to the activities reported as if the reported activities were sequential ("simple time") and 2) unconstrained, allowing the time reported to considerably exceed 24 hours, as if the activities reported were completely simultaneous ("simultaneous time"). Third, it included a prompt asking respondents after completing the survey if they might have omitted to mention any unpaid care activities (Ciudad de Buenos Aires 2016: 11). The 2005 survey asked respondents if they had neglected to mention any episode of infant care during day or night (Esquivel 2012: 77). The 2016 survey instrument included slightly different wording: "Keep in mind that people often engage in multiple activities, from sleeping, eating, and bathing to working, cleaning house, caring for other persons etc. Some of these activities are conducted simultaneously (for example, cooking while caring for children) (Ciudad de Buenos Aires 2016: 33).

This reminder probably increased reporting of direct care activities. However, it did not include specific mention of passive care or the "estar al pendiente" phrase included in the Mexican and Ecuadorian surveys. Also, neither of the Buenos Aires surveys separately tabulated supervisory care or the size of the additions made to other categories of direct care as a result of these prompts. Therefore, it is impossible (as far as we can tell) to empirically assess the prompts' effects on respondents' reports of different categories of time use. As a result, we decided that analysis of the microdata would not yield any additional insights.

Indirect evidence suggests that supervisory care was not well-captured by the surveys. In her discussion of results from the 2005 survey, Esquivel reports that mothers of children less than six years of age spent an average of 5 hours and 29 minutes per day (including simultaneous activities) in caring for them, an average reduced to only 4 hours and 50 minutes if all those children attended kindergarten or infant care (2012: 85). While the survey did not ask how many hours children spent in such out-of-home care, it surely amounted to more than this 39-minute difference. What could account for the small size of this effect? It is possible that that other household members provided additional supervisory care, but because only one household members was surveyed, member, this possibility cannot be explored.

The official tabulations from the 2016 survey also suggest underestimation of supervisory constraints, reporting that women with any form of childcare assistance (whether public, in the form of daycare, or private, in the form of a family member or a domestic service) devoted an average of 7 hours 44 minutes to market work, while those without devoted 6 hours and 48 minutes on average—a difference of only 56 minutes per day, including simultaneous activities (Ciudad de Buenos Aires 2016: 15). Here again, the quantitative estimate makes the effect of any substitute for maternal care seem quite small.

SUMMARY OF CROSS-NATIONAL AND CROSS-REGIONAL DIFFERENCES

The empirical analysis here demonstrates potential for valuable international comparisons of time devoted to direct care in developing countries that is hampered by differences in survey design and administration. Limited comparability is evident not only between diary-based and activity-based surveys, but between countries using the same basic survey design within the same major geographic region, such as South Korea and China, South Africa and Ghana, Ecuador and Mexico. The category of direct care that looms largest in all the surveys—even those in relatively low-fertility countries with aging populations—is the care of household children under the age of 10.

Efforts to capture secondary activities in diary-based surveys have not always been successful (as in the South Korean case). Even the South African and Ghanaian surveys, which (like the Buenos Aires survey mentioned briefly above, explicitly urged respondents to report secondary activities) yielded far more modest results than, for example, the Australian survey of 1997, which explicitly instructed enumerators that passive childcare was an example of a secondary activity. It seems possible that low reporting of secondary activities in all four of the time diary surveys analyzed is related to relatively low reporting of supervisory care, which could result either from poor specification of the meaning of this category in survey administration, or cultural/linguistic differences in the very conceptualization of care. In this context, it is striking that the activity-list surveys of Ecuador and Mexico yielded much higher reports of supervisory care, which could not be entirely explained by the reporting of time that exceeded 24 hours per day. On the other hand, the "supervisory care deficit" that could be calculated for the Ecuadorian case suggests that even there, supervisory direct care is underestimated.

Simply including a category of supervisory or passive care or including a prompt to report activities that may have been overlooked (as in the South African case) does not automatically solve the measurement problem. One might expect the Chinese survey, which included explicit attention to supervisory or passive childcare, to show higher rates of household-level direct childcare than the Korean survey, which did not code this particular activity, but this was not the case. Large differences in the ratio of direct to supervisory care in Ecuador and Mexico indicate that even activity-list survey results are susceptible to small differences in survey administration that cannot be discerned from scrutiny of the lists themselves.

Yet the comparative results also offer some valuable lessons. The South Korean survey achieves the plausible result that virtually every household with a child under the age of 10 participated at least some direct care on a diary day, which the other three diary-based surveys do not. The most distinctive feature of the Chinese survey, its inclusion of time-use results for children ages 3 and over, could not be fully explored here, but promises unique insights. The South African survey (like the Buenos Aires survey modeled on it in some respects) and the Ghanaian survey demonstrate a neat way of including measures based on both constrained and simultaneous time. By including measures of the time that young children spent in childcare or school, the Ecuadorian survey makes

it possible to estimate a supervisory care deficit. For reasons that cannot be entirely explained by differences in survey instruments, the Mexican survey yielded very high measures of time spent in both direct and supervisory care.

The multivariate analysis of determinants of time devoted to indirect, active, and supervisory care in households including at least one child under the age of 10 provides some suggestive results. In every survey, the presence of children under the age of 5 had significant and positive effects on the time that mothers devoted to direct care, while the presence of children 5 to 10 years old had negative—though small—effects on direct care and larger positive effects on indirect care.

This is not a surprising finding, given that older children are likely to attend school, but it raises the possibility that children in this category, young as they are, may be helping with the active or supervisory care of younger siblings. Children in the 11 to 17 age group often showed larger negative effects on direct care, and adult women often had the largest negative effects. The Chinese survey, which included a measure of supervisory care, yields results showing that older children significantly reduced mothers' supervisory time. In South Africa and Ghana, reports of supervisory or passive care are too low to make inferences regarding this category; in Ecuador and Mexico, by contrast, children over the age of 11—whether male or female—significantly reduce mothers' supervisory time.

Clearly women and older children themselves distribute the direct care responsibilities in ways consistent with household economies of scale.

In both South Korea and China, time that women and mother spent in formal employment reduced indirect care time by slightly more than direct care time, but in both cases the reductions in unpaid work represented only a small percentage (about 25% or less) of the increase in paid work. In South Africa and Ghana, the reductions in indirect care time were much greater than reductions in direct care, but this may simply reflect underenumeration of direct care. In Ecuador and Mexico, reductions in direct care associated with paid employment were small, but time devoted to production for own consumption had small positive effects.

The differential effects of different types of non-care work help explain why residence in a city or urban area relative to a town or rural area tends to have a negative effect, especially in South Korea. In urban areas childcare is more salient because it cannot easily be combined with directly remunerative activities and transporting children to school and other activities is probably more time-consuming. The effects of rural residence are greater in South Africa, and smaller in China and Ghana, and higher in Mexico than in Ecuador. These differences likely reflect differences in the definition of rural residence, as well as the distribution of the population.

In all countries where surveys collected information on the presence or contribution of a domestic servant (South Africa, Ghana, Ecuador and Mexico) it reduced women's and mothers' time in indirect care more than their time in active care. In Ecuador, effects on supervisory care were especially large and negative. In Mexico, effects on active and supervisory care were positive, but this may reflect differences in the definition of the variable between the two Latin American countries.

One of the most noticeable similarities among all countries is the positive effect of education on time women and mothers spend in childcare. This could reflect the effect of

higher literacy on reporting of childcare time, the normative effects of education contributing to greater social desirability of reporting childcare, or simply greater effort developed to developmental care activities in order to help children succeed in a more education-intensive economy. This important finding helps explain why South Korea, the country with the highest average educational attainment, also reports the highest levels of average time devoted to active childcare—even though children there famously spend many hours in childcare, education, and tutoring activities outside the home. By comparison, the effects of household income (measured here rather approximately as below 50% or greater than 150% of the median, compared to the middle category, are rather small and inconsistent.

Cumulatively, these results help explain why the relative amount of time devoted to the direct care of children seems to increase rather than decrease in the process of economic development, despite the concomitant effects of fertility decline. Shifts to paid employment, along with urbanization, make it difficult to combine childcare with directly remunerative activities. Declines in household size and co-residence of adult women, in particular, increase care demands on mothers. Increased educational requirements also lead women and mothers to devote more time to developmental care, including the management of childcare and school arrangements and their transportation requirements.

RECOMMENDATIONS

The critical scrutiny of survey designs and analysis of microdata from the six countries considered here highlights the achievements and the limitations of existing time-use surveys. The most general recommendation that emerges is that national statistical offices have much to gain by improving public access to both micro-data and meta-data in order to gain as much knowledge as possible regarding best practices and to encourage policy-relevant research. Indeed, the limitations noted above help explain why relatively few academic researchers have taken advantage of the proliferation of new data sets.

While a series of partial repositories do exist, a comprehensive repository, including anonymized micro-data, and detailed instruments, complemented by methodological, operational and quality appraisal reports (or at least the latter items, where data privacy regulations or institutional ethics requirements bar public data access to microdata) would strengthen opportunities for evidence based harmonization.

The methodological recommendations outlined below encompass both changes in survey design and avenues for future research. They also address possible innovations that could improve cost-effectiveness. The first list pertains to all surveys, while the second list pertains more narrowly to either diary-based or list-based surveys.

Specific Recommendations for All Surveys

1. More international effort should be devoted to harmonization of survey design in basic approach (diary versus list, or hybrids thereof), durations of time periods queried, categories of aggregation, and survey administration (differences in interviewing methods, training and processing of microdata). The Harmonized European Time Use Survey provides inspiration for such an effort though it falls short for a number of reasons alluded to above and reiterated in the recommendations below.

2. As a first step, the small differences in the three major activity code groupings, ICATUS, HETUS and CAUTAL, should be reconciled, especially the classification of care for non-household members and the category of supervisory care.

3. Standardization of age categories for children and elderly would be helpful, as well as consideration of whether "direct care" should include services to household adults otherwise able to care for themselves.

4. Regardless of the type of survey fielded, specific attention should be devoted to the development of clear and consistent prompts to respondents regarding on-call, supervisory, and passive care of dependents, including children, individuals suffering illness and disability, and elderly in need of assistance, especially as a secondary activity (for a similar recommendation specific to the South Korean survey, see Yoon 2018).

5. Since the household remains the basic unit of care provision, and, includes many adults other than parents and children—especially in developing countries— surveys should collect data on all household members. Ideally, this effort should extend to the time use of young children, as reported by their primary caregivers, as in the 2017 survey of China conducted by Inner Mongolia University (as well as other precedents). Otherwise, it will remain quite difficult to assess the effects of childcare provision, school attendance, after-school programs, and community-based elder care on household-level care provision.

6. Devise internationally consistent criteria to designate "who else was present" or "with whom" an activity was conducted in the household, in order to better measure social interaction and minimize possible double counting of supervisory time (see also Yoon 2018).

7. For some activities that may be conducted on behalf of specific household members, such as phone calls or internet searches, inquiries regarding "for whom" would also improve measurement of both indirect and direct care time (Harvey and Spinney 2011).

8. Survey design should respond to the growing interest in developing satellite national income accounts that illuminate the evolving relationships between the monetary value of unpaid and paid care services. For this purpose, combining data on time use with data on household consumption and expenditures would be advantageous, suggesting the need to move beyond stand-alone time use surveys. Also, the output-based approach to valuation developed by the United Kingdom's Office of National Statistics has important implications for the categorization of time use activities.

9. Additional research on the optimal design of time-use surveys is needed, and would, ideally, include both experimental methods (such as administration of different types of surveys to the same or similar populations in order to calibrate differences) and qualitative research such as focus-group discussions of the ways in which respondents perceive the meaning of the questions they are asked to answer (see earlier discussion of studies conducted by IDRC and OXFAM). Such methodological triangulation could substantially improve data quality appraisals.

10. The level of detail in measurement of specific activities in many surveys is quite high and may be unnecessary. Given budget constraints, more accurate and consistent measurement of relatively large activity categories would likely be more cost effective than more fine-grained results that are not comparable with surveys from other countries and of relatively little interest to researchers. Here lies the appeal of "light diaries" that ask respondents to stick to a 24-hour period that is easy to recall (unlike the activity-list surveys reviewed here) but instead of asking open-ended questions regarding activities, offers a relatively short list of choices for both primary and secondary activities (Chatzitheochari et al. 2018).

As Jonathan Gershuny observes, "The combination of diary and stylised questionnaire data will yield stronger and more widely application time-use estimations than either form of evidence can provide on its own" (2012: 266).

As mentioned in the introduction to this paper, successful adoption of light diary approaches will require special attention to the composition and wording of the stylized questionnaire. Indeed, a Finnish experiment with light diary instruments that could be compared with standard Finnish diary instruments found that childcare was underestimated by the former (Pääkkönen 2013). This represents an important finding, given the likelihood that the standard diary instruments themselves understated the temporal demands of supervisory care. The wording regarding responsibility used by the New Zealand Statistical Office and the U.S. Bureau of Labor Statistics (described earlier), as well as the "estar pendiente" questions asked in the Ecuadorian and Mexican surveys analyzed here, could serve as models.

Simplification could complement the design of digital surveys based on phone applications that could reduce survey cost and improve response rates. The electronic time recorder used in the study of new mothers in Australia offers a valuable precedent (Smith and Craig 2009). Technological innovations in "digital ethnography" are proliferating (Lai et al. 2009). A number of applications for web-based applications and smart phones have been developed (Chatzitheochari et al. 2018; Fernee and Sonck 2014; Vrotsou et al. 2014; Daum et al., 2019; Masuda et al. 2014).

The percentage of the population in less developed countries covered by a mobile-cellular network is currently about 88% compared to 99% in developed countries.[31] Such aggregate figures disguise large variations in national and sub-national level coverage and may say little about actual access to mobile phone coverage. These issues have serious implications for survey sample design. Offers to defray the costs of mobile

31 ITU World Telecommunication Union/ICT Indicators database. Regions in this table are based on the ITU regions, see: http://www.itu.int/en/ITU-D/Statistics/Pages/definitions/regions.aspx. The link to the full spreadsheet is here: https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/ITU_Key_2005-2019_ICT_data_with%20LDCs_28Oct2019_Final.xls. Categorizations of less developed, developing, and developed are based on UN definitions.

phone service (or subsidize phone purchases) in return for survey participation could ameliorate these problems.

The issue of activity list coding could be bypassed if and when technical innovations allow respondents to self-code the full variety of their activities. However, attention must extend beyond activities. As this discussion has shown background responsibilities and constraints have particularly significant consequences for women and should be separately assessed.

Specific Recommendations for Diary-Based and Activity-List Surveys

Because the recommendations made above are unlikely to be adopted in the short run, some possible interim improvements could move each type of survey toward greater comparability with the other:

1. Diary-based surveys should include one or two stylized questions regarding activities and responsibilities that have been shown to have a "secondary" character, such as the active and the supervisory care of dependents. Another use of time that has been shown to commonly overlap with other activities is the use of media, such as listening to radio, music or video.

2. Activity-list surveys could inquire after time use on the previous day, rather than the previous week, in order to reduce recall errors and improve comparability with diary-based surveys. This would also make it easier to invite reporting of simultaneous activities and constrain responses to a 24-hour maximum. Here, the approach adopted by South African and Ghana in their time diary survey tabulations, providing both constrained and unconstrained totals could be useful.

IN SUM

The time-use surveys currently being conducted by national statistical offices provide valuable but incomplete information on the household care economy. The recommendations for improvement outlined above could help initiate the research and negotiation required to put them into effect. The history of gradual progress in harmonizing the System of National Accounts provides inspiration: until the end of the 1960s, a variety of national accounts were largely inconsistent with one another (Vanoli 2014). Since then, persistent efforts at harmonization promoted by the United Nations, among other multilateral organizations, have led to significant improvements in the international collection and analysis of valuable information. Similar efforts could vastly improve the usefulness of time use surveys.

4 TABLES

Table 1. Selected Time-Use Survey Characteristics Relevant to Comparisons of Direct Care Time in Six Countries

	East Asia		Africa		Latin America	
	S. Korea 2014 (1)	China 2017 (2)	South Africa 2010 (3)	Ghana 2009 (4)	Ecuador 2012 (5)	Mexico 2014 (6)
Survey Type						
Time Diary	√	√	√	√		
Activity List	-	-	-	-	√	√
Time Period Surveyed						
1 previous day		√	√	√		
2 previous days (weekend and weekday)	√					
Preceding week	-	-	-	-	√	√
Minimum time slot	10 minutes	10 minutes	30 minutes	60 minutes	Not specified	Not specified
Individuals Surveyed per Household						
Up to 2 members	-	-	√	-	-	-
All members over a certain age	√	√	-	√	√	√
Demographic Parameters						
Minimum age of respondents	10+	3+	10+	10+	12+	12+
Definition/s of "children"	<10 and 10-18	<18	< 7 and <18	<10	<12	<15
Definition of "elderly" (if specified)	65+	Not specified	Not specified	Not specified	Not specified	60+
Complete information on age of household members	√	√	√	√	√	√

	East Asia		Africa		Latin America	
	S. Korea 2014 (1)	China 2017 (2)	South Africa 2010 (3)	Ghana 2009 (4)	Ecuador 2012 (5)	Mexico 2014 (6)
Care Activities/ Responsibilities						
Includes care (direct or indirect) for non-household members	Only help to non-cohabiting family members	√	√	√	√	√
Includes direct care of elderly family members	√ (parents and grandparents)	Included with all adult family members	Sick, elderly, disabled adults combined	Included with all adult family members	Not specified	√
Effectively includes simultaneous activities	No	√	√	√	√	√
Explicitly tabulates passive care or supervisory care for children	No	√	For children and adults combined	√	√	√
Explicitly tabulates passive care or supervisory care for elderly and/or disabled	No		Same as above		√	√
Tabulates care for non-dependent adults	√	√	No	√	√	√
Includes prompts re passive or supervisory care	No	No	√	No	√	√
Asks "with whom"	√ (but only if engaged in same activity)	√	No	No	No	No

Table 2. Demographic Characteristics of Surveyed Households in Six Countries

Percentage of households with:	South Korea 2014 (1)	China 2017 (2)	South Africa 2010 (3)	Ghana 2009 (4)	Ecuador 2012 (5)	Mexico 2014 (6)
At least one child <10	19%	22%	49%	51%	44%	31%
At least one child < 10 and no woman 18+ and <75	1%	1%	2%	3%	1%	1%
At least one child < 10 and no man 18+ and <75	5%	2%	22%	26%	11%	11%
At least one elderly 75+	13%	17%	8%	6%	10%	11%
At least one resident 75+ and no woman 18+ and <75	60%	41%	25%	48%	43%	41%
At least one resident 75+ and no man18+ and <75	71%	25%	36%	74%	56%	54%
At least one probable dependent (child under 10 OR elderly 75+, OR with disability or illness*	34%	37%	54%	55%	56%	44%
At least one probable dependent and no woman 18+ and <75	24%	19%	5%	8%	10%	11%
At least one probable dependent and no man 18+ and <75	31%	24%	24%	31%	19%	21%
Number of households	11,986	12,471	22,484	4,193	21,290	15,501

Note: The South Korean survey collected information on whether household members suffered from dementia, stroke, or disability; The Chinese survey 2017 collected information on whether the respondent had a chronic or temporary illness Mexico and Ecuador collected information on whether household members had a disability; Mexico also asked if they had a chronic or temporary illness. Neither South Africa nor Ghana collected this information. Household sampling weights used.

Table 3. Participation Rates for Women and Men 18+ in Care Activities on Diary Day or Surveyed Week, All Households and Households with Probable Dependents

	South Korea 2014 (1)		China 2017 (2)		South Africa 2010 (3)		Ghana 2009 (4)		Ecuador 2012 (5)		Mexico 2014 (6)	
	W	M	W	M	W	M	W	M	W	M	W	M
All households												
Indirect care	96%	68%	87%	44%	93%	72%	88%	33%	94%	85%	98%	94%
Direct care of household children	28%	20%	22%	9%	30%	5%	48%	15%	46%	21%	49%	38%
Direct care of non-household children	7%	4%	1%	0%	1%	0%	1%	0%	0%	0%	7%	3%
Direct care for household adults reported elderly (75+), sick or disabled	12%	3%	2%	2%	5%	3%	6%	2%	14%	5%	12%	10%
Direct care for non-household adults	2%	1%	1%	1%	0%	0%	1%	1%	3%	1%	8%	5%
Number of observations	12790	11052	12288	11397	17472	14166	3821	3107	26461	24766	19246	16550
Households with at least 1 child <10												
Indirect care	99%	64%	81%	38%	93%	65%	94%	27%	96%	86%	99%	93%
Direct care of household children	95%	75%	56%	2 9%	56%	14%	79%	30%	82%	45%	90%	76%
Direct care of non-household children	6%	4%	0%	0%	1%	0%	0%	0%	0%	0%	5%	2%
Direct care for household adults reported elderly (75+), sick or disabled	20%	2%	1%	1%	8%	5%	8%	4%	15%	5%	11%	9%
Direct care for non-household adults	3%	2%	1%	1%	0%	0%	1%	1%	2%	0%	6%	4%
Number of observations	2068	1859	2431	1493	4891	2848	1216	798	6108	5047	4732	3671

	South Korea 2014 (1)		China 2017 (2)		South Africa 2010 (3)		Ghana 2009 (4)		Ecuador 2012 (5)		Mexico 2014 (6)	
	W	M	W	M	W	M	W	M	W	M	W	M
Mothers and fathers of children in households with at least 1 child <10*												
Indirect care	99%	63%	84%	36%	95%	58%	96%	26%	98%	88%	99%	94%
Direct care of household children	96%	76%	56%	29%	72%	19%	87%	33%	95%	54%	96%	86%
Direct care of non-household children	6%	4%	0%	0%	1%	0%	0%	0%	0%	0%	5%	1%
Direct care for household adults reported elderly (75+), sick or disabled	20%	2%	2%	2%	10%	6%	8%	4%	17%	6%	9%	7%
Direct care for non-household adults	3%	2%	0%	1%	0%	0%	0%	1%	2%	0%	6%	5%
Number of observations	1,860	1,696	1493	1195	2783	1441	881	664	3726	3191	2916	2381
At least 1 household member 75+												
Indirect care	95%	75%	78%	42%	87%	70%	72%	33%	86%	75%	94%	90%
Direct care of household children	8%	7%	11%	4%	20%	3%	28%	12%	27%	12%	31%	22%
Direct care of non-household children	6%	4%	0%	0%	0%	0%	2%	0%	0%	0%	5%	3%
Direct care for household adults reported elderly (75+), sick or disabled	9%	7%	3%	2%	4%	3%	11%	3%	25%	10%	45%	38%
Direct care for non-household adults	0%	0%	0%	1%	0%	0%	0%	0%	2%	0%	6%	4%
Number of observations	1918	1227	2375	1294	1701	998	404	235	4894	4473	3646	2814

	South Korea 2014 (1)		China 2017 (2)		South Africa 2010 (3)		Ghana 2009 (4)		Ecuador 2012 (5)		Mexico 2014 (6)	
	W	M	W	M	W	M	W	M	W	M	W	M
At least one probable dependent (child under 10 AND elderly 75+, OR with disability or illness*												
Indirect care	95%	58%	77%	32%	89%	72%	80%	19%	90%	74%	96%	89%
Direct care of household children	75%	58%	40%	14%	39%	11%	55%	19%	63%	34%	72%	52%
Direct care of non-household children	10%	4%	44%	0%	0%	0%	2%	0%	0%	0%	3%	1%
Direct care for household adults reported elderly (75+), sick or disabled	18%	4%	2%	1%	6%	2%	7%	2%	17%	5%	35%	25%
Direct care for non-household adults	0%	0%	0%	0%	0%	1%	0%	0%	2%	0%	6%	4%
Number of observations	83	57	83	57	349	176	72	35	427	300	308	196

Participation rates between diary-based surveys of a single day and activity list surveys based on a week (as for Ecuador and Mexico) are not directly comparable for activities that are unlikely to be conducted every day. The Korean survey is based on two diary days; the China survey on one day. This also affects comparisons of both participation rates and time conditional on participation between the two countries. Motherhood and fatherhood are identified by relationship to head of household. Individual sampling weights applied; results for those in households with at least one child under 10 eliminate households that include children <10 and <18 to avoid confounding effects of older children providing care.

Table 4. Average Minutes Per Day in Care Activities on Diary Day or Surveyed Week Converted to Daily Average for Women and Men 18+, All Households and Households with Probable Dependents (not conditional on participation)

	South Korea 2014 (1)		China 2017 (2)		South Africa 2010 (3)		Ghana 2009 (4)		Ecuador 2012 (5)		Mexico 2014 (6)	
	W	M	W	M	W	M	W	M	W	M	W	M
All households												
Indirect care	165	36	167	58	217	93	153	27	245	58	268	76
Direct care of household children	37	11	61	19	31	4	52	9	69	14	140	44
Direct care of non-household children	4	2	1	0	1	0	1	0	0	0	7	2
Direct care for household adults reported elderly (75+), sick or disabled	3	1	4	3	3	1	4	2	8	3	16	11
Direct care for non-household adults	1	1	2	1	0	0	1	1	2	0	7	3
Average total direct care	45	15	68	23	35	6	57	12	79	17	169	60
Direct care as % of total care	21%	29%	29%	28%	14%	6%	27%	30%	24%	22%	39%	44%
Households with at least 1 child <10*												
Indirect care	189	31	154	53	227	82	174	24	258	51	286	71
Direct care of household children	186	51	163	59	61	10	95	17	151	34	305	100
Direct care of non-household children	2	1	1	0	0	0	0	0	0	0	4	1
Direct care for household adults reported elderly (75+), sick or disabled	3	1	3	2	5	3	4	3	7	3	14	8
Direct care for non-household adults	1	1	2	2	0	0	0	1	1	0	4	2
Average total direct care	191	54	168	63	66	13	100	20	159	37	326	71
Direct care as % of Total Care	50%	63%	52%	54%	23%	14%	36%	46%	38%	42%	53%	61%

	South Korea 2014 (1)		China 2017 (2)		South Africa 2010 (3)		Ghana 2009 (4)		Ecuador 2012 (5)		Mexico 2014 (6)	
	W	M	W	M	W	M	W	M	W	M	W	M
Mothers and fathers of children in households with at least 1 child <10												
Indirect care	190	31	158	45	243	72	184	22	296	57	315	73
Direct care of household children	190	52	150	58	82	14	109	18	191	43	376	125
Direct care of non-household children	2	1	0	0	0	0	0	0	0	0	3	1
Direct care for household adults reported elderly (75+), sick or disabled	3	1	4	2	6	3	3	3	8	3	13	6
Direct care for non-household adults	1	1	1	1	0	0	0	1	1	0	4	2
Average total direct care	195	54	155	62	88	17	113	22	200	46	396	133
Direct care as % of total care	51%	63%	50%	58%	27%	19%	38%	50%	40%	45%	56%	65%
At least 1 household member 75+												
Indirect care	168	50	151	64	200	90	109	32	206	56	236	76
Direct care of household children	5	3	29	8	21	2	25	5	39	8	75	24
Direct care of non-household children	4	1	1	0	0	0	1	0	0	0	5	2
Direct care for household adults reported elderly (75+), sick or disabled	4	2	5	3	3	1	10	1	32	7	58	35
Direct care for non-household adults	0	0	1	1	0	1	0	0	1	0	4	2
Average total direct dare	14	7	36	13	24	5	37	7	73	16	143	63
Direct care as % of total Care	8%	13%	19%	17%	11%	5%	25%	18%	26%	22%	38%	45%

	South Korea 2014 (1)		China 2017 (2)		South Africa 2010 (3)		Ghana 2009 (4)		Ecuador 2012 (5)		Mexico 2014 (6)	
	W	M	W	M	W	M	W	M	W	M	W	M
At least one probable dependent (child under 10 OR elderly 75+, OR with disability or illness*												
Indirect care	152	30	153	44	206	81	130	10	188	40	216	67
Direct care of household children	98	30	97	26	36	5	53	10	97	24	178	58
Direct care of non-household children	1	0	0	0	0	0	1	0	0	0	2	1
Direct care for household adults reported elderly (75+), sick or disabled	15	15	8	1	5	1	3	1	11	2	46	29
Direct care for non-household adults	0	0	0	0	0	4	0	0	1	0	3	3
Average total direct care	114	45	105	27	40	10	57	10	108	27	230	90
Direct care as % of total care	43%	60%	41%	38%	16%	11%	31%	51%	37%	40%	52%	58%

Number of observations for women and men in each country same as Table 3. Motherhood and fatherhood are identified by relationship to head of household. Individual sampling weights applied. *Results for members of households with at least one child under 10 eliminate households that include children <10 and <18 to eliminate confounding effects of older children providing care.

Table 5. Household Participation Rates in Care of Household Children in all Households with at least one Child Under 10 in all Households with at least One Child under 10 and Two Adults on Diary Day or Surveyed Week Converted to Daily Average

	South Korea 2014 (1)	China 2017 (2)	South Africa 2010* (3)	Ghana 2009* (4)	Ecuador 2012* (5)	Mexico 2014* (6)
All households						
Indirect care	100%	90%		96%	100%	100%
Active childcare	100%	56%		81%	90%	94%
Supervisory childcare	_	28%		11%	92%	95%
Households with up to 2 adults						
Indirect care	99%	85%	98%	96%	100%	100%
Active childcare	100%	54%	69%	80%	90%	94%
Supervisory or passive childcare	-	27%	4%	11%	92%	94%

*Households with incomplete member diaries excluded. No incomplete diaries were evident for South Korea or China.

Table 6. Average Total Household Care Minutes Per Day for Household Children in All Households with at least One Child Under 10 and in All Households with at least One Child Under 10 and No More Than Two Adults on Diary Day or Surveyed Week Converted to Daily Average (not conditional on participation)

	South Korea 2014 (1)	China 2017 (2)	South Africa 2010* (24-hour day) (3a)	South Africa 2010* (no constraint) (3b)	Ghana 2009* (24-hour day) (4a)	Ecuador 2012* (5)	Mexico 2014* (6)
All households							
Indirect care	244	249			274	438	517
Active childcare	235	166	-		103	116	164
Supervisory childcare	-	84	-		8	126	349
Total direct childcare	235	250	-		110	241	513
Households with up to 2 adults							
Indirect care	231	117	329	348	251	392	434
Active childcare	233	133	81	89	102	112	144
Supervisory or passive childcare	-	68	2	3	8	124	322
Total direct childcare	233	201	83	92	110	236	466

* Households with incomplete member diaries excluded.

Table 7. Ratio of Women's Average Time to Men's Average Time in Total Work, Paid Work, and Care Work, Adults 18+

	South Korea 2014 (1)	China 2017 (2)	South Africa 2010 (3)	Ghana 2009 (4)	Ecuador 2012 (5)	Mexico 2014 (6)
Total Work (Paid and Unpaid)	1.2	1.1	1.1	1.1	1.2	1.1
Paid Work	0.5	0.6	0.6	0.7	0.5	0.5
Volunteer Work	4.0	0.3	0.8	0.6	1.5	1.8
Indirect Care	4.5	2.8	2.3	5.7	4.2	3.5
Direct Care	3.3	3.0	5.8	5.8	4.6	2.8
Direct Care for Household Adults Reported Elderly, Sick or Disabled	2.4	1.3	3.0	2.0	2.7	1.5
Active Care of Household Children	3.3	3.7	10.0	6.1	4.6	3.5
Supervisory Care of Household Children	-	2.4	1.0	2.0	5.3	3.1

*Numbers too small to calculate a meaningful ratio. Results for South Africa and Ghana are constrained to 24-hours.

Table 8. Korea 2014. Ordinary Least Squares Estimates of Determinants of Daily Time Women and Mothers Devote to Indirect Care and Active Childcare Time in Households with at least One Child under 10

	Minutes of Indirect Care		Minutes of Active Childcare	
	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10
Household structure				
Total children <5	6.24*	7.34**	51.29***	52.53***
	(3.50)	(3.61)	(4.74)	(4.76)
Total children 6-10	11.72***	14.00***	-11.34***	-10.39**
	(3.51)	(3.61	(4.38)	(4.34)
Total female children 11-17	10.68*	14.76***	-23.55***	-19.67***
	(5.51)	(5.51)	(6.05)	(6.26)
Total male children 11-17	9.78	13.88**	-30.12***	-29.83***
	(6.73)	(6.97)	(6.13)	(6.09)
Total other 18+ women	-30.67***	-36.90***	-38.87***	-51.13***
	(4.47)	(5.37)	(5.67)	(5.88)
Time spent in other work				
Time spent in formal employment	-0.26***	-0.25***	-0.24***	-0.23***
	(0.01)	(0.01)	(0.01)	(0.01)
Unpaid time devoted to family business	-0.16***	-0.17***	-0.16***	-0.12***
	(0.03)	(0.03)	(0.03)	(0.03)
Time spent in subsistence farming	-0.22*	-0.25	-0.49***	-0.52***
	(0.12)	(0.18)	(0.12)	(0.15)
Other characteristics				
"City" (relative to "town")	-0.02	-1.09***	19.53***	20.12***
	(5.33)	-0.25	(6.23)	(6.32)
Education				
No schooling	-65.33***	-71.87***	-98.75***	-91.35***
	(21.32)	(22.59)	(13.76)	(17.73)
Less than high school degree	-2.86	-16.62	-50.75***	-47.70***
	(8.55)	(10.45)	(8.58)	(9.07)
Some college	-27.91***	-24.17**	4.48	9.48
	(10.18)	(10.50)	(10.63)	(10.95)

	Minutes of Indirect Care		Minutes of Active Childcare	
	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10
Education				
College degree	-8.36*	-4.36	22.75***	23.66***
	(4.56)	(4.79)	(5.54)	(5.46)
More than college	-16.40*	-12.82	20.60*	22.26*
	(8.55)	(9.00)	(11.36)	(11.61)
Monthly household income				
Less than 50% median income	7.51	10.20	18.72**	18.13**
	(6.38)	(6.66)	(8.13)	(8.69)
Over 150% of median income	-3.79	-10.20*	-15.55**	-19.45***
	(5.49)	(5.58)	(6.59)	(6.74)
Constant	213.85***	209.35***	151.21***	146.77***
	(8.39)	(8.90)	(10.02)	(9.95)
F statistic	66.41	58.59	97.38	88.76
P value of F statistic	0	0	0	0
R^2	0.26	0.27	0.37	0.39
Number of observations	2,472	2,242	2,472	2,242

Source: KTUS 2014. The dependent variable is indirect care unconditional minutes per day. The omitted categories are 'high school degree' and '50% to 150% of median income' for education and household income, respectively. Individual sampling weights used. Significant at .001 level (***), at .005 level (**), at .10 level (*).

Table 9. China 2017. Ordinary Least Squares Estimates of Determinants of Daily Time Women and Mother Devote to Indirect Care and Active Childcare in Households with at Least One Child Under 10

	Minutes of Indirect Care		Minutes of Active Childcare		Minutes of Supervisory Childcare	
	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10
Household structure						
Total children <5	-10.42***	-12.57**	90.03***	69.63***	38.62***	22.87***
	(2.36)	(5.00)	(2.18)	(6.25)	(1.36)	(4.90)
Total children 6-10	14.06***	2.11	10.32***	12.99**	5.21***	-10.82**
	(2.47)	(5.10)	(2.27)	(6.37)	(1.42)	(5.00)
Total female children 11-17	11.38***	16.08**	6.74**	15.40*	-4.31**	-12.36*
	(3.38)	(7.47)	(3.11)	(9.34)	(1.94)	(7.33)
Total male children 11-17	11.06***	15.74*	6.51**	3.47	1.14	10.28
	(3.16)	(8.10)	(2.92)	(10.13)	(1.82)	(7.95)
Total other 18+ women	-15.59***	-15.90***	-1.52	-1.32	-2.55**	-7.82*
	(1.81)	(4.67)	(1.67)	(5.83)	(1.04)	(4.58)
Time spent in other work						
Time spent in formal employment	-0.19***	-0.21***	-0.09***	-0.17***	-0.04***	-0.11***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.00)	(0.01)
Time spent in non-formal employment	-0.14***	-0.17***	-0.09***	-0.24***	-0.04***	-0.14***
	(0.01)	(0.02)	(0.01)	(0.03)	(0.01)	(0.02)
Other characteristics						
Rural					6.32***	13.51**
	4.58*	-12.26*	7.28***	5.00	-1.67*	-4.57
	(2.72)	(6.32)	(2.51)	(7.90)	(1.006)	(4.21)

	Minutes of Indirect Care		Minutes of Active Childcare		Minutes of Supervisory Childcare	
	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10
Education						
No schooling	-17.60***	32.66***	-24.86***	-39.04***	-4.67**	-0.45
	(3.72)	(9.80)	(3.43)	(12.25)	(2.14)	(9.61)
Primary completed	-5.90	-11.05	-13.25***	-11.15	-1.82	2.04
	(3.71)	(8.66)	(2.98)	(9.10)	(1.86)	(7.14)
Secondary not completed	-47.85***	-54.10***	6.04*	17.79	-0.43	0.29
	(5.56)	(12.70)	(3.42)	(10.83)	(2.13)	(8.50)
Tertiary	-56.89***	-66.79***	6.21	27.47*	2.15	-4.38
	(5.81)	(13.60)	(5.13)	(15.88)	(3.20)	(12.46)
Other	-81.89***	-60.07	12.06**	35.57**	3.40	31.13**
	(19.40)	(53.32)	(5.35)	(17.01)	(3.34)	(13.34)
Monthly household consumption						
Less than 50% median income	0.63	8.85	5.53**	3.49	-4.32**	-16.21**
	(3.02)	(7.91)	(2.79)	(9.89)	(1.74)	(7.75)
Over 150% of median income	7.05**	17.60***	-2.69	-15.03*	-1.07	-9.03
	(2.90)	(6.45)	(2.67)	(8.06)	(1.66)	(6.32)
Constant	203.60***	215.93***	38.09***	71.15***	15.30***	66.62***
	(3.092)	(9.917)	(2.85)	(12.40)	(1.78)	(9.72)
F Statistic	112.5	27.83	158.38	25.0	75.05	13.32
P value of F statistic	0.00	0.00	0.00	0.00	0.00	0.00
R^2	0.13	0.18	0.17	0.16	0.09	0.09
Number of observations	12288	2075	12288	2075	12288	2075

Source: 2017 Chinese Time Use Survey conducted by Inner Mongolia University.
Variables on production of goods for own use and presence of a domestic servant were not included.
Significant at .001 level (***), at .005 level (**), at .10 level (*).

Table 10. South Africa 2010: Ordinary Least Squares Estimates of Determinants of Daily Time Women and Mothers Devote to Indirect Care and Direct Active Childcare in Households with at Least One Child Under 10

	Minutes of Indirect Care		Minutes in Direct Active Childcare	
	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10
Household structure				
Total children <5	0.09	-7.89***	25.63***	28.49***
	(1.80)	(2.39)	(0.94)	(1.42)
Total children 6-10	7.48***	10.14***	0.04	-5.37***
	(1.89)	(2.46)	(0.98)	(1.46)
Total female children 11-17	-0.47	-4.86	-3.14***	-5.18***
	(2.28)	(3.35)	(1.18)	(1.99)
Total male children 11-17	9.02***	5.57*	-1.85	-7.94***
	(2.35	(3.26)	(1.22)	(1.94)
Total other 18+ women	-29.22***	-26.78***	-14.38***	-9.98
	(1.40)	(2.11)	(0.73)	(1.25)
Time spent in other work				
Time spent in formal employment	-0.40***	-0.44***	-0.08***	-0.11
	(0.00)	(0.01)	(0.01)	(0.01)
Time spent in non-formal employment	-0.33***	-0.35***	-0.07***	-0.09
	(0.01)	(0.02)	(0.01)	(0.01)
Time spent in production for own use	-0.25***	-0.29***	-0.07***	-0.11
	(0.02)	(0.03)	(0.01)	(0.02)
Other characteristics				
Rural	21.68***	28.21***	-13.15***	-18.15
	(3.35)	(4.32)	(1.74)	(2.57)
Domestic worker does the most housework	-64.71***	-53.89***	-5.44	-9.63
	(9.16)	(10.81)	(4.76)	(6.43)

	Minutes of Indirect Care		Minutes in Direct Active Childcare	
	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10
Education				
No schooling	-79.08***	-13.29	-22.83***	-16.75
	(7.22)	(14.07)	(3.75)	(8.37)
Less than primary completed	-9.41*	6.42	-11.14***	0.38
	(5.09)	(6.56)	(2.64)	(3.90)
Primary completed	-5.80	-5.79	-15.87***	-12.13
	(6.60)	(8.42)	(3.43)	(5.00)
Secondary not completed	-8.67**	-7.07	-5.96***	-4.35
	(4.33)	(5.32)	(2.25)	(3.16)
Tertiary	-11.34	-21.56***	1.86	-0.44
	(7.11)	(8.33)	(3.70)	(4.95)
Other	-1.88	-7.52	-10.84	8.82
	(28.15)	(34.55)	(14.63)	(20.55)
Monthly household income				
Less than 50% median income	-1.04	-7.25	3.94**	3.40
	(3.47)	(4.52)	(1.80)	(2.69)
Over 150% of median income	4.21	-2.03	-0.71	-1.99
	(4.24)	(5.44)	(2.20)	(3.24)
Constant	295.90***	314.24***	64.57***	81.63
	(5.03)	(6.40)	(2.62)	(3.80)
F statistic	171.42	131.67	88.77	59.66
P value of F statistics	0.00	0.00	0.00	0.00
R^2	0.25	0.32	0.15	0.18
Number of observations	9120	4950	9120	4950

Source: SA TUS 2010. The dependent variable is expressed as unconditional minutes per day constrained to 24 hours. The omitted categories are 'secondary school completed' and '50% to 150% of median income' for education and household income, respectively. Individual sampling weights used. * p<0.10, ** p<0.05, *** p<0.01.

Table 11. Ghana 2009: Ordinary Least Squares Estimates of Determinants of Time Women and Mothers Devote to Daily Indirect Care, Active Childcare, and Passive Childcare in Households with at Least One Child Under 10

	Minutes of Indirect Care		Minutes of Active Childcare		Minutes of Passive Childcare	
	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10
Household structure						
Total children <5	9.49***	11.81	40.01***	45.59***	1.55**	1.51
	(2.77)	(3.44)	(1.96)	(2.64)	(0.76)	(1.11)
Total children 6-10	7.06**	6.75**	-7.93***	-6.47**	0.37	0.66
	(2.76)	(3.44)	(1.95)	(2.64)	(0.76)	(1.11)
Total female children 11-17	-12.54***	-11.28**	-4.42	0.19	-0.76	-0.89
	(3.88)	(4.97)	(2.74)	(3.81)	(1.07)	(1.60)
Total male children 11-17	7.91**	10.09**	-3.42	-3.20	0.24	-0.36
	(3.75)	(4.44)	(2.65)	(3.41)	(1.03)	(1.43)
Total other 18+ women	-24.26***	-11.07**	-22.657***	-16.96***	-0.57	4.50**
	(3.02)	(5.59)	(2.13)	(4.29)	(0.83)	(1.80)
Time spent in other work						
Time spent in formal employment	-0.22***	-0.24***	-0.05**	-0.07***	-0.01	-0.01
	(0.03)	(0.03)	(0.02)	(0.03)	(0.01)	(0.01)
Time spent in non-formal employment	-0.20***	-0.22***	-0.08***	-0.09***	-0.01***	-0.013***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Time spent in production for own use	-0.18***	-0.20***	-0.06***	-0.08***	-0.01**	-0.01**
	(0.01)	(0.02)	(0.01)	(0.01)	(0.00)	(0.01)
Other characteristics						
Rural	14.98***	7.292	-5.06	-12.98	-3.63**	-5.66
	(5.16)	(5.86)	(3.64)	(4.50)	(1.42)	(1.89)
Domestic worker does the most housework	12.26	-23.09	-1.70	-8.87	-4.22	-6.07
	(19.94)	(26.89)	(14.08)	(20.64)	(5.49)	(8.66)

	Minutes of Indirect Care		Minutes of Active Childcare		Minutes of Passive Childcare	
	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10	Women 18+	Mothers 18+ of child under 10
Education						
No schooling	-10.20*	-1.86	-12.21***	-2.50	-3.25**	-4.46
	(5.96	(6.88)	(4.21)	(5.28)	(1.64)	(2.22)
Primary completed	-3.34	-1.61	-2.14	-4.04	-1.96	-3.001
	(6.77)	(7.47)	(4.78)	(5.74)	(1.86)	(2.41)
Higher secondary	-26.03***	-18.96*	1.76	17.14	-4.55**	-3.47
	(8.34)	(10.59)	(5.88)	(8.13)	(2.30)	(3.41)
Higher education	19.22	19.25	5.65	14.73	-4.64	-10.82**
	(13.60)	(16.11)	(9.60)	(12.37)	(3.74)	(5.19)
Monthly household consumption						
Less than 50% median consumption	-13.02**	-12.14*	10.75**	13.01**	3.86**	4.45**
	(6.11)	(6.89)	(4.31)	(5.29)	(1.68)	(2.22)
Over 150% of median consumption	2.04	-0.84	3.34	6.00	1.47	1.50
	(5.62)	(6.55)	(3.97)	(5.03)	(1.55)	(2.11)
Constant	217.36***	225.20***	75.00***	76.22***	9.78***	12.29***
	(6.56)	(7.91)	(4.63)	(6.07)	(1.81)	(2.55)
F statistic	36.96	30.64	49.94	36.40	2.53	2.89
P value of F stat	0.00	0.00	0.00	0.00	0.00	0.00
R^2	0.19	0.22	0.24	0.25	0.02	0.03
Number of observations	2524	1766	2524	1766	2524	1766

Source: Ghana TUS 2009. The dependent variable is expressed as unconditional minutes per day constrained to 24 hours. The omitted categories are 'Middle/junior secondary school completed' and '50% to 150% of median. Individual sampling weights used.
* p<0.10, ** p<0.05, *** p<0.01

Table 12. Ecuador 2012. Ordinary Least Squares Estimates of Determinants of Time Women and Mother Devote to Daily Indirect Care, Active Childcare, and Supervisory Childcare in Households with at Least One Child Under 10

	Indirect Care		Active Childcare		Supervisory Childcare	
	Women	Mothers	Women	Mothers	Women	Mothers
Household structure						
Total <5	8.40***	0.50	29.18***	34.39***	18.30***	22.51***
	(1.66)	(2.18)	(0.76)	(1.04)	(1.20)	(1.78)
Total 6-10	7.11***	9.80***	-4.24***	-7.68***	3.54***	3.38**
	(1.60)	(2.0)	(0.73)	(0.96)	(1.16)	(1.64)
Total female children 11-17	-4.00**	-0.91	-6.86***	-8.14***	-5.36***	-7.78***
	(2.02)	(2.50)	(0.92)	(1.20)	(1.46)	(2.04)
Total male children 11-17	6.42***	10.69***	-4.66***	-6.95***	-2.08	-5.89***
	(1.94)	(2.42)	(0.88)	(1.16)	(1.40)	(1.98)
Total other 18+ women	-60.59***	-45.13***	-21.78***	-12.41***	-25.82***	-18.85***
	(1.41)	(2.73)	(0.65)	(1.30)	(1.02)	(2.23)
Time spent in other work						
Time in market employment	-0.14***	-0.16***	-0.04***	-0.04***	-0.02***	-0.012**
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Time in own-use production	0.72***	0.58***	0.14***	0.14***	0.27***	0.27***
	(0.03)	(0.03)	(0.01)	(0.02)	(0.02)	(0.03)
Rural	-7.02**	-1.40	-2.32*	-4.52***	0.16	-2.87
	(2.87)	(3.53)	(1.31)	(1.69)	(2.08)	(2.89)
Live-in domestic servant	-73.49**	-94.89*	11.20	-5.32	-26.46	-43.61
	(33.7)	(51.1)	(15.4)	(24.50)	(24.4)	(41.83)
Education						
No education	-42.82***	-6.20	-30.23***	-6.69	-45.07***	-32.15***
	(5.72)	(8.59	(2.61)	(4.11)	(4.14)	(7.02)
Primary	-3.58	-7.64**	-12.94***	-6.48***	-16.24***	-13.41***
	(2.94)	(3.59)	(1.34)	(1.72)	(2.12)	(2.94)

	Indirect Care			Active Childcare		Supervisor Childcare		
	Women	Mothers		Women	Mothers	Women	Mothers	
High school	-51.88***	0.96		-1.98	5.12	-4.71	21.03***	
	(5.55)	(8.11)		(2.53)	(3.88)	(1.91)	(3.19)	
College and above	-34.00***	-25.24***		2.57	4.22*	8.62***	5.78***	
	(4.00)	(4.89)		(1.83)	(2.34)	(1.40)	(1.67)	
Monthly household income								
Less than 50% median income	-18.00***	-16.71***		-3.15*	-2.76	0.23	3.38**	
	(3.53)	(4.16)		(1.61)	(2.00)	(1.36)	(1.63)	
Over 150% of median income	0.62	-4.10		-3.35**	-1.29	0.47	6.38***	
	(2.99)	(3.82)		(1.37)	(1.83)	(0.98)	(1.27)	
Constant	310.27***	325.68***		77.26***	78.39***	27.97***	30.17***	
	(3.36)	(4.11)		(1.53)	(1.97)	(1.63)	(2.38)	(1.63)
F statistic	267.22	92.32	267.23	236.01	144.94	27.46	15.39	27.46
P value of F-statistic	0	0	0	0	0	0	0	0
R^2	0.23	0.14	0.23	0.21	0.21	0.04	0.03	0.03
Number of Observations	13289	8322	13289	13289	8322	11431	7191	11431

Source: Ecuador TUS 2012. The dependent variable is expressed as average unconditional minutes per day.
Secondary education describes completion of grades 7-10, while high school describes completion of grades 11-13. The omitted categories are 'secondary' for education and '50% to 150% of median income' for household income. Sampling weights provided in the dataset used to weight all estimates. * p<0.10, ** p<0.05, *** p<0.01

Table 13. Mexico 2014. Ordinary Least Squares Estimates of Determinants of Time Women and Mother Devote to Daily Indirect Care, Active Childcare, and Supervisory Childcare Time in Households with at Least One Child Under 10

	Indirect Care		Active Childcare		Supervisory Childcare	
	Women	Mothers	Women	Mothers	Women	Mothers
Household structure						
Total <5	7.5***	5.53*	54.81***	64.51***	27.26***	23.09***
	(2.35)	(3.19)	(1.61)	(2.30)	(3.40)	(5.08)
Total 6-10	14.54***	20.69***	-11.46***	-18.21***	10.35***	4.85
	(2.26)	(2.99)	(1.55)	(2.16)	(3.26)	(4.76)
Total female children 11-17	3.95	16.01***	-9.99***	-9.41***	-15.49***	-20.05***
	(2.94)	(3.72)	(2.01)	(2.69)	(4.24)	(5.93)
Total male children 11-17	8.19***	14.73***	-7.31***	-13.2***	-9.97**	-18.92***
	(3.01)	(3.87)	(2.06)	(2.80)	(4.35)	(6.17)
Total other 18+ women	-47.6***	-36.57***	-21.89***	-6.28**	-48.41***	-23.51***
	(1.98)	(3.78)	(1.35)	(2.73)	(2.86)	(6.03)
Time spent in other work						
Wage work (average minutes/day)	-0.18***	-0.2***	-0.06***	-0.07***	-0.1***	-0.11***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Own consumption (average minutes/day)	0.75***	0.6***	0.1***	0.06	0.14**	0.07
	(0.05)	(0.06)	(0.03)	(0.04)	(0.07)	(0.09)
Rural	9.4**	6.38	-2.07	-5.02	-14.4**	-17.9**
	(4.49)	(5.57)	(3.08)	(4.02)	(6.50)	(8.87)
Domestic servant	-32.66***	-37.13***	13.83**	22.19***	24.14*	37.37**
	(10.07)	(11.85)	(6.90)	(8.55)	(14.56)	(18.88)
Education						
No education	-48.5***	-8.73	-49.48***	-1.06	-116.6***	-105.23***
	(7.95)	(13.73)	(5.45)	(9.92)	(11.49)	(21.89)
Primary	-2.95	-1.83	-22***	-7.83*	-43.46***	-23.7***
	(4.48)	(5.67)	(3.07)	(4.09)	(6.48)	(9.03)

	Indirect Care		Active Childcare		Supervisory Childcare	
	Women	Mothers	Women	Mothers	Women	Mothers
High school	-11.03**	2.7	13.7***	14.09***	-17.05***	-19.65**
	(4.57)	(5.61)	(3.13)	(4.05)	(6.60)	(8.95)
College and above	-32.04***	-15.27**	26.49***	27.73***	-3.73	-1
	(5.75)	(7.20)	(3.94)	(5.20)	(8.31)	(11.47)
Monthly household income						
Less than 50% median income	-12.74***	-10.52**	3.49	2.82	12.08*	14.83*
	(4.50)	(5.27)	(3.08)	(3.81)	(6.50)	(8.40)
Over 150% of median income	15.21***	0.05	-6.63**	-4.81	0.54	10.5
	(4.27)	(5.94)	(2.93)	(4.29)	(6.17)	(9.46)
Constant	341.71***	341.43***	88.71***	90.04***	240.56***	254.94***
	(4.80)	(6.09)	(3.29)	(4.40)	(6.94)	(9.71)
F statistic	131.66	61.78	151.42	107.51	46.54	11.41
p-value of F-stat	0	0	0	0	0	0
R squared	0.2	0.16	0.23	0.25	0.08	0.03
Number of Observations	7689	4755	7689	4755	7689	4755

Source: Mexico TUS 2014. The dependent variable is expressed as average unconditional minutes per day.
Secondary education describes completion of grades 7-10, while high school describes completion of grades 11-13. The omitted categories are 'secondary' for education and '50% to 150% of median income' for household income. Sampling weights provided in the dataset used to weight all estimates. * p<0.10, ** p<0.05, *** p<0.01

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6 APPENDIX

APPENDIX A1:

Specific Activity Codes for Unpaid Direct and Supervisory Care of Household and Non-Household Members

Szalai (1972)

20 Care to babies

21 Care to older children

22 Supervision of schoolwork (exercises and lessons)

23 Reading of tales or other non-school books to children, conversations with children

24 Indoor games and manual instruction

25 Outdoor games and walks

26 Medical care (visiting the children's doctor or dentist, or other activities related to the health of children).

27 Others

29 Travel to accompany children including waiting for means of transport

International Classification of Activities for Time Use Surveys (ICATUS) (based on UNSD, 2017)

4 Unpaid caregiving services for household and family members

41 Childcare and instruction

411 Caring for children including feeding, cleaning, physical care

412 Providing medical care to children

413 Instructing, teaching, training, helping children

414 Talking with and reading to children

415 Playing and sports with children

416 Minding children (passive care)

417 Meetings and arrangements with schools and child care service providers

419 Other activities related to childcare and instruction

42 Care for dependent adults

421 Assisting dependent adults with tasks of daily living

422 Assisting dependent adults with medical care

423 Assisting dependent adults with forms, administration, accounts

424 Affective/emotional support for dependent adults

425 Passive care of dependent adult

426 Meetings and arrangements with adult care service providers

429 Other activities related to care for dependent adults

43 Help to non-dependent adult household and family members
431 Feeding, cleaning, physical care for non-dependent adult household and family members including for temporary illness
432 Affective/emotional support for non-dependent adult household and family members
439 Other activities related to care for non-dependent adult household and family members

44 Travelling and accompanying goods or persons related to unpaid caregiving services for household and family members
441 Travelling related to care-giving services for household and family members
442 Accompanying own children
443 Accompanying dependent adults
444 Accompanying non-dependent adult household and family members

49 Other activities related to unpaid caregiving services for household and family members
490 Other activities related to unpaid caregiving services for household and family members

51 Unpaid direct volunteering for other households
511 Unpaid volunteer household maintenance, management, construction, renovation and repair
512 Unpaid volunteer shopping/purchasing goods and services
513 Unpaid volunteer childcare and instruction
514 Unpaid volunteer care for adults
515 Unpaid volunteer unpaid help in enterprises owned by other households
519 Other activities related to direct unpaid volunteering for other households

Harmonized European Time Use Survey (HETUS) Codes for Direct Care (EUROSTAT 2019)

38 CHILD CARE
381 Physical care and supervision
382 Teaching the child
383 Reading, playing and talking with child
384 Accompanying child
389 Other or unspecified childcare

39 HELP TO AN ADULT FAMILY MEMBER
(Codes at three-digit level, 391, 392 and 399, are voluntary)
391 Physical care of a dependent adult household member
392 Other help to a dependent adult household member
399 Help to a non-dependent adult household member

42 INFORMAL HELP TO OTHER HOUSEHOLDS
421 Construction and repairs as help
422 Help in employment and farming
423 Care of own children living in another household
424 Other child care as help to another household
425 Help to an adult of another household
429 Other or unspecified informal help to another household

Classification of Time-Use Activities for Latin America and the Caribbean (Clasificación de Actividades de Uso del Tiempo para América Latina y el Caribe, CAUTAL) (CEPAL 2016)

In original Spanish

4 Trabajo de cuidado no remunerado a miembros del hogar
41 Cuidado a miembros del hogar de 0 a 14 años
411 Cuidado y apoyo a miembros del hogar de 0 a 14 años
4111 Dar de comer a miembros del hogar de 0 a 14 años
4112 Cargar y acostar a miembros del hogar de 0 a 14 años
4113 Bañar, asear o arreglar a miembros del hogar de 0 a 14 años
4114 Jugar, conversar o leer con miembros del hogar de 0 a 14 años
4115 Estar pendiente de miembros del hogar de 0 a 14 años
412 Cuidado temporal de salud a miembros del hogar de 0 a 14 años
413 Apoyo escolar o de aprendizaje a miembros del hogar de 0 a 14 años
4131 Apoyo en tareas escolares a miembros del hogar de 0 a 14 años
4132 Asistir a juntas, festivales u otras actividades de apoyo escolar o de aprendizaje de los miembros del hogar de 0 a 14 años
414 Acompañamiento y traslados de miembros del hogar de 0 a 14 años
4141 Acompañamiento y traslados a guarderías o centros de enseñanza a miembros del hogar de 0 a 14 años
4142 Acompañamiento y traslados a centros de atención de salud a miembros del hogar de 0 a 14 años

4140 Acompañamiento y traslados a cualquier otro lugar a miembros del hogar de 0 a 14 años

410 Otras actividades de cuidado y apoyo a miembros del hogar de 0 a 14 años

42 Cuidado a miembros del hogar de 15 a 59 años

421 Cuidado y apoyo a miembros del hogar de 15 a 59 años

422 Cuidado temporal de salud a miembros del hogar de 15 a 59 años

423 Acompañamiento y traslados a miembros del hogar de 15 a 59 años

423 Acompañamiento y traslados a centros de atención de salud a miembros del hogar de 15 a 59 años

4230 Acompañamiento y traslados a cualquier otro lugar a miembros del hogar de 15 a 59 años

420 Otras actividades de cuidado y apoyo a miembros del hogar de 15 a 59 años

43 Cuidado a miembros del hogar de 60 años y más

431 Cuidado y apoyo a miembros del hogar de 60 años y más

432 Cuidado temporal de salud a miembros del hogar de 60 años y más

433 Acompañar, llevar o recoger a miembros del hogar de 60 años y más para que reciban servicios de cuidado y apoyo

4331 Acompañamiento y traslados a centros de atención de salud a miembros del hogar de 60 años y más

4332 Acompañamiento y traslados para gestiones legales, administrativas y financieras a miembros del hogar de 60 años y más

4330 Acompañamiento y traslados a cualquier otro lugar a miembros del hogar de 60 años y más

430 Otras actividades de cuidado y apoyo a miembros del hogar de 60 años y más

44 Cuidado a miembros del hogar con discapacidad o dependencia permanente (todas las edades)

441 Cuidado a miembros del hogar con discapacidad o dependencia permanente

4411 Dar de comer, bañar y arreglar a miembros del hogar con discapacidad o dependencia permanente

4412 Jugar, conversar o leer con miembros del hogar con discapacidad o dependencia permanente

4113 Estar pendiente de miembros del hogar con discapacidad o dependencia permanente

4410 Otras actividades de cuidado a miembros del hogar con discapacidad o dependencia permanente

442 Cuidado de salud a miembros del hogar con discapacidad o dependencia permanente

4421 Cuidado temporal de salud a miembros del hogar con discapacidad o dependencia permanente

4422 Cuidado permanente de salud a miembros del hogar con discapacidad o dependencia permanente

443 Acompañamiento y traslado a algún lugar a miembros del hogar con discapacidad o dependencia permanente

4431 Acompañamiento y traslado a centros de atención de salud a miembros del hogar con discapacidad o dependencia permanente

4430 Acompañamiento y traslado a cualquier otro lugar a miembros del hogar con discapacidad o dependencia permanente

440 Otras actividades de cuidado a miembros del hogar con discapacidad o dependencia permanente

5 Trabajo no remunerado para otros hogares, para la comunidad y voluntario

51 Trabajo no remunerado para otros hogares

511 Quehaceres domésticos no remunerado para otros hogares

512 Trabajo de cuidado no remunerado a personas de otros hogares

510 Otras actividades no remuneradas de ayuda a otros hogares

52 Trabajo no remunerado para la comunidad

521 Trabajo no remunerado para mejora de la comunidad

522 Trabajo no remunerado para la vida social de la comunidad

520 Otro trabajo no remunerado de apoyo a la comunidad

53 Trabajo voluntario en instituciones sin fines de lucro

531 Trabajo voluntario en actividades de salud

532 Trabajo voluntario en actividades de educación

530 Otras actividades

Author's Translation

4 Unpaid care work for household members

41 Caring for household members ages 0 to 14

411 Care and support for household members ages 0 to 14

4111 Feeding household members ages 0 to 14

4112 Carrying and putting to bed household members ages 0 to 14 years

4113 Bathing or grooming household members ages 0 to 14 years

4114 Playing, talking with or reading to household members ages 0 to 14

4115 Paying attention to household members ages 0 to 14 years

412 Temporary health care for household members ages 0 to 14

413 School or apprenticeship support to household members ages 0 to 14

4131 Support in homework for household members ages 0 to 14

4132 Attending meetings, festivals or other school support activities of the members of the household ages 0 to 14

414 Accompaniment and transport of household members ages 0 to 14

4141 Association and transport to day-care centers or educational centers of household members ages 0 to 14 years

4142 Accompaniment and transport to health care centers of household members ages 0 to 14 years

4140 Accompaniment and transport to any other place of household members ages 0 to 14

410 Other care and support activities for household members ages 0 to 14

42 Care for household members ages 15 to 59

421 Care and support for household members ages 15 to 59

422 Temporary health care for household members ages 15 to 59

423 Accompaniment or transport of household members ages 15 to 59

4231 Accompaniment or transport to health care centers of household members ages 15 to 59

4230 Accompaniment or transport to any other place of household members ages 15 to 59

420 Other care and support activities for members of the household aged 15 to 59 years

43 Care for household members aged 60 and over

431 Care and support for household members aged 60 and over

432 Temporary health care for household members age 60 and older

433 Accompanying, taking or picking up household members ages 60 and over to receive care and support services

4331 Accompanying or transporting household members ages 60 and over to health care centers

4332 Accompanying or transporting household members ages 60 and over for legal, financial or administrative procedures

4330 Accompanying or transporting household members ages 60 and over to any other place

430 Other care and support activities for household members ages 60 and over

44 Caring for household members with a disability or permanent dependence (all ages)

441 Caring for household members with a disability or permanent dependence

4411 Feeding, bathing, or grooming household members with a disability or permanent dependence

4412 Playing or talking with or reading to w household members with a disability or permanent dependence

4413 Paying attention to household members with disability or permanent dependence

4410 Other care activities for household members with a disability or permanent dependence

442 Health care for household members with a disability or permanent dependence

4421 Temporary health care for household members with a disability or permanent dependence

4422 Permanent health care for household members with a disability or permanent dependence

443 Accompanying or transporting household members with a disability or permanent dependence

4431 Accompanying or transporting household members with a disability or permanent dependence to health care centers

4430 Accompanying or transporting household members with a disability or permanent dependence to any other place

440 Other care activities for household members with a disability or permanent dependence

5 Unpaid or volunteer work for other households or the community

51 Unpaid work for other households

511 Unpaid housework for other households

512 Unpaid care work for people from other households

510 Other unpaid activities to help other households

52 Unpaid work for the community

521 Unpaid work for community improvement

522 Unpaid work for the social life of the community

520 Other unpaid work in support of the community

53 Volunteer work for non-profit institutions

531 Volunteer work in health activities

532 Volunteer work in education activities

530 Other activities

APPENDIX TABLE A.2

Average Minutes Per Day in Care Activities on Diary Day in South Africa, Conditional on Participation, Constrained vs. Unconstrained Measures

	South Africa 2010 Constrained to 24 hours (1)		South Africa 2010 Unconstrained (2)		% Difference (3)	
	W	M	W	M	W	M
All households						
Indirect care	234	131	247	138	6%	5%
Direct care of household children	103	76	113	91	10%	20%
Direct care of non-household children	100	137	108	142	8%	4%
Direct care for household adults reported elderly (75+), sick or disabled	70	55	73	61	4%	11%
Direct care for non-household adults	140	180	141	183	1%	2%
Total Direct Care	413	448	435	477	5%	6%
Households with at least 1 child <10						
Indirect care	244	126	259	133	6%	6%
Direct care of household children	108	74	120	84	11%	14%
Direct care of non-household children	55	30	58	30	5%	0%
Direct care for household adults reported elderly (75+), sick or disabled	59	55	62	58	5%	5%
Direct care for non-household adults	68	503	69	503	1%	0%
Total Direct Care	290	662	309	675	6%	6%
Mothers and fathers of children in households with at least 1 child <10						
Indirect care	255	125	273	132	7%	6%
Direct care of household children	114	73	126	81	11%	11%
Direct care of non-household children	43	.	44	.	2%	
Direct care for household adults reported elderly (75+), sick or disabled	56.	47	58	48	4%	2%

	South Africa 2010 Constrained to 24 hours (1)		South Africa 2010 Unconstrained (2)		% Difference (3)	
	W	M	W	M	W	M
Direct care for non-household adults	85	.	85	.	0%	
Average Total Direct Care	298	120	313	129	5%	8%
At least 1 household member 75+						
Indirect care	230	128	244	134	6%	5%
Direct care of household children	103	72	114	82	11%	14%
Direct care of non-household children	120	30	120	30	0%	0%
Direct care for household adults reported elderly (75+), sick or disabled	79	55	82	56	4%	2%
Direct care for non-household adults	.	269	.	269		0%
Total Direct Care	298	426	316	437	5%	3%
At least one probable dependent (child under 10 OR elderly 75+, OR with disability or illness*						
Indirect care	230	112	250	115	9%	3%
Direct care of household children	91	50	103	53	13%	6%
Direct care of non-household children	.	30	.	30	.	0%
Direct care for household adults reported elderly (75+), sick or disabled	87	49.	89	49	2%	0%
Direct care for non-household adults	.	503	.	502	0%	0%
Total Direct Care	178	632	192	634	8%	0%

APPENDIX TABLE A.3

Ordinary Least Squares Regression of Distinct Activity Types on Reporting of Activity Hours Greater than 168 Per Week

Dependent variable: total activity hours (including sleep) per week exceeding threshold			
Mexico			
	All	Women	Men
Active direct care	0.884***	0.889***	0.885***
Supervisory care	0.927***	0.938***	0.992***
Indirect care	0.605***	0.545***	1.236***
Volunteer work	0.891***	0.891***	0.917***
Paid employment	0.502***	0.579***	0.417***
Production for own consumption	0.645***	0.682***	0.588***
Constant	-46.28***	-47.24***	-46.62***
F statistic	4365	3217	1471
p-value of F-stat	0.000	0.000	0.000
R squared	0.341	0.418	0.272
N	42118	22407	19711
Ecuador			
	All	Women	Men
Active direct care	0.908***	0.894***	1.260***
Supervisory care	1.031***	1.037***	1.258***
Indirect care	0.753***	0.720***	1.291***
Volunteer work	1.361***	1.318***	1.452***
Paid employment	0.472***	0.579***	0.338***
Production for own consumption	0.882***	0.906***	0.739***
Constant	-50.28***	-52.68***	-47.83***
F statistic	6929	5030	2077
p-value of F-stat	0.000	0.000	0.000
R squared	0.402	0.488	0.292
N	61979	31722	30257

***statistically significant at .001 level

APPENDIX TABLE A.4

Crosswalk of Care Activity Codes Across Six Surveys

Care categories and detailed survey activity codes				
	Mexico 2014[a]	Ecuador 2012[b]	South Africa 2010[c]	Ghana 2009[d]
Direct care for household children				
Physical care	Weekly time dedicated to the feed children aged 0-5	61-Time to feed a child under 12 years of age	511 Physical care of children: washing, dressing, feeding – mentioned spontaneously	7111 Caring for children/ physical care
	Weekly time dedicated to the bathing/cleaning children 0 to 5 years	62-Time to bathe and / or dress a child under 12 years of age	512 Physical care of children: washing, dressing, feeding – not mentioned spontaneously	
	Weekly time dedicated to put children aged 0-5 to bed			
Developmental care	Give learning therapy to children aged 0-14	63-Time to play, talk with a child under 12 years of age	521 Teaching, training and instruction of household's children – mentioned spontaneously	7112 Teaching, training, helping children
		64-Time to perform or practice exercises for children under 12 years of age	522 Teaching, training and instruction of household's children – not mentioned spontaneously	
Other care	Attendance at school events for children aged 0-14	66-Time to attend school meetings of household members		
	Accompany children aged 0-14 to places where they are taken care of	68-Time to take or accompany member to some educational center	531 Accompanying children to places: school, sports, lessons, etc. – mentioned spontaneously	7113 Accompanying children to places
	Accompany children aged 0-14 for medical care		532 Accompanying children to places: school, sports, lessons, etc. – not mentioned spontaneously	
			590 Care of children, the sick, elderly and disabled in the household not elsewhere classified	7900 Providing unpaid caregiving services to household members n.e.c

Care categories and detailed survey activity codes				
	Mexico 2014[a]	Ecuador 2012[b]	South Africa 2010[c]	Ghana 2009[d]
Direct care for household children				
Supervisory care	Helps children aged 0-14 to complete school tasks	67-Time to help or be on the lookout for some child's homework	561 Supervising children and adults needing care – mentioned spontaneously	7114 Minding children (passive care)
	Weekly time dedicated to the passive care of children aged 0-14	65-Time to be aware of some child or child of the home while doing other activities	562 Supervising children and adults needing care – not mentioned spontaneously	
Direct care for non-household children				
	Weekly time dedicated to free support to other homes in the care of children under 6 years,	104 - Weekly time dedicated to teaching classes for free	671 Caring for non-household children – mentioned spontaneously	8116 Childcare as help to other households
			672 Caring for non-household children – not mentioned spontaneously	
Direct care for household adults who are elderly, sick or disabled				
Care for the elderly	Weekly time dedicated to advising household members 60+		540 Physical care of the sick, disabled, elderly household members: washing, dressing, feeding, helping	7121 Caring for adults/ physical care
	Weekly time dedicated to accompany household members 60+ for healthcare			
	Weekly time dedicated to the accompany/travel with household members 60+			
	Weekly time dedicated to the care of people aged 60 and over			7122 Caring for adults/ emotional support

Care categories and detailed survey activity codes				
	Mexico 2014[a]	Ecuador 2012[b]	South Africa 2010[c]	Ghana 2009[d]
Direct care for household adults who are elderly, sick or disabled				
Care for the sick		69-Time to accompany, take or pick up sick people from home to receive attention		7114 Minding children (passive care)
		72-Time to care for sick members of the household		
		73-Time to accompany sick people to hospital, health centers		7123 Accompanying adults to places
		74-Time to accompany sick people to visit midwives, therapists	550 Accompanying adults to receive personal care services: such as hairdresser's, therapy sessions, etc.	
		75-Time to prepare home remedies for household members		
Care for the disabled	Weekly time dedicated to feed disabled household members	124-Weekly time to feed a member with a disability		7200 Travel related to unpaid caregiving services to household members
	Weekly time dedicated to the care in the cleanliness or adjustment to disabled	125-Weekly time in bathing, cleaning, dressing some member with disabilities		
	Weekly time dedicated to load, bed or help disabled,	127-Weekly time to care at night for a member with a disability		
	Weekly time dedicated to the preparation of remedy or special food for disabled	129-Weekly time in preparing some special food for some member with disabilities		
	Weekly time dedicated to the health care of disabled,	131-Weekly time in cleaning room member with home disability		

Care categories and detailed survey activity codes				
	Mexico 2014[a]	Ecuador 2012[b]	South Africa 2010[c]	Ghana 2009[d]
Direct care for household adults who are elderly, sick or disabled				
Care for the disabled		132-Weekly time in washing and / or ironin –g the clothes of some member with disabilities	580 Travel related to care of children, the sick, elderly and disabled in the household	
	Weekly time dedicated to the transfer for medical attention or therapy to disabled	130-Weekly time to take or accompany the medical service to a member with disabilities		
	Weekly time dedicated to give therapy or support in the execution of exercises to disabled	126-Weekly time in practicing special therapies to some member with disabilities		
	Weekly time dedicated to transfer to school, work or other disabled			
	Weekly time dedicated to support in work or school activities for disabled			
	Weekly time dedicated to attend school events or festivals of disabled people			
		128-Weekly time in supervising being aware of some member with disability of the household		
Direct care for non-household adults				
	Weekly time dedicated to free support to other homes in the care of disabled	99 - Weekly time in free care of people in other homes	673 Caring for non-household adults	8117 Adult care as help to other households
	Weekly time dedicated to the free support to other homes in the care of people from 6 to 59 years,			
	Weekly time dedicated to free support to other homes in the care of people aged 60 and over,			

Care categories and detailed survey activity codes				
	Mexico 2014[a]	Ecuador 2012[b]	South Africa 2010[c]	Ghana 2009[d]
Indirect care				
	Weekly time dedicated to the preparation of tortillas	15-Time to cook or prepare food for the home	410 Cooking, making drinks, setting and serving tables, washing up	6111 Food management
	Weekly time dedicated to lighting the stove, oven or another device	16-Time to serve food, set table at home	420 Cleaning and upkeep of dwelling and surroundings	6112 Cleaning and upkeep of dwelling and surroundings
	Weekly time dedicated to cooking, preparing or heating food or beverages	17-Time to wash, dry, household crockery	430 Care of textiles: sorting, mending, washing, ironing and ordering clothes and linen	6113 Do-it-yourself decoration, maintenance and small repairs
	Weekly time dedicated to serving food, washing dishes and organizing them	18-Kitchen cleaning time or kitchen place in home	440 Shopping for personal and household goods	6114 Care of textiles and footwear
	Weekly time dedicated to the transfer for delivery of food at school or work	22-Time to bring food to members at home, work, school, hospital	441 Accessing government service, such as collecting pension, going to post office	6115 Household management
	Weekly time dedicated to the exterior cleaning of the house	23-Time to light a wood or coal fire	448 Waiting to access government service	6116 Pet care
	Weekly time dedicated to the interior cleaning of the house	31-Time to lay a bed or pick up where you sleep at home	450 Household management: planning, supervising, paying bills, etc.	6121 Shopping for/ purchasing of goods and related activities
	Weekly time dedicated to the elimination of garbage	32-Time to clean the bathroom / home	460 Do-it-yourself home improvements and maintenance, installation, servicing and repair of personal and household goods	6122 Shopping for/ availing of services and related activities
	Weekly time dedicated to the care of plants	33-General house cleaning time	470 Pet care	6200 Travel related to provision of unpaid domestic services
	Weekly time dedicated to the care of pets	35-Time to warm water to bathe	480 Travel related to household maintenance, management and shopping	
	Weekly time dedicated to cleaning clothes	36-Time to wash vehicle or animal transport home	490 Household maintenance, management and shopping not elsewhere classified	
	Weekly time dedicated to ironing clothes	37-Time for pet care of the home	491 Chopping wood, lighting fire and heating water not for immediate cooking purposes	

Care categories and detailed survey activity codes				
	Mexico 2014[a]	Ecuador 2012[b]	South Africa 2010[c]	Ghana 2009[d]
Indirect care				
	Weekly time dedicated to organizing and storing clothes	38-Time in home gardening activities		
	Weekly time dedicated to repair clothes	39-Time to throw away household trash		
	Weekly time dedicated to shoe cleaning	40-Time to wash or clean shoes of household members		
	Weekly time dedicated to the repair or maintenance of housing	41-Time to wash clothes for household members		
	Weekly time dedicated to the repair of furniture or belongings	42-Time to iron clothes for household members		
	Weekly time dedicated to vehicle cleaning	43-Time to bring or remove washing service clothes		
	Weekly time dedicated to the repair or maintenance of vehicle	44-Time to fold, save clothes household members		
	Weekly time dedicated to the search or purchase of spare parts, tools, house or car of vehicle	46-Time to make periodic purchases for the home		
	Weekly time dedicated to the search or purchase of articles of perishable consumption	47-Time to make daily purchases for the home		
	Weekly time dedicated to the search or purchase of items or goods for the home	48-Time to make purchases of medications for household members		
	Weekly time dedicated to making payments or homework	49-Time to buy school supplies, clothes or shoes for household members		
	Weekly time dedicated to the administration of economic resources of the home	50-Time to buy household utensils		
	Weekly time dedicated to the processing or collection of social programs	51-Time to buy orthopedic appliances for household members		
	Weekly time dedicated to the transfer of clothes or shoes for cleaning or repair	52-Time to buy or carry out procedures to acquire housing, land or vehicles		

	Care categories and detailed survey activity codes			
	Mexico 2014[a]	Ecuador 2012[b]	South Africa 2010[c]	Ghana 2009[d]
	Weekly time dedicated to supervision of work in the house	53-Time to make payments for basic household services		
	Weekly time dedicated to the transfer for repair of furniture, appliances or toys	54-Time to make necessary payments of the household or its members		
	Weekly time dedicated to supervision of work in the house	53-Time to make payments for basic household services		
	Weekly time dedicated to the transfer for repair of furniture, appliances or toys	54-Time to make necessary payments of the household or its members		
	Weekly time dedicated to the transfer for cleaning or maintenance of means of transport	55-Time in ordering important roles of household members		
	Weekly time dedicated to the application of protection measures	56-Time to organize, supervise chores of the home		
	Weekly time dedicated to the attention or waiting for a service	57-Time to carry and decide on household income and expenses accounts		
	Weekly time dedicated to the organization of household chores	58-Time to secure housing and home vehicle		
		59-Time in home moving activities		
		60-Time to accommodate spaces in the home		
		77-Time to make repairs in the home of the home		
		78-Time to supervise a repair of home of the home		
		79-Time to bring, fix or help repair home vehicle		
		80-Time to bring, help repair household electrical appliances		
		70-Time to take or pick up a member of the work home		
		71-Time to accompany a member of the household to a special class		

	South Korea 2014	China 2017
Physical care	511 Physical care of cohabiting child under the age of 10	070101 Care for children under 18 years of age: washing, dressing, feeding, medical care
	514 Providing medical care of cohabiting child under the age of 10	
	521 Physical care of cohabiting child age of 10 or above	
	514 Providing medical care of cohabiting child age 10 or above	
Developmental care	512 Educational activities with young children LT 10	070102 Helping children under 18 of age do homework
	513 Reading and playing with young children LT 10	070103 Supervising children under 18 years of age doing homework or practice exercises
	513 Reading and playing with young children LT 10	070104 Reading books (paper or electronic) to or with children under 18 years of age
Other care	612 Volunteering for children's education related	070177 Waiting for children to complete school activity
	851 Travel related to care of household members	070188 Taking or accompanying children to some educational center, attending parents meeting, participating school organized activity
	519 Other care of child under the age of 10	070199 Commuting time for childcare related activity
		070105 Watching TV with children under 18 years of age
		070106 Playing with children under 18 years of age
		070107 Looking after children who are playing indoors or outdoors, keeping them in a safe environment and supervising them when playing games
		070108 Supervising baby-sitter activity
Direct care for non-household children		
	571 Physical care of non-cohabiting family members except parents and grandparents	070301-- 070399 Same activity categories for non-household children under 18 years of age as for household children
	579 Other care of non-cohabiting family members except parents and grandparents	
	852 Travel related to care of non-household family members	
Direct care for household adults who are elderly, sick or disabled		
Care for the elderly	531 Providing medical care for spouse	070201 Care for adults' daily life including feeding, dressing, personal hygiene assistance
	539 Other caring activities for spouse	070202 Medical care for adults
	541 Providing medical care for parents or grandparents	070203 Accompanying adults doing outdoor activities (taking a walk, visiting relatives, going shopping, going to movie)
	549 Other caring activities for parents	070288 Other adult care activity
	551 Other medical care activities for family	070299 Adult care related commuting time
	559 Other caring activities for family	
	551 Other medical care activities for family	
	559 Other caring activities for family	
Care for the sick or disabled		

	South Korea 2014	China 2017
Direct Care for Non-Household Adults		
	561 Medical care for non-household parents	070401 – 070499: the same activity categories for non-household adults as for household adults
	569 Other caring activities for non-household parents	
Indirect Care		
	411 Preparing a meal	06011 Cooking regular meals
	412 Preparing a snack	060102 Cooking with quick-frozen foods and semi-finished products
	413 Cleaning after a meal	060201 Cleaning activities such as washing dishes and brushing pots based on hand washing
	414 Receiving food service	060212 Washing dishes and brushing pots based on machine washing
	421 Doing Laundry	060301 Indoor cleaning
	422 Sewing	0600401 Laundry, brushing shoes
	423 Using clothing repair and cleaning services	060402 Ironing, organizing and storing clothing
	431 Cleaning interiors of house	060403 Sewing clothing and hand weaving
	432 Organizing stuff in the room	060501 Feeding, cleaning, walking pets
	434 Taking trash out	060502 Pet treatment, beauty and breeding
	441 Repair and Improvements of interior and exterior	060601 Decoration or repair of house
	442 Repair interior and appliances	060602 Production, installation, commissioning and repair of personal and household items
	443 Exterior repair services	060603 Maintenance and repair of vehicles
	444 Interior repair services	060704 Maintenance and repair of small appliances
	451 Vehicle repair and maintenance	060701 Arrangement of family affairs
	452 Using services for vehicle repair and maintenance	068888 Other household activities
	461 Pet care	069999 Related transportation activities
	462 Plant care	
	463 Pet and plant care services	
	471 Shopping offline	
	472 Shopping online	
	473 Service purchase offline	
	474 Service purchase online	
	479 Other shopping activities	
	491 Balancing checkbook and paying bills	
	492 Using bank services	
	493 Using public office services	
	499 Other household management activities	
	841 Travel related to household management	

a. Detailed activity descriptions are obtained from the metadata are translated from Spanish. Care categories pertaining to adults 15-59 are excluded (there are 3 such categories: advice, travel, and travel related to health care for 15-59) as these adults are neither elderly nor sick nor disabled.

b. Detailed activity descriptions are obtained from variable labels in the dataset translated from Spanish.

c. Code 580 ("Travel related to care…") was placed under direct care for household sick, disabled and elderly instead of "direct care for household children" since "accompanying children" already has its own code. Also note that code 590 was placed under "other care" for household children despite the recipient of care being ambiguous.

d. Follows the decision made for the South African survey where we include "NEC" care for household members under care for children. Codes 7121-7200 are placed under direct care for household adults who are elderly, sick or disabled despite the fact that the codes do not specify if the recipients are elderly, sick or disabled.

APPENDIX B

METHODOLOGICAL ISSUES WITH THE 2009 TIME USE SURVEY OF GHANA

This survey seems to have adopted unusual measures in coding activity duration and applying ICATUS categories, and also includes many households with missing individual diaries, as indicated below.

1. Activity duration

The TUS data contains two measures of the duration of an activity (termed here Measure 1 and Measure 2 for consistency with the South African procedures) Measure 1 splits the time in which simultaneous activities have been recorded and assigns them equally to each activity (so reading and eating as simultaneous activities in a one-hour slot are assigned 30 minutes each). Measure 2 gives each activity the full time (so both reading and eating are assigned 60 minutes each).

Measure 1 appears to have been adjusted such that if all activities within a time slot do not sum up to an hour, the time shortfall is made up by adding equal amounts of time to each activity. For example, if the time slot from 7 am to 8 am has the activities reading and eating that are assigned 25 minutes each under Measure 2 (which records time spent as it is reported), then Measure 1 assigns them 30 minutes each (by adding 5 minutes to each).

As an example, the observations below are taken from the diary of a 28-year old woman between 10AM and 12AM. Between 10 to 11AM she was engaged in housework and direct care as simultaneous activities. Measure 1 assigns them 30 minutes each while measure 2 assigns them 60 minutes each. Between 11 to 12AM her diary records that she was engaged in personal care followed by direct care followed again by personal care as sequential (not simultaneous) activities. Measure 2—which is presumably how she reported them—records these activities as taking 20, 20 and 10 minutes each. It obviously falls short of an hour by 10 minutes. Measure 1 splits the difference (3.3333) and adds to each activity.

Diary hour	2-digit activity code	Activity code description	Whether simultaneous	Measure 1	Measure 2
10-11	6	Providing unpaid domestic services for own final use within household	Yes	30	60
10-11	7	Providing unpaid caregiving services to household members	Yes	30	60
11-12	15	Personal care and maintenance	No	23.33333	20
11-12	7	Providing unpaid caregiving services to household members	No	23.33333	20
11-12	15	Personal care and maintenance	No	13.33333	10

Another example comes from a 15-year old boy where the activities according to Measure 2 sum up to more than one hour, and Measure 2 deals with by subtracting the excess; between 4-5PM the boy records having engaged in 3 activities non-simultaneous activities which sum up to 65 minutes. The excess (5 minutes) has been divided by 3 (=1.67) and subtracted from each activity.

Diary hour	2-digit activity code	Activity code description	Whether simultaneous	Measure 1	Measure 2
16-17	15	Personal care and maintenance	No	8.3333	10
16-17	15	Personal care and maintenance	No	13.3333	15
16-17	14	Mass media	No	38.3333	40

2. Anomalous activity codes

Documentation for the Ghana survey indicates that it followed ICATUS 2005 codes with some modifications. It lists the following 2-digit codes in its report (pages 11-12):

SNA Production	
01	Work for corporations/quasi-corporations, non-profit institutions and government (formal sector work)
02	Work for household in primary production activities
03	Work for household in non-primary production activities
04	Work for household in construction activities
05	Work for household providing services for income

Non-SNA Production	
06	Providing unpaid domestic services for own final use within household
07	Providing unpaid caregiving services to household members
08	Providing community services and help to other households
Non-Productive	
09	Learning
10	Socializing and community participation
11	Attending/visiting cultural, entertainment and sports events/venues
12	Hobbies, games and other pastime activities
13	Indoor and outdoor sports participation and related courses
14	Mass media
15	Personal care and maintenance

However, it includes both 2-digit and detailed (5-digit) codes that go well above 15 and 15900 respectively. Some of these 2-digit and corresponding detailed codes are listed in the table below. Since a total of 260 distinct codes (and 1137 such activities) go above 15900, not all are listed. These "anomalous" codes go well up to 99,200.

2-digit code	Detailed code	Frequency	Fraction of total codes
15	15906	2	0.18
15	15911	1	0.09
15	15931	3	0.26
15	15961	1	0.09
16	16100	3	0.26
16	16101	1	0.09
16	16110	1	0.09
16	16111	146	12.84
16	16112	8	0.7
16	16114	1	0.09
16	16115	5	0.44
16	16121	9	0.79
16	16122	2	0.18
16	16131	14	1.23
16	16151	4	0.35
16	16161	13	1.14
16	16164	1	0.09
16	16191	1	0.09

2-digit code	Detailed code	Frequency	Fraction of total codes
16	16200	5	0.44
16	16206	1	0.09
16	16260	1	0.09
16	16361	1	0.09
16	16411	1	0.09
16	16451	1	0.09
16	16900	1	0.09
17	17100	1	0.09
17	17110	1	0.09
17	17111	8	0.7
17	17114	4	0.35
17	17121	2	0.18
17	17122	1	0.09
17	17131	2	0.18
17	17134	2	0.18
17	17161	1	0.09
17	17300	1	0.09
17	17411	1	0.09

Moreover, there are certain codes that fall below 15900 but are not part of the detailed ICATUS codes and are also not part of the portions of detailed codes that the Ghana dataset itself provides. For example, the Ghana dataset contains detailed codes for direct care activities for household members; these are:

7111 Caring for children/physical care
7112 Teaching, training, helping children
7113 Accompanying children to places
7114 Minding children (passive care)
7121 Caring for adults/physical care
7122 Caring for adults/emotional support
7123 Accompanying adults to places
7200 Travel related to unpaid caregiving services to household members
7900 Providing unpaid caregiving services to household members n.e.c.

However, the dataset contains the following 7000-level codes ("correct" codes have been bolded, while "incorrect"/unknown codes are not bolded):

Detailed code	Frequency	Fraction of total codes
7000	1	0
7011	1	0
7100	7	0
7110	2	0
7111	**8696**	**2.63**
7112	**225**	**0.07**
7113	**251**	**0.08**
7114	**908**	**0.27**
7115	2	0
7117	7	0
7118	1	0
7119	3	0
7120	6	0
7121	**350**	**0.11**
7122	**66**	**0.02**
7123	**43**	**0.01**
7130	7	0
7131	2	0
7144	2	0
7174	1	0
7191	1	0
7200	**277**	**0.08**
7211	3	0
7300	29	0.01
7360	1	0
7700	1	0
7711	1	0
7800	1	0
7900	**57**	**0.02**

Clearly, activities are clustered around the "correct" codes (like 7111-7114, for example), but it is unclear what codes such as 7000 or 7011 or 7100 mean. They might indicate that for the latter three codes, the data entry intended to register 7111 but made a typo. One way of salvaging these codes would be to assign them to their nearest "correct" neighbor. But there is no obvious way to deal with the codes that go above 15,900.

3. Missing Diaries

Due to both individual non-response and the dropping of some observations with incomplete diaries, about 1163 households (or 28% of the 4127 households with at least one complete diary) have missing diaries. Our estimates of total household care above do not include these households.