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**The Present and Future of Time-Use Analysis in Developing Countries**

Expert paper prepared by:

Maria Floro, American University and  
Elizabeth M. King, Brookings Institute<sup>1</sup>

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<sup>1</sup> The views expressed in this paper are those of the authors and do not necessarily represent those of the United Nations.

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by

Maria S. Floro

and

Elizabeth M. King<sup>3</sup>

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<sup>2</sup> Part of the United Nations Economic and Social Commission for Asia and the Pacific Project, “Time Use and Gender Equality in Asia and the Pacific: A Data Analysis Initiative.”

<sup>3</sup> Professor of Economics, American University, Washington DC and Nonresident Senior Fellow, The Brookings Institution, Washington DC.

## **Abstract**

This paper argues that time use data can deepen our understanding of human behavior, such as how women, men and children across socioeconomic strata conduct their daily lives and make choices. It reviews previous research which show that time-use information reveals a much wider range of economic contributions from women, men and children than conventional measures of economic activities, and yields more comprehensive estimates of aggregate production. In addition, household production and caregiving contribute to all aspects of the well-being of household members, and yet typically remain unmeasured. Time-use data and analyses uncover the commonly hidden time dimensions of income poverty by exposing the time pressure faced by household members.

The effectiveness of various development policies and investments will be a major concern in the next months and years as countries and development agencies work towards the 17 SDGs. This review of time-use research shows that any assessment of that effectiveness can be enriched by documenting and analyzing how those policies and programs lead to shifts in people's time allocation. Cost-effectiveness measures of programs and investments are incomplete when they ignore the required time inputs of users. There have been major improvements in conceptualizing, collecting and analyzing time-use information. Many countries are now collecting TUD, but many more improvements are needed to address the practical difficulties that face developing countries in implementing data collection instruments.

## **I. Introduction**

There are several good reasons for the growing interest in collecting and analyzing timeuse data (TUD) in developing countries. TUD can help reveal the full extent of economic activities in the household, including its members' time on subsistence production, temporary and casual work, self-employment, domestic chores, voluntary and civic work and caregiving including time invested in children's schooling as well as visits to a health clinic. Most of these activities are typically not in the market and those that are performed for earning income may have irregular timing and duration, so it is not easy to put a monetary value on them. But by capturing both market and nonmarket economic activities, the time burden of women and children in household production and care activities, and not only that of men, is more accurately measured. TUD can capture also people's other unmeasured activities such as training, participation in various community events, and socialization, as well as transfers of time to other households for the purpose of giving care.

Because economic statistics can influence policy debates and choices, the availability of measures of all forms of work and household production and other non-market economic activities can shape economic and social policies that consider and address the time constraints faced by household members and thus better designed. For example, the level of response to an employment stimulus or workforce training program for women is likely to be constrained by lack of affordable quality care services for young children or the elderly. Men and women incur the time cost also of accessing water and fuel supply or medical services, of working or looking for work, and so on, as they perform their multiple roles. Balancing the burdens of work and household responsibilities can leave many, especially women, stressed, overworked and disenfranchised.

The Sustainable Development Goals (SDGs), officially known as *Transforming our world: the 2030 Agenda for Sustainable Development*, are a set of 17 aspirational goals (and 169 targets) adopted by the United Nations at its 2015 General Assembly. These goals do not indicate how TUD can elucidate the level of family and individual resources needed to achieve the goals, but achieving them will surely require investments of people's time. Analysis of TUD can help support the attainment of many of the SDGs and enable governments to address them strategically and systematically. This benefit go well beyond indicator 5.4.1 for monitoring the

progress on SDG Target 5.4 which explicitly calls for recognizing and valuing “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.”<sup>4</sup> While appropriate indicators for monitoring the SDG goals have already been chosen based on familiar measures and more readily available data across countries, we argue that those indicators can be enhanced by TUD because these data illuminate the processes and behavioral changes involved in reaching the SDG outcomes.

Table 1 lists some of the ways in which information on time spent by women, men and children across social and economic strata can inform the attainment and monitoring of specific SDGs. In sum, TUD are highly relevant for monitoring the progress on these development goals because:

- Measures of unpaid work provide a more comprehensive picture of women’s total economic contributions and allow a better appreciation of the tradeoffs as well as constraints faced by women regarding time use that affect their labor force participation, bargaining position in the household, and their ability to achieve a healthy work-life balance.
- Better data on work hours lead to more accurate measures of productivity, availability and nature of employment, and thus the capacity of people to earn income. They also lead to a better understanding of an important dimension of poverty, namely time poverty. These are related to the SDGs on poverty, economy and consumption.
- The differences in intensity of work as measured by hours of work, paid or unpaid, as well as work characteristics such as location and the overlap or scheduling of economic activities allow a fuller understanding of inequalities, including between genders. These are related to the SDGs on inequality and women.
- Time spent in care activities is related to the goals on productivity of the economy, consumption and health.
- Information on time spent in food preparation and gathering fuelwood and water are crucial in addressing food security and energy issues in a gender-aware manner.

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<sup>4</sup> Indicator 5.4.1 involves the estimation of the “percentage of time spent on unpaid domestic and care work, by sex, age group and location” (UN Economic and Social Council, 2016).

Table 1. How time-use data can inform the attainment of the SDGs

	<b>SDG Goals</b>	<b>Links to Time-Use Data</b>
Poverty	End poverty in all its forms everywhere	Time poverty is a dimension of people’s well-being. Because poor households may have to stitch together various incomeearning activities, they face extra demands on time that are associated with job search and efforts to cope with the consequences of poverty such as collecting fuel and clean water.
Food Security	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	The time inputs spent on food production -whether growing subsistence crops, engaging in fishing, animal husbandry, and hunting for own consumption, and backyard gardening - and food preparation are crucial in meeting these objectives.
Health and Well-being	Ensure healthy lives and promote well-being for all at all ages	Time spent in accessing health care and time spent for leisure, rest, social activities, and caregiving are important inputs into healthy lives. A healthy work-life balance requires knowledge of time allocation and the ability of working women to have time for rest, leisure, and participation in organizations and community activities.
Education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for	Investments in education and skills acquisition involve the time of learners and, if the learner is young, also the time of adults (SDG target 4.2), such as when parents read to young children or help with homework. Adults may spend time acquiring skills through second-chance programs or reskilling themselves by accessing new technology (SDG target 5b). Time spent in the

	all.	adult learning and training opportunities is often unmeasured, such as attending seminars and training on sexual and reproductive health and reproductive rights (target 5.6), financial literacy (target 5a), climate change mitigation, adaptation, and impact reduction methods (target 13.3), as much as men.
Energy	Ensure access to affordable, reliable, sustainable and modern energy for all	Access to sources of energy depend not only on the availability of public physical infrastructure but also on time spent in activities that produce (e.g., collecting fuel and water), conserve (e.g., transportation choice) and use energy (e.g., cooking).
Economy and Jobs	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	TUD shed light on the choices and trade-offs that individuals and households have to make about seeking work and working. Domestic and care work limit women's ability to obtain decent market work at the same rate as men. TUD can provide information about time spent in subsistence production work and informal, non-typical, and casual forms of employment that are inadequately captured by standard labor force surveys.

Gender Equality	Achieve gender equality and empower all women and girls	TUD describe gender patterns in all activities, revealing both the amount of unpaid care and domestic work in the household and the unequal burden on men and women, and girls and boys. This information is vital for estimating indicator 5.4.1 (the percentage of time spent on unpaid domestic and care work), as well as “the promotion of shared responsibility within the household and the family” (SDG 5.4). The interaction between market and non-market economic activities and the allocation of time between productive and reproductive work allow a comprehensive assessment of the gender inequalities in the labor market and in participation in groups and organizations involved in political, economic and public
		discourses.
Inequality	Reduce inequality within and among countries	TUD can illuminate the impact of social stratification, income and wealth on the well-being of individuals and households, including on the mechanisms that they employ to cope with the burden of work and their unequal access to basic services. TUD can also reveal the impact of race, caste, ethnicity, and unequal incomes within countries, as well as the impact of different welfare regimes, social policies, and public investments on the daily lives and work of people.
Consumption	Ensure sustainable consumption and production patterns	TUD can depict consumption choices and productive behaviors of household members, such as their use of public services and common property resources. TUD can reveal new ways by which countries can shift consumption and production practices towards more sustainable regimes.

In the rest of this paper, we assess the state of existing time-use survey instruments, including what data they collect and how data are collected. We discuss some of the important changes in these instruments, identify specific areas for improving them further and suggest ways for doing

so. Finally, we review some of the literature that use TUD to demonstrate the advantages of such data for measuring economic output, understanding individual and family behaviors and informing policy. The review is meant to be illustrative, not comprehensive, of the valuable insights and assessments that can be made by analyzing TUD.

## **II. Status of Time Use Surveys and Directions for Improvement**

The collection of time-use information on how individuals allocate their time to different activities has been taking place for over a century now. The first collection of TUD was performed by Statistics Norway in 1912 to gather information about household work (Aslaksen and Koren, 1996). A few countries followed and TUD became part of social surveys that were conducted to examine the living conditions of workers and their families in the early 1920s. For example, in 1924, the USSR undertook the first systematic collection of TUD with the objective of understanding leisure time and community-oriented work (Juster and Stafford, 1991). The Bureau of Home Economics of the U.S. Department of Agriculture (USDA) also collected TUD in the 1920s for the purpose of understanding the impact of new technology on the time use of farm homemakers (Frazis and Stewart, 2007). Sweden followed in the 1930s to measure the size of the economy as constituted by the household and the market (Aslaksen and Koren, 1996).<sup>5</sup> By the 1980s, the importance of TUD as a principal source for estimating unpaid work as well as for gathering information on leisure became evident (Goldschmidt-Clermont, 1983; Chadeau, 1985), and more countries began collecting such data. As of 2015, over 85 countries around the world have conducted time use surveys.<sup>6</sup>

A number of factors have significantly contributed to the increase in TUD collection and analysis. First, with the explicit recognition of the importance of the household economy that operates alongside the market economy, there has been a significant broadening of the concept of work and economic production, and thus usefulness of TUD. Economists, development scholars and other social scientists have realized the limitations of ignoring the household economy in contexts where a substantial proportion of economic production is informal, protracted, and

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<sup>5</sup> Time use surveys were also carried out in the fifties through the seventies in other industrialized countries addressing issues such as commuting to work, use of mass media, and leisure time (Hirway, 2010: 3). In the developing countries, the earliest time use surveys were conducted by research scholars in Gambia (1952), Burkina Faso (1967), and Peru (1966) to name a few.

<sup>6</sup> United Nations Statistics Division (UNSD) Time Use Data portal.

unpaid, and thus difficult to measure with more traditional labor surveys. They have realized also that the labor participation, work hours and other life choices that people make could be better understood using information that reveal more about their time constraints and intra-household division of responsibilities (Juster and Stafford, 1985; Bittman, 1991). Their research demonstrate that such data reveal aspects of the opportunities and constraints faced by individuals that can be used to formulate gender-aware economic and social policies (Budlender, 2008).

This broader definition of work has been enshrined in the 2013 resolution of the 19<sup>th</sup> International Conference of Labour Statisticians (ICLS), an international body that makes recommendations to the ILO regarding major changes in the convention and guidelines for its measurement. This definition is broadly inclusive of productive activities—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” (ILO 2013: 2).<sup>7</sup> By recognizing that work happens in all parts of the economy, including households and communities, whether paid or unpaid, that resolution was a turning point. It broadened the existing conventions and standards regarding the concept of work.

Labor force surveys have undergone marked improvements over the years in order to provide better data about the size of the labor force and the nature of jobs, but these surveys generally still underestimate the size of the labor force and the range of productive activities, particularly the work performed by women. In particular, informal employment, which ranges from self-employed, home-based productive activities to informal sector enterprises to temporary, seasonal or casual jobs in a formal or informal businesses, and which dominate employment in many low-income countries, continues is difficult to measure with confidence.<sup>8</sup> Workers in these jobs and their work hours are notoriously difficult to pin down. For example,

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<sup>7</sup> Using a “main purpose” test, the work definition identifies five categories namely: “a) *own-use production work* comprising production of goods and services for own final use; b) *unpaid trainee work* comprising work performed for others without pay to acquire workplace experience or skills; c) *volunteer work* comprising non-compulsory work performed for others without pay; d) *employment work* comprising work performed for others in exchange for pay or profit; and e) *other work activities* such as unpaid community service and unpaid work by prisoners, as well as unpaid military or alternative civilian service” (ILO, 2013: 3).

<sup>8</sup> The 17<sup>th</sup> ICLS defined informal employment as comprising the total number of informal jobs, whether carried out in formal sector enterprises, informal sector enterprises, or households, during a given reference period (Hussmans (2004).

women's home-based market activities are typically woven seamlessly into their domestic chores -- milling flour, weaving, food cultivation, care of animals, and many others—making the delineation between market production and household work difficult to draw.

Second, the United Nations agencies have been instrumental in putting the question of accounting for unpaid work, especially women's, in the policy agenda of member countries, thereby making it necessary for countries to collect time use data. Owing to four UN World Conferences on Women during the two decades of 1975-1995 and the follow-up mechanisms and related conventions, a significant consensus was reached at the 4<sup>th</sup> World Conference on Women in Beijing about the need to measure unpaid work because of its relevance to women's welfare. In addition, other global landmarks worth mentioning are: the recognition of gender equality and women's empowerment as a key Millennium Development Goal (MDG) and a post2015 Sustainable Development Goal (SDG), the already-mentioned 2013 ICLS resolution for measuring work to include unpaid work, and, the inclusion of the share of unpaid work by women and men as an indicator for monitoring progress towards the SDGs.

Nonetheless, the propensity to underreport unpaid family workers and casual, temporary or seasonal (wage) labor in agriculture, informal enterprises, as well as formal enterprises, is widespread across countries. This underestimation issue arises when surveys such as censuses classify workers according to their "main occupation," which would often result in women being recorded as housewives and thus not in the labor force. Although gradually remedied in 1993 with the refinement of the labor force definition to include unpaid family workers, the continuing bias in perception has resulted in the underestimation of women's economic contribution. This measurement error is larger in labor markets that are characterized by significant informal employment especially in casual and irregular jobs. Thus, although the estimation and valuation of subsistence production and informal sector activities were included in the System of National Accounts (SNA) in 1993, there were practical difficulties in implementing it (UN 1993). A relatively recent phenomenon that is likely to increase this underestimation is the spread of mobile technologies which has allowed the place and times of work to take place outside offices and shops and outside traditional work hours. The growth of the service sector also has made atypical work schedules (shift work, long, or dispersed hours) more common.

Third, social scientists, particularly time-use researchers, have been developing different methods since the 1980s to address many of the challenges and difficulties of TUD collection and measurement (Bittman, 1991; Gershuny and Robinson, 1988; Ironmonger, 1996; Gershuny, 2011). TUD are generally collected in four ways: a) the observation method in which interviewers observe and record the time and activity of the respondent; b) the stylized question method in which the respondent is presented a list of activities and is asked to report the time spent on each specified activity during the reference period (usually the previous day or week); c) the interview–recall method that uses stylized analogues of a diary and respondents are asked to recall the activities performed for each time slot; and d) the time diary method in which the respondent is asked to record all activities undertaken during a given period of time and the beginning and ending time for each activity. Researchers have examined the merits and limitations of these approaches, reaching the conclusion that the time diary method is a more complete and reliable approach than the recall methods, allows for the collection of time data on simultaneous or joint activities and the inclusion of context variables, but that the observation method can be more accurate if reading time is a problem for the respondent, provided that the presence of the observer does not unduly influence the activities performed by the respondents (King, 1978; King and Evenson, 1983; Juster and Stafford, 1991; Hirway, 2010).

Fourth, there have been methodological developments in the valuation of unpaid work and other nonmarket activities (Goldschmidt-Clermont, 1982, Goldschmidt-Clermont et al., 1989; Mullan, 2010). These approaches include the input-related method that is based on the imputation of a shadow value to time, and the output-related method which relies on the imputation of market prices directly to the goods and services produced by unpaid labor.<sup>9</sup> While both methods have been used by countries in estimating the aggregate value of household production, input-based methods, particularly the (labor) replacement cost approach and the global wage substitute approach, are commonly used due to the relative ease of obtaining the data needed for estimation. For example, Folbre and Yoon (2008) use the minimum wage and hourly wage of a childcare worker to generate two estimates of the value of childcare in the United States.

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<sup>9</sup> See Goldschmidt-Clermont (1982), Clermont et al. (1989), Hirway (2010), and Beneria et al. (2015) for detailed discussion of the merits and limitations of each method of valuation.

Despite these improvements that have led to more time-use surveys and TUD analyses around the world, there are remaining major obstacles that deserve attention in time-use research, especially in developing countries. One practical difficulty pertains to the (in)ability of respondents to read and record the time of an activity accurately, a problem that is especially relevant in contexts where time pieces are not typically owned or used. This makes it difficult to use the self-reporting time diary method accurately, casting doubt on the reliability of responses to the stylized questions or recall method.”<sup>10</sup> Another concern pertains to the social norms that shape the explicit recognition of certain productive and care activities, especially in conjunction with the presence of overlapping (or simultaneous or joint) activities. For example, in settings where childcare is done in a collective manner by mothers who gather for a chat in the afternoon, the activity may be recorded as time for “socializing” or as “leisure.” Or, a mother who carries her baby on her back while tending to her vegetables or cooking may record these two activities but miss the childcare.

Yet another practical difficulty stems from the structure of employment itself in lower-income countries. The predominance of unpaid family workers and casual, temporary or seasonal (wage) labor in agriculture and small informal enterprises still results in widespread underestimation of work, especially for women and children. With greater urbanization, the service sector has expanded greatly and has made atypical work schedules (shift work, long, or dispersed hours) more common. And, rather than reduce this underestimation, the relatively recent growth of jobs using mobile technologies which allows the place and times of work to take place outside offices and shops and outside traditional work hours, will further challenge classification and measurement. Mobile technologies are being regarded as today’s engine of growth; they are estimated to have boosted the GDP of the U.S., Germany, South Korea, Brazil, China, and India by 2-4 percent each (11 percent in the case of South Korea) and to have added 11 million jobs.<sup>11</sup>

In addition, unlike the 1993 System of National Accounts (SNA) which systematized data collection, countries use different methods and frequency of TUD collection. The variety of

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<sup>10</sup> Responses to these methods become even more problematic when the reference period is longer, say, “in the past week.”

<sup>11</sup> See Bezerra, Bock et al. (2016).

survey approaches has raised questions about the international comparability of data (Hirway, 2010b; Budlender, 2008). While countries such as Australia, Canada, France, Netherlands, Norway, Sweden and the UK now collect them on a regular basis, others have collected the data only once or twice.<sup>12</sup> Moreover, the sampling and survey designs tend to vary. The different modes of data collection adopted in various countries reflect different political exigencies, pragmatic challenges as well as cost considerations. Some developing countries have been conducting their time-use surveys also, but these are usually designed for a specific purpose.<sup>13</sup> For example, the time-use surveys in Bhutan and Lao PDR have been designed specifically to estimate their Gross National Happiness Index, productivity in farming, and labor inputs in small businesses.

There are questions too about whether the International Classification of Activities for Time-Use Statistics (ICATUS) developed by United Nations Statistics Division in 1997 is an appropriate categorization of activities in developing countries. Proponents of adopting this classification and harmonization of TUD across countries argue that data standards have to be maintained, but several countries in Asia, Latin America and the Caribbean and Africa do not strictly follow the ICATUS classification in their national time-use surveys.<sup>14</sup> Related to this is whether or not harmonization—the building of a satisfactory common ground in terms of methods and activity classifications as a prerequisite for performing international comparisons—should take precedence over the specific needs and uses of a country.<sup>15</sup>

Finally, managing the cost of collecting TUD has been a practical difficulty. Cost considerations have resulted in some countries adopting the stylized question method which collects data on only a list of specific tasks (Esquivel et al., 2008). For example, the 2001 Bolivian time-use survey listed only seven tasks to which the respondent was asked a yes/no question for each task and the “average time per day” as well as daily frequency. Similarly, in the

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<sup>12</sup> For example, Spain carried out two national surveys (2002-03 and 2009-10) and Turkey only one (in 2006).<sup>13</sup> See the discussion in Esquivel et al. (2008).

<sup>14</sup> Gershuny and Fisher of Oxford University Center for Time Use Research (CTUR), in collaboration with other time use scholars, produced a Multinational Time Use Survey (MTUS) data that contained harmonized activity episode and context information and that encompassed over 60 datasets from 25 countries. For more information, see: <http://www.timeuse.org/mtus.html>

<sup>15</sup> See the UN Trial International Classification of Activities for Time-use Statistics (ICATUS) web site: <http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=231&Lg=1>

Guinea and Nigeria 2003 time-use surveys, the interview-based recall method used a list of 9 and 14 possible activities, respectively. Cost considerations have led to approaches that involve embedding a time-use module into a larger data effort. Instead of a stand-alone national time-use survey with supplementary modules to collect demographic and other household and community-level information, time-use modules have been attached to other surveys—to national household surveys as in Thailand, Oman, Laos, Bolivia, Mexico, Tunisia; labor force surveys as in China, Costa Rica, Bangladesh, Ecuador, Nepal; and specialized surveys such as on health and nutrition (China), consumption (Japan), the World Bank Living Standards Measurement Survey (Ghana, Guatemala, Madagascar, Malawi, Sierra Leone), or the US Government’s Global Hunger and Food Security Initiative’s Women’s Empowerment in Agriculture Index (WEAI) surveys.

Scholars and policymakers agree that TUD collection can be improved further to support better policy analysis. Substantial developments in the past about the collection, measurement and valuation of time spent in various activities allow the systematization and harmonization of TUD efforts across countries, but the practical difficulties must be overcome in order to implement them (UN, 1993). To date, there are several good practices for a well-designed survey instrument that can be shared and considered for adoption and implementation. A sample list is provided in Appendix A.

### **III. Benefits of Time-Use Research for Development Policy**

We began this paper by referring to some of the benefits of TUD and, in particular, its usefulness for helping countries meet and track the SDGs. In this section, we review previous research that have used TUD in order to demonstrate the ways by which this type of data informs development policy. A growing literature demonstrates that better TUD can equip researchers with an analytical tool for examining research questions that delve more deeply into individual and social behaviors than is usually possible with standard labor force or household survey data. TUD allow empirical analyses of economic choices and constraints faced by groups of individuals and households, and they can provide a more comprehensive picture of policy impacts on the lives of men, women and children. For these reasons, we argue that TUD can have significant impact on the design of programs and policies that affect the well-being of households, communities and the macro-economy. We have organized our review of existing

studies according to different policy themes. This review is meant to be illustrative, not exhaustive or comprehensive.

### **A. Market work, productivity and wages**

Past studies have demonstrated the magnitude with which conventional labor force surveys underestimate the labor market participation rate and hours of work of men and women as compared with estimates using TUD. For example, using the 1998-1999 Indian Time Use Survey, Hirway and Jose (2011) illustrate that better documentation of unpaid family labor in agriculture, participation in subsistence production as well as home-based work more than doubles the female workforce participation rate estimated using the conventional labor force and household surveys, such as the National Sample Survey Organization (NSSO). They estimate that 41.6 per cent of women participate in subsistence productive activities, compared with only 7 per cent of men. The average weekly time spent by women on these activities is also much longer (6.1 hours per week as compared with men's (0.97 hours).

Floro and Komatsu (2011) arrive at similar conclusions using data from the 2000 South African national time use survey. They find that a non-trivial proportion of men and women classified as either "not in the labor force" or "unemployed" were actually working. Their results show that 11 percent of women and 16 percent of men classified as "not in the labor force" were working an average of 2.6 and 3.6 hours, respectively. Among those classified as "unemployed," nearly 12 and 27 percent of women and men, respectively, actually spent 2.9 and 4.6 hours in the labor market. The majority of the men in these two categories were engaged in subsistence work related to fishing, hunting, and farming. Besides subsistence farming activities, 20 and 26 percent of women in the two categories were engaged in making or selling textile or leather products in mobile locations, suggesting that they had informal jobs.

TUD can also depict the type and characteristics of the work that people may have, such as the mobile nature of their work or irregular work time arrangements which allow them to combine their roles as income earners, care workers and household workers. TUD can reveal the extent to which people have multiple jobs, whether all are paid jobs or a combination of paid and unpaid work. Time allocation studies have identified both primary and secondary activities performed by survey respondents because TUD can reveal the extent of multiple, concurrent, and intermittent labor market activities. In India, Hirway and Jose (2011) estimate that about onethird

of men workers and 40 percent of women workers farm and then may work as a domestic worker in a rich man's house that labor force surveys do not capture.

Studies of home-based work and certain informal sector activities indicate the strong likelihood of women combining paid work and domestic activities such as cleaning, cooking and childcare. Women often cope with time pressure by performing secondary work activities in conjunction with another (primary) activity such as childminding and cooking, or childcare and market work. Szebo and Cebatorev (1990) find that in St. Lucia not only are most domestic activities done by rural women but also that those activities are highly intertwined and performed simultaneously with childcare or socializing with kin or friends. This intensification of work time is further documented by Floro and Pichetpongsa (2010) in their study of home-based workers in the squatter communities of Bangkok. As Roldan (1985, p. 266) puts it: "Outworking can be started, interrupted and recommenced at will and is readily combined with other such tasks as the supervision of children and food preparation."

TUD on paid work are essential for analyzing the relationship between husbands' and wives' wages and their spouses' allocation of time. For example, Hill (1989) estimates a simultaneous equations model of the labor force participation and work hours' decisions of married Japanese women in the formal and informal sectors of the labor market. Her trichotomous logit model for the Tokyo Metropolitan Area explicitly recognizes that women may actively be choosing to work as family workers in the informal sector rather than as employees and not only whether to work for pay or not. On average, family workers worked 2,350 hours annually and earned on average 302.8 yen per hour, compared to employees who worked 1,934 hours annually at an average hourly rate of 331.3 yen. Using data from both the 2009 Thailand Labor Force Survey and the National Time Use Survey, Sangaroon et al. (2015) also analyze the interplay of husbands' and wives' allocation of time by means of a three-stage, least squares method with instrumental variable methods. The study finds that an increase in men's market work and hourly wage encourages their wives, especially those in rural areas, to allocate more time towards housework, care work, and market work. Perhaps to maintain men's socially assigned role as the main breadwinner of the household, a similar increase in wives' market work and their hourly wage has the opposite effect, with their husbands shifting more, not less, time from unpaid domestic and care work to market work. Perhaps due to the same gender norms, an

increase in the wife's hourly wage tends to increase their time in unpaid work, especially those in urban areas. This is contrary to what one would expect from labor supply models, suggesting that women may be compensating for the perceived threat to their husband's main provider role by doing more household work. In contrast, an increase in the hourly wage of rural women reduces their time in both unpaid and paid work.

An essential part of labor market participation is looking for work, seeking information about job opportunities, and establishing contacts and networks. These activities require an investment of time and effort, and TUD can reveal how much time is invested, how it differs between men and women, and how it relates to other time use, including homework. Since time is a significant cost of job search, unemployed or underemployed women are more constrained in their job search compared to their male counterparts since women spend more hours in housework. This inhibits their ability to network or to travel to workplaces in search of a job. Hence, women's ability (or lack thereof) to find paid work is linked to their household and care work. Indeed, using the 2000 South Africa TUD, Komatsu and Floro (2016) find that unemployed men are more likely to spend time looking for paid work than women (19.9 percent vs. 3.2 percent). On average, unemployed men spent almost 59 minutes a day in job search while unemployed women spent only 7 minutes. Among those who were actively looking for work during the reference period, unemployed men spent 296 minutes in job search (conditional on participation) compared with unemployed women (204 minutes).

As already noted, multi-tasking or overlapping activities are fairly common in the household economy, complicating the estimation of total work and full production. Failure to account for these activities significantly underestimates not only an individual's economic contributions but also the total production in the household. Using 1992 Australian time use survey data, Ironmonger (1994) and Bittman and Matheson (1996) show that the omission of overlapping activities underestimates the time spent caring for children. Time-use research also shows that childcare and care of sick and disabled persons frequently show up as secondary activities (Ironmonger, 2004; Bittman et al., 2004), but many respondents do not report them unless asked specifically about a secondary activity. Floro and Miles (2003) estimate that accounting for these secondary activities contribute an additional 25 percent of total working time for women and men in Australia, with the amount of multi-tasking done by women (158

minutes per day, on average) being more than double that done by men (67 minutes per day, on average). Among couples, considering overlapping work increases women's total work time by nearly 44 percent, while men's time increases by 20 percent.

## **B. Unpaid household work and caregiving**

Unpaid work sustains the standard of living, the satisfaction of bodily needs, and the fabric of affective relations within families and communities. In both developed and developing countries, the significant amount of the time devoted to these activities implies that unpaid work and care are essential components of production and of well-being. TUD help to arrive at estimates of the value of nonmarket work in households and, thus, also of households' "full income." This unpaid work includes the unremunerated care activities provided to one's own household members, relatives, and the community (Hirway, 2015). The United Nations Research Institute for Social Development (UNRISD) divides these activities into direct care (mainly bathing, dressing or teaching children, etc.) and indirect care (such as minding children and accompanying them to places). Indirect care includes also household upkeep such as cleaning, doing the laundry, preparing meals, and so on, which is a crucial aspect of family life and vital for social reproduction as it keeps families together and nurtures human and social values.

### **1. Household work**

Conventional statistics obscure the realm of unpaid household work, making it easier for policymakers to ignore the negative effects of cutbacks in public services that affect the provision of care to children, the sick, and the elderly. In particular, reliance on the estimated value of marketed output fails to capture these dimensions of women's lived experience. Using TUD from several countries, the *2012 World Development Report* and the *2015 World's Women: Trends and Statistics* document that women do most of the housework and care even in contexts where they also do most of the market work, so the absence of data on this type of work seriously underestimates their economic contributions (World Bank, 2011; UN Department of Economic and Social Affairs, 2015). The amount of time on unpaid domestic work varies widely across countries, ranging from an average of 3 hours (Benin and South Africa) to over 6 hours per person per day (Turkey and Italy). Women spend from 30 percent more time on housework than men in Cambodia to six times more in Guinea (Berniell and Sánchez-Páramo, 2011). In contrast,

men in some countries, including Madagascar, Cambodia, Pakistan and South Korea, spend less than one hour per day, on average, on household work, while at the other end of the spectrum, men in Bulgaria, Estonia, France, Poland, Slovenia and Sweden spend a little over 3 hours (UN Department of Economic and Social Affairs, 2010). Overall, women spend an average of 2.7 more hours per day on household work and care than men.

While gender differences in unpaid household work have persisted, there have been important shifts in these gender patterns over time, with men increasing their contributions to non-routine domestic work over time.<sup>16</sup> For now, longitudinal data are collected by developed countries, enabling the analysis of these trends. The Multinational Time Use Study (MTUS) by Kan et al. (2011) uses more than 50 surveys from over 20 countries, recording more than 550,000 diary days. Their findings indicate that men's domestic work has been rising over the past four decades—in the UK and the USA, increasing from 90 and 105 minutes per day, respectively, in the 1960s, to 148 and 173 minutes per day in the early 2000s. Similar levels of increase were observed in the continental European and Scandinavian countries. An overall steady decline in women's domestic work during the same decades has contributed to a gender convergence. Women's domestic work during the 1960s totaled over 360 minutes per day in the UK and USA and 425 minutes in France, declining to 280 minutes per day in the UK, 272 minutes per day in the US in the 2000s and to 302 minutes per day in France in the 1990s. Also, while women tend to concentrate their time on routine housework, men are spending the largest proportion of their time on non-core domestic work such as house repair and yardwork.

In developed countries, Galvez-Munoz et al. (2011) show how care work at home is an essential and distinctive part of national economies and is influenced by the type of social policies adopted by governments. Their cross-national comparison of total work of women and men in 15 European countries, using the Harmonized European Time-Use Survey (HETUS) data, captures gender patterns in total workload and care responsibilities and also differences in these patterns across welfare regimes. In countries with considerably high state provisioning of social services and benefits, such as Sweden and Norway, there is relatively more sharing of household work burden between women and men and the total workload is near parity. This is in contrast

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<sup>16</sup> Routine housework pertains to housework such as cleaning, doing the laundry and cooking, while non-routine types of household work includes shopping, gardening and household repairs (Kan et al., 2011).

with the longer worktime (at least 1 hour per day) experienced by women in Southern and Eastern European countries, such as Lithuania, Slovenia, Estonia, Hungary, Italy and Spain, which have relatively low social expenditures per capita and weaker family policies. These findings are corroborated by analyses of the longitudinal Multinational Time Use Study (MTUS) data for the period 1961-2004 (Kan, Sullivan and Gershuny, 2011; Gershuny and Fisher, 2013). These studies show a relatively faster decline in women's proportion of total unpaid work in countries with extensive welfare policies, extended parental leaves and subsidized childcare, such as the Nordic countries. The variation in the rates of decline in women's share of domestic work across the different policy regimes suggests that public policies can influence the pace and degree of change in the distribution of unpaid work.

Efforts to measure household production have led to the development of satellite national accounts that include a comprehensive picture of the aggregate economic activity within the household. In the late 1980s, Statistics Norway embarked on a pioneering effort to create a satellite national accounts that would include the value of unpaid household work, increasing GDP by about 40 percent (Aslaksen and Koren, 1996). Shortly thereafter, Ironmonger (1996) estimated the economic value in Australia added by unpaid work and own capital of households to be approximately equal to those in the market. Today, satellite accounts of household production accompany official national accounts in several countries—Colombia, Finland, Germany, Australia, Norway, United Kingdom and Canada (Ahmad and Kohn, 2011; Beneria et al., 2015). Different valuation and measurement methods have been applied to reach these estimates and have yielded a range of values, from 20.4 percent of GDP in Colombia (2012-13) to 43.8 percent in Australia (2000) (Bittman et al., 2004; Abraham and Mackie, 2005). Future methodological improvements will refine these estimates further and will make it possible for more countries to publish satellite accounts.

## **2. Child care**

Raising children is one of the most important human endeavors, ensuring the continuation of humankind, the reproduction of society and its labor force. Childcare is an extremely heterogeneous activity, so a careful exploration of time use patterns provides better estimation of the time spent by parents and other household members as well as the time output of care (Folbre and Yoon, 2008). The distinction between primary and secondary child care is not so clear-cut

since some primary activities are relatively “passive”, such as looking after or minding children even when they are napping, while others, such as logistical or managerial activities like transporting children or dealing with doctors or teachers on behalf of children, may not involve much direct interaction with children. Using the 2000 United Kingdom Time Use Survey, Mullan (2010) illustrates aspects of childcare that are more reliably captured by TUD. For example, supervisory childcare can be captured by using some context information such as the presence of children in the same location while performing another activity, such as cooking, gardening or watching TV.

## **2. Elderly care**

Household dynamics in multi-generational households are more complex, with time allocation patterns revealing distinct patterns in unpaid work among household members. Srivastava (2016) examines how power and control can be acted out between mothers-in-law and daughters-in-law in societies such as India where informal social security mechanisms take the form of services expected from sons and daughters-in-law for the sons’ parents in return for the promise of an inheritance bequest. Using the 1998 Indian time use data, the study finds strict specialization within a multi-generational household in terms of the allocation of time by family members: Men mostly do market work and contribute very little to reproductive work. The distribution of domestic work is uneven, with daughters-in-law doing more than double the amount of household chores done by mothers-in-law. Indeed, daughters-in-law have the longest working day among household members and enjoy the least leisure time.

In countries with inadequate or non-existent social security systems, families are the primary source of long-term care assistance for the aged, and women tend to provide the bulk of this care. With the slowing of population growth and increases in life expectancy, many countries face the prospects of an increasingly aging population. Nowhere are these issues clearer than in urban China. Liu, Dong and Zheng (2010) examine the labor supply of married women in urban China using TUD from the 1993-2006 China Health and Nutrition Survey panel data and find that the presence of the husband’s parents in the household reduces the wife’s paid work by 3.8 to 6.4 hours per week, on average.<sup>17</sup> The recent relaxation of the one-child policy in China could

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<sup>17</sup> The first estimate is based on the simple Tobit method; while the second estimate is based on the two-stage least squares Tobit method.

increase fertility rates, putting greater pressure on married women to balance the burdens of caring for aging parents, in-laws and their own young children.

Mitigating the burden of extended household living arrangements, elderly household members can also contribute to household production. In India, elderly widows receive less care and are expected to work for their living (Dreze and Srinivasan, 1997). TUD document the level and type of caregiving that grandparents and other co-habiting relatives contribute.<sup>18</sup>

### **3. Contributions of older children**

The contributions of older children in the household in the form of paid and unpaid work tend to be invisible in labor force data, but TUD can reveal the nature and intensity of that work. The expectations about the time-use of boys and girls can be quite distinct, even at an early age, reinforcing the gender division of labor at later ages. Older daughters and sons are expected to help the household in gathering water/fuel, domestic chores, caring for younger children, and so on, with these tasks too often interfering with time for school. Even if not working for pay, the amount of domestic and care work performed by children, particular girls, can be onerous. In Lesotho, for example, 10.8 percent and 7.8 percent of girls and boys, respectively, work a total of at least 50 hours a week (Bardasi and Wodon (2010). Household work also often tops up income-generating activities in low-income households, leading to very long workdays (Edmonds, 2006; Rosati and Rossi, 2003).

Using 1992 Australian Time Use Survey, Floro and Miles (2003) show that the presence of older daughters reduces the secondary work activities of married women. Without carefully designed sampling and survey instruments, these activities of children are likely to be underestimated. Using the time-use module from the US National Survey of Families and Households, South and Spitze (1994) find that an adult son living in the household increases married women's housework while an adult daughter at home reduces housework of both women and men.

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<sup>18</sup> See, for example, Duflo (2003) and Shi et al. (2016).

#### **4. Gender differences and persistent division of work and care**

The sections above have touched on gender differences in time use but the topic of gender patterns related to market and nonmarket work deserve more discussion.

First, time allocation within the household can be influenced by negotiation and bargaining among household members. A number of studies examining time use patterns of couples demonstrate that this is anything but simple, however. Using the 2008 Chinese National Time Use Survey, Fengdan et al. (2016) find that how bargaining power is measured and the household division of labor can yield different outcomes. For example, if women's bargaining power is proxied by the gender age gap between spouses, the results suggest in households where there is a smaller age gap, women are able to increase the amount of time their husbands spend on market work and decrease their own time on household work; this proxy measure shows no effect on husbands' household work or on wives' market work. However, if women's bargaining power is proxied by the gender education gap, in households where husbands are far more educated than their wives, the former spend less time on household and care work, but there is no effect on the wife's household work.

The household structure also affects this negotiation and bargaining. Female-headed households tend to have different time-use patterns compared with male-headed households. The differences between female heads and female spouses in male-headed households are influenced by the woman's age, household sex composition, asset ownership, and patterns of sex discrimination in the labor market as shown by Lawson's (2008) study of time allocation among adult women in Lesotho. Female household heads are not only likely to have fewer assets compared to women in male-headed households, but the amount of time they spend on domestic work is far higher compared to their counterparts in male-headed households.

Second, the gender division of household labor is not static. It can change in response to economic development, labor market conditions, policy reforms and a host of other demographic and social factors such as urbanization, and divorce rates. Changes in technology, earnings and access to social services can cause households and individuals to shift time between activities. Changes in economic conditions such as increase in employment opportunities can affect the level and distribution of unpaid work in a household. Time use studies in developed countries have shown that while large differences persist in men's and women's time in paid and unpaid

work, these have converged between the 1960s and 1990s (World Bank, 2011). In the United States between the 1960s and 1990s, for example, American men doubled their housework hours, while women cut their housework hours almost in half (Abraham et al., 2006). Similarly, in Australia the gender division of labor in households with children in the 1990s has blurred as a result of more mothers entering the labor market (Craig, Mullan and Blaxland, 2010). The shift has resulted from a reduction in mothers' unpaid work and a corresponding small increase in fathers'. This trend is consistent with that observed in other high-income countries, showing a modest convergence in the work patterns of men and women (Abraham et al., 2006; Fisher et al., 2007; Sayer, 2005; Kan, Sullivan and Gershuny, 2011; Gershuny and Fisher, 2013).

This trend towards the narrowing of the gender gap can reverse, however. The convergence in Australia seems to have stopped and taken a reversal between 1997 and 2006 in the context of increasing labor market deregulation, a reduction in public social programs, and the spread of 'long-hours' culture (Craig, Mullan and Blaxland, 2010). As a result, the 2006 gender division of unpaid work in households with children was not substantially different from that in 1992.

Third, time-use studies indicate that, although norms regarding household division of labor can change, they are persistent and only tend to evolve slowly. The other studies in this issue on China and Thailand illustrate clear gendered patterns in the household division of labor and the interdependence of women's and men's paid and unpaid work. In China, wives spend on average about two hours more than their husbands in household and care work, while husbands work over one hour more on market work, on average, than their wives (Shi et al., 2016). In Thailand, an increase in husbands' hourly wages creates incentives for rural and urban women to substitute their market work time for more household work (Sangaroon et al., 2015). Both studies show that the majority of Chinese and Thailand working women in rural and urban areas increase their total work time—about one-half hour more, on average, than their husbands—when they take on the dual responsibilities of being an income-earner and caregiver. At the same time, Thai men spend more time for leisure, self-care and sports, as well as socializing and community participation than women (Sangaroon et al., 2016). Similar findings were reached by Connelly and Kimmel (2014) using American Time Use Survey data; they find that regardless of household type, whether married with or without children and whether older non-married or young single, women work more hours in total than men.

The above studies also indicate that the unequal sharing of unpaid work, including caregiving, between women and men constrains women's ability to fully participate in the labor market and to have time for themselves. It also has consequences on their earnings. Using the 2008 National China TUS data, Qi and Dong (2013) find that working women in China not only spend more hours on housework than male workers but are also more likely to experience interference with their market work by housework activities. This study illustrates how some Chinese workers, primarily women, cope with the competing time demands of household work and market work, by undertaking household work right before and after market work, thus stretching their work day. Others are compelled to attend to domestic chores during working hours either by forgoing work breaks or disrupting their market work in order to pick up and feed their children. This switching back and forth between the two types of work activities at least once on a weekday are observed in 74 percent of female workers, compared to 41 percent of male workers. Strikingly, about 45 percent of women switch between work activities more than once on a weekday, implying that women's market work time is more fragmented and more rushed than men's.

Thus, even though governments might be promoting women's participation in the labor market and supporting employment of women, gender identity and fear of the consequences of norms violation can compel women to reduce their time in labor market, fragment their work schedules to accommodate care responsibilities, withdraw from the labor force, or compensate for the violation by 'doing gender'. Bertrand et al. (2015) illustrate the latter by using a combined dataset involving 2003-11 American Time Use Survey (ATUS) data with the Current Population Survey (CPS) data to examine the relation between individual earnings and the amount of household work among couples.<sup>19</sup> Their analysis reveals that women who are 'overly successful' in the labor force tend to pay for this success at home by spending more time in household work in order to abate the reversal of the traditional gender roles. In other words, they find that gender difference in nonmarket work or unequal sharing of household and care work is greater when the wife earns more than the husband.

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<sup>19</sup> The sample is comprised of couples with at least 1 person receiving labor income.

#### **D. Community and volunteer work**

Another type of unpaid work that remains in the statistical shadows is community and volunteer work. This refers to economic activities whose beneficiaries are not members of the immediate family, do not involve any direct payment, and the work is non-compulsory (ILO, 2011).<sup>20</sup> Volunteer work has long been a part of the custom and norm of sharing and of mutual support mechanisms in communities around the world, and yet this form of unpaid work is excluded from the System of National Accounts as with household work.

TUD can reveal the extent to which a particular form of ‘volunteer’ and inter-household time transfers takes place among extended families and large kinship systems. Nuclear members receive/give time from/ to extended family members in the form of care and productive activities. This kind of transfers involves two or more households and are important features of informal exchanges that occur among households in both developed and developing countries. The study by Butz and Stan (1982) of 1,200 Malaysian households show that informal transactions through inter-household exchange networks can be significant, particularly among poor households. Although these transfers are often monetary, a sizable quantity consists of various kinds of help provided to relatives and kin residing outside the households.

TUD are a useful tool for measuring the labor time transfers between households and other forms of volunteer work. Salamon et al. (2011) considers it as “a powerful ‘reality check’ guarding against over-reporting (volunteer work) activities...(and), the accuracy of TUS in recording time individuals spend on various daily activities is far superior to that of ordinary opinion surveys” (p. 234). Combining TUS databases from 26 countries with ILO wage database and the multi-country John Hopkins Comparative Nonprofit Sector Project survey data, Salamon et al. (2011) estimate that 971 million people volunteered in a typical year worldwide, either through organizations or directly to persons outside their household. This voluntary work represents a significant economic contribution, estimated in 2005 to produce goods and services valued at US\$1.348 trillion using a replacement cost valuation approach.

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<sup>20</sup> Volunteer work can be performed in the public sector or nonprofit organizations such as hospitals, humanitarian aid and social programs; they are also done for businesses and other households in the community.

## **E. Poverty, inequality and well-being**

A more accurate measure of a person's total work burden leads to a more complete measure of well-being. Hours of work have implications for personal health, investments in human capabilities, and time available for leisure, socialization, and sleep. Chronic and severe time pressures can weaken a person's physical and mental health and the abilities to perform tasks and maintain relationships in daily life. TUD, therefore, can be useful in assessing wellbeing and a fuller definition of poverty.

The concepts of “time-related constraints of the poor” and “time stress of the poor” (overwork or ‘time poor’) imply that poverty is not only about material deprivation but also about the heavy time burden of unpaid activities shouldered by the poor (Hirway, 2010a).<sup>21</sup> TUD reveal the extent to which a person is ‘time poor’ in the sense of not having time for adequate rest and sleep, leisure, and community or social life.<sup>22</sup> To date, a number of studies by Lawson (2008), Bardasi and Wodon (2010), Arora (2014) and Noh and Kim (2015) have used time use survey data to identify those who work long hours out of necessity and are time-poor.<sup>23</sup> Estimates of time poverty rates tend to vary, however, depending on the definition, measurement method and choice of time poverty line. In Guinea, one-half of adult women are considered timepoor compared to a little over one-third of men when one uses a time poverty line of 50 work hours/week (Bardasi and Wodon, 2010).<sup>24</sup> In contrast, time poverty is quite low for both men (8.2%) and women (6.8%) in Lesotho (Lawson, 2008). In Korea, the highest incidence of time poverty occurs among women who are income poor, whereas income poor men have the lowest time poverty rate.<sup>25</sup> These studies on time poverty make it clear that long hours of unpaid work

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<sup>21</sup> The concept of time poverty was first introduced by Claire Vickery (1977) who argued that official poverty measures do not correctly measure household needs for they neglect the importance of labor time necessary to meet them. She developed a method for identifying households whose combined money income and available time are deemed insufficient to provide a standard of living above the poverty line. For this purpose, she calculated the trade-off between money and time (a threshold curve) representing a composite (time and income) poverty line, so that households are defined as poor if they have less than a certain combination of time and money.

<sup>22</sup> TUD also enables the measurement of time pressure in the form of time deficits. Zacharias et al. (2012) and Goodin et al. (2008) show how these deficits differ for men and women.

<sup>23</sup> See also studies by Goodin et al. (2005), Merz and Rathjen (2009) and Burchardt (2008).

<sup>24</sup> Care work time is not included in the estimation of the total work hours of women and men.

<sup>25</sup> This conclusion is also reached by Memis and Antonopoulos (2010) in their study of the incidence of time poverty among South African women and men.

and time poverty of poor women make it very difficult for them to engage in more paid work. Breaking the cycle of poverty in which many are trapped therefore requires not only employment creation schemes but also programs and policies that reduce women's unpaid work.

The above studies indicate that income poverty and time poverty reinforce each other. Persons who are 'time squeezed' are likely to cope with the time pressure by multi-tasking or undertaking secondary work activities such as childminding and cooking, or childcare and market work. Craig and Bittman (2008) use the 1997 Australian Bureau of Statistics Time Use Survey to provide a comprehensive picture of the heavy time pressure associated with having children and the gender disparity of this burden: "Ignoring the time when childcare is momentarily a background activity fails to acknowledge the constraining effects of responsibility for children and often results in time estimates that most mothers find laughably low" (p. 61). Time use studies in Mozambique and Thailand reinforce the importance of secondary activities in accurately measuring the amount of time spent in care work. Arora (2014) shows that about one-third of women in rural Mozambique engage in child care while performing household chores, and about one-fifth care for a child while working on the farm. In the slum communities of metropolitan Bangkok, informal workers work for as long as 15-hour day (Floro and Pichetpongsa (2010). The strong correlation between work intensity and low level of well-being especially among women indicates that increase in income improves a person's well-being only if she can cut back on work hours, or does not have to perform simultaneously market work and childcare over long periods.

#### **F. Leisure, personal care and health**

Leisure and time for personal care are often not given much importance in time allocation studies, and are instead considered the residual categories of time use. However, understanding how people live, what they consume and how they spend their time provides insights into people's future health. Exactly when work and nonwork activities take place, during the day, week and year, is significant for assessing well-being (Gershuny, 2011). TUD provide measures of healthy—or unhealthy—behaviors, such as the duration of exercise, walking or cycling to work which have significantly positive metabolic consequences, or the duration of physically idle time, such as sitting at a computer or watching television over long periods that likely yield adverse consequences on health. Medical science has shown that sufficient sleep and exercise are

good for health care, and not only about the use of health services. Instead, people today feel heavier time pressure with less time for leisure activities than in the past (Daly, 1996; Jacobs and Gerson, 2004; Robinson and Godbey, 1999).

In Thailand, as wage increases, married women and men allocate more time for leisure reflecting the fact that higher earnings enable households to purchase domestic help and laborsaving appliances (Yokying et al., 2016). However, this is not the case for more educated men and women who tend to have longer market work hours and less time for leisure, social, religious and civic engagement compared to those with less education. This may be due to the prevalence of a work culture, especially in skilled, professional and managerial jobs.

Eating meals together as a family has been associated with better nutritional quality and better school performance of children, suggesting that using TUD to examining time spent in food preparation might be useful (Gillman et al., 2000; Lin, Guthrie and Frazao, 1999). People report less time preparing and eating family meals at home due to family members' varying and busy schedules (Neumark-Sztainer et al., 2003). Jabs and Devine (2006) argue that time scarcity i.e., the feeling of not having enough time, has changed food consumption patterns, resulting in a decrease in food preparation at home and in family meals, and an increase in the consumption of fast foods or ready-prepared foods. These patterns are associated with less healthful diets and may contribute to obesity and a higher prevalence of cardiovascular disease and diabetes. More than a third of US parents, for example, say they eat takeout food regularly and one-fifth of all meals are consumed in a car (Gardyn, 2002), with over 12 percent of all calories of adults coming from fast foods (Guthrie et al., 2002).

## **G. Education**

Investments in human capital development (e.g., schooling, nutritional status, health care) require time inputs from the beneficiary, as well as from parents or other household members as from service providers such as teachers and doctors. Consider early child development, for example, which forms the basis for later academic and economic success of that child. Besides sufficient nutrition and protection from disease, the cognitive and socioemotional development of a young child before the age of 5 development requires brain stimulation through responsive and increasingly complex developmentally appropriate interactions between caregivers and children

(Grantham-McGregor et al. 2007, Nores and Barnett, 2010). Inadequate stimulation and interactions disrupt basic neural circuitry and thus brain development. The importance of parental attention and time in a child's cognitive development is demonstrated by the impact of several programs reviewed by Engle et al. (2007). In Jamaica, parenting practices improved when children and parents were actively involved in a home-visiting program, but not when the parental role was limited to information sharing. In Bolivia, information and skill building about health, hygiene, nutrition, and development, linked with a literacy program for indigenous women and home visits, resulted in higher test scores for participants' children than those of matched non-participants. In Turkey, where mothers attended group sessions to practice skills to play with their children, there were short-term and long-term effects on child development.

For this reason, the presence or absence of a parent or adult caregiver—and their education level, controlling for household wealth or income—usually emerges as an important determinant of a child's schooling. Orphanhood and other reasons for absent parents may lead relatives or community members to take greater responsibility, but orphans are less likely to be enrolled than non-orphans, as in the case of South Africa (Case, Paxson and Ableidinger, 2004). Transfers of time and resources between related households, with or without parental death or absence, do seem to matter in child schooling; in some cases, such transfers are given with the expectation of future pay-back from the child (Anderson, King and Wang, 2003).

The composition of the household affects school enrollment in other ways—and may affect it differently for sons and daughters. The presence of very young children may impinge upon the ability of older children by increasing the household responsibilities of older children. Glick and Sahn (2000) find that the number of siblings under 5 years of age in Guinea has a strongly and significantly negative impact on girls' schooling but no effect on boys. The most plausible interpretation is that young siblings raise the demand for a girl's time in childcare or in other home activities (in order to permit the mother to devote more time to the younger children). The number of sisters aged 13–20, in contrast, has a significantly positive impact on girls' grade attainment, and this too is consistent with the reliance on daughters to bear the burden of caregiving. Having more, older daughters reduces the opportunity cost of an individual daughter's time through substitution or scale economies in household work. TUD that accurately capture these care responsibilities can inform policies such as subsidized childcare that reduce the dependence of households on the domestic labor of girls.

The greater reliance on older daughters to take on more of the caregiving has been shown by time use data to be at the expense of their own schooling. The socially ascribed role for girls to take on domestic responsibilities, along with families' preference to give priority to boys' education investment, have contributed to the lag in girls' education for some countries (Altinok and Aydemir, 2015). Using 1999 Indian Time Use Survey data, Motiram and Osberg (2010) find clear gender inequalities in the allocation of household tasks although there is mixed evidence regarding gender favoritism in schooling. School attendance in rural areas drops much more rapidly with age for girls, but this is not the case in the urban areas where the attendance of boys and girls is essentially similar. Wittenberg (2005) uses the South Africa TUD to examine punctuality and absenteeism among school pupils and finds these problems to be particularly severe for pupils from poor households. The study also shows that the girls in these households spend large amounts of time on household chores.

#### **IV. Impact of policies and shocks on time use**

The previous sections have focused on the ways in which TUD can inform and influence development policy and investments by revealing the amount of time that people devote to work in the labor market, at home and in the community as well as other voluntary activities; to leisure and rest; and to human capital formation. This section reviews the evidence on how selected policies and investments by the government, in turn, affect people's time use. We focus on the locus of programs that have to do with social and employment policies (including family leave and child care services), investments in water and energy infrastructure, and income shocks.

Several countries have made important strides in reducing the tensions between paid and unpaid work through a combination of labor, welfare and social policies. The manner in which the government provides support and designs social policies has different implications for affordability and access to services (Floro and Meurs, 2009). Welfare systems in Scandinavian countries are oriented towards the provision of state services and benefits for the majority of the population and thus seems to produce more egalitarian distribution of unpaid care work and total work time among countries (Razavi, 2007; Warren, Pascall and Fox, 2010; Carrasco and Dominguez, 2011; Gershuny and Fisher, 2011; Galvez-Muñoz et al., 2011). Other European countries such as the Netherlands and France also offer generous family allowances and paid parental leaves as well as publicly supported childcare and education (Ilkharacan, 2013).

Gershuny and Fisher (2013) find a relatively more rapid decline in women's proportion of total unpaid work in countries with extensive welfare policies, extended parental leaves and subsidized child care, such as the Nordic countries, compared to those with weaker welfare regimes as in Southern Europe.

Yet, even in countries with the most generous welfare policies, domestic responsibilities continue to fall more heavily on women than on men as shown in a number of time use studies (Kan et al., 2011; Gershuny and Fisher, 2013). This is because the benefits cover only a portion of parental expenditures and total time spent on caregiving and so gender norms kick in beyond that portion. In OECD countries, the percentage of children under 3 covered by publicly financed care varies widely, from 2 percent in the UK to 74 percent in Denmark. For children between 3 years and school age, more care services are provided, although the percentage of children reached still ranges from 53 percent in the US to 99 percent in Belgium and France (Gornick and Meyers, 2003). Former socialist countries achieved high rates of pre-school enrollment (ages 3-6) in the 1980s, from around 70 percent or more in the European areas to about 20-50 percent in Central Asia and the Caucasus. However, these rates dropped in Central Asia and the Caucasus since 1990, as state subsidies, household incomes, and access to education decreased (UNICEF, 2008; Giddings, Meurs and Temesgen, 2007).

We turn now to investments in public infrastructure such as access to safe water, electricity, and sanitation systems which can significantly reduce the burden of unpaid work—though still depending on the socially ascribed roles that designate the tasks of water collection, food preparation and caring for the sick. TUD reveal the gender-specific effects of these public investments. In Tanzania, girls are more likely than boys to be assigned the tasks of gathering fuel, fetching water, and preparing food, suggesting that improvements in access to safe water and electricity can reduce girls' unpaid work burden (Fontana and Natali, 2008). Pakistani women on the other hand are primarily designated to collect water, and so are likely to benefit from improved access to safe water (Ilahi and Grimard, 2000). The task of collecting water is shared by male and female household members in Mongolia; 46.8 percent and 39.9 percent of prime-aged women and men respectively spend about 103 minutes per day on average performing this task (Terbish and Floro, 2016). In Lesotho, in-house water supply and the availability of public transport and health centers reduce women's time in household work and travel (Lawson, 2008). Improvements in the availability of safe water affected 43 percent of the

women who were spending about 22 hours a month on average collecting water, while improvements in public transport reduced the time spent by 39 percent of women and 36 percent of men traveling to health services.

The correlation between public investments and time use can vary across income groups. Income determines the household's access to time-saving infrastructure such as piped-in water supply and electric power, the ability to purchase time-saving appliances, and access to paid care services or centers—usually with unequal effects on women's and men's time use. The unequal burden of income poverty on household members in terms of unpaid work is corroborated by Kizilirmak and Memis's (2009) study of the time-use patterns in South Africa and by studies on European countries by Galvez-Munoz et al. (2011) and Carrasco and Dominguez (2011). In Italy and Spain, a considerable amount of care work among middle- and higher-income households is provided by private day care and hired domestic workers, many of whom are female immigrants. Women in low-income households either rely upon the unpaid work provided by other female members, such as older daughters or a female kin. TUD thus allow for a more comprehensive assessment of the benefits of public infrastructure and services in reducing overall poverty by alleviating its time dimension and the gender inequality in the work burden (Blackden and Wodon, 2006; Chakraborty, 2005).

## **V. Concluding remarks**

In this paper, we have argued that research using time use data can deepen our understanding of human behavior, such as how women, men and children across socioeconomic strata conduct their daily lives and make choices. Previous studies have shown that TUD reveal a much wider range of economic contributions from women, men and children than conventional measures of economic activities, and elucidate hidden (statistically invisible) aspects of market work, such as time in job search, unpaid family labor (in family farms and enterprises), work that is temporary, atypical, and contingent (casual or home-based), and subsistence production. Incorporating these activities into the measure of economic production has yielded much higher estimates of aggregate production. Repeated measures of people's time-use patterns have shown shifts over time in the economic activities of men and women, between those who live in rural and urban areas, and across economic strata.

Household production and caregiving are critical uses of time, contributing to all aspects of the well-being of household members and their investments in human capital; yet, these activities typically remain unmeasured. Research has shown that TUD illustrate various aspects of the interconnections between women's and men's activities, how women and men share the workload in the market and at home, and the relative persistence of gender patterns in time allocation. One of the most striking findings from TUD is the extent to which people engage in joint or overlapping activities: Because multi-tasking is quite common in household production, taking secondary activities into consideration increases total workhours significantly, especially among mothers who carry the heaviest responsibility for caregiving alongside other household work. Indeed, TUD uncover the commonly hidden time dimensions of income poverty by exposing the time pressure faced by household members, particularly women and girls, who have to balance their expected duties in household work, caregiving and unpaid family work with the need to work for pay, attend school, or contribute to community activities.

The effectiveness of various development policies and investments will be a major concern in the next months and years as countries and development agencies work towards the 17 SDGs. Our review of time-use research shows that any assessment of that effectiveness can be enriched by documenting and analyzing how those policies and programs lead to shifts in people's time allocation. People respond to improvements in the availability of public infrastructure and services if those improvements ease their time constraints—as shown by how better roads can promote market activities and shorter travel to schools or health centers raise utilization rates. Cost-effectiveness measures of programs and investments are incomplete when they ignore the required time inputs of users.

Finally, this paper reviewed the major improvements in conceptualizing, collecting and analyzing time-use information. Many more countries are now collecting TUD, with some of those countries, on a regular basis and are able to estimate satellite national accounts. Many more improvements are needed, however. We discussed some of the practical difficulties that face developing countries in implementing data collection instruments, especially in rural areas and settings where women's and children's work is substantial but hidden. With more progress on the time use survey design, methodological, data collection regularity and data accessibility fronts, time-use data and research can be a powerful component of every country's policy toolbox, enhancing the processes of formulating, monitoring and evaluating policy and investments.

## Appendix A. Areas of Improvements in TUD Collection

This paper has demonstrated time use data as an important policy tool for addressing the post2015 Sustainable Development Goals. It has also shown that methods for collecting TUD have improved in the last few decades, thanks to the efforts of time use researchers. The potential significant benefits of TUD for informing policy can only be realized, however, if countries invest resources to utilize these methods that lead to better TUD. Below are some recommendations for improving time-use surveys.

1. *Collecting time diaries from all members of from 10 years old and up.* This would enable comparisons of time-use patterns involving children as well as elderly persons, and studies related to children's development and the well-being of the elderly, as well as their contributions to household, labor market, and community/volunteer work.
2. *Collecting the start and ending times of secondary and tertiary activities, and careful training of interviewers to help respondents record these activities.* This improvement would allow for more accurate estimations of the time spent in activities such as caregiving (e.g. passive child minding) which are performed simultaneously with primary or main activities.
3. *Identifying the day of the week when the diary is recorded and asking the following question at the start of the diary or interview: Is this a regular work day for you?* This information enables the separation of a typical work day from holidays or weekend.
4. *Adding context questions and columns in the time-use diary for each activity.* Context questions can include: a) location [home, school, neighbor's house, other family member's (parents or parents-in-law) house, work, public place, other (specify)]; b) with whom [alone, with wife/husband, with parents or parents-in-law, child 0-6 years old, other household member (specify), acquaintance]; c) receive help from another household member, and if so, which member; d) use any appliance or technology, e.g. computer, phone, others (specify) while performing the task? These context variables enable data analysts to improve data on care activities which are easy to forget and are therefore often overlooked, leading to underestimation of the time required for such activities. They also allow accounting for non-labor inputs so as to better estimate the value of the produced goods and services

5. *Asking the respondent about possession of time-keeping devices:* Do you own a watch or clock, or use a mobile phone for keeping time? This information helps in assessing the quality of time use data.
6. *Collecting relevant demographic, individual, household and community information.*  
Examples are: a) Does your household have the following: computer, washing machine, refrigerator, car, truck and other important types of assets or wealth? b) Do you own your dwelling? What type of floor do you have? c) What is the household's main source of drinking water? d) What is the main source of energy or heat, or type of fuel used? e) How much is your total household income (specify if weekly or monthly) that includes wages, profits and other sources (by income ranges)? f) Did you use the following paid services in the last month: i) household help or domestic service worker, ii) childcare center or facilities, iii) nursing home or elderly care facilities, iv) other [specify]; g) How far (in kilometers) are the following facilities from your home: i) school, ii) health clinic or hospital, iii) public transportation, iv) other [specify]? h) How many hours in the last week did you work for pay or income (excluding travel time)?
7. *Collecting information regarding participation in economic and social programs, or access to government services.* Do you or your household have access to the following government services or have participated in the following social, welfare or poverty reduction programs; and do you or your household use the following services: childcare services, unemployment insurance, medical insurance, pension fund?
8. *When possible, linking the TUD with existing census surveys, labor force surveys, or other household of surveys,* such as household demographic and nutrition surveys, etc. Combining TUD with other data sources enriches the information available, allows deeper analyses of individual behaviors and choices, with appropriate controls for background variables.
9. *Collecting longitudinal time use data.* A periodic (preferably every 4 or 5 years) collection, using the same households (that are nationally representative) to the extent possible, provides a very useful panel TUD for monitoring and for impact evaluation of economic shock or policy change.

10. *Documenting fully the survey design* in a survey manual and a data dictionary would support a wider use of data by researchers. These documents would be helpful as well to the improved training of interviewers.

11. *Making data widely accessible to researchers but maintain confidentiality of respondents.* This could involve signing an agreement regarding responsible use of the data in order to maintain the confidentiality of the respondent's identity (e.g. name and address).

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