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# TIME-USE ANALYTICS: AN IMPROVED WAY OF UNDERSTANDING GENDERED AGRICULTURE-NUTRITION PATHWAYS

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## ABSTRACT

There is a resurgence of interest in time-use research driven, *inter alia*, by the desire to understand if development interventions, especially when targeted to women, lead to time constraints by increasing work burdens. This has become a primary concern in agriculture-nutrition research. But are time-use data useful to explore agriculture-nutrition pathways? This study develops a conceptual framework of the micro-level linkages between agriculture, gendered time use, and nutrition and analyzes how time use has been conceptualized, operationalized, and interpreted in agriculture-nutrition literature on low- and middle-income countries (LMICs). The paper argues that better metrics, but also conceptualizations and analytics of time use, are needed to understand gendered trade-offs in agriculture-nutrition pathways. In particular, the potential unintended consequences can be grasped only if the analysis of time use shifts from being descriptive to a more theoretical and analytical understanding of time constraints, their trade-offs, and resulting changes in activity.

## KEYWORDS

Time use, methodology, gender analysis, feminist research, development

JEL Codes: B4, C42, N5

## INTRODUCTION

The promotion of healthy lives and well-being is a priority in development agendas. However, the burdens of malnutrition and disease are multiple, differentiated, and have various root causes. Reducing undernutrition requires radical multi-sectoral interventions (Black et al. 2013; Buse and Hawkes 2015). Renewed academic and policy interest in leveraging agriculture to improve nutrition plays a pivotal role in spurring multidisciplinary thinking on well-being. However, linkages between

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agriculture-food systems and health and nutrition outcomes are multiple, complex, both direct and indirect, and difficult to document (Kadiyala et al. 2014; Webb and Kennedy 2014).

A central link between agriculture and nutrition is time use – that is, the ways in which agriculture determines how people allocate time to productive and reproductive work and the implications these may have on nutrition. One hypothesis tested in some literature is that high or increasing agriculture-related time burdens, especially for women, may have negative repercussions on nutrition. Based on a conceptual framework of the micro-level linkages between agriculture, intrahousehold division of labor, and nutrition, this paper examines how a collection of studies on agriculture, gendered time use, and nutrition conceptualize, operationalize, and interpret time use. The focus is on rural settings in low- and middle-income countries (LMICs).

This work makes a conceptual and methodological contribution to gender analyses of agriculture, nutrition, and well-being (Floro 1995; Imai et al. 2014; Sraboni et al. 2014; Arora and Rada 2017). It argues that time-use research has the potential to illuminate important aspects of gendered participation in agricultural work and development projects, especially with regard to the reproductive burden and nutritional outcomes. The paper provides a framework for the relevance of time-use research in LMICs, and it offers key recommendations on how to conceptualize, collect, and use time-use data. We conclude that a stronger conceptualization of time use is needed in order to improve data collection and interpretation. Methodologies should be broad enough to encompass household socioeconomic status, composition, seasonality, and work intensity, as well as a focus on gendered relations rather than women's time use exclusively.

## RENEWED INTEREST IN TIME-USE RESEARCH: TIME USE IN AGRICULTURE-NUTRITION PATHWAYS

Time-use data collection began in the 1920s to shed light on the living conditions of working class families (United Nations Statistical Division [UNSD] 2005; Benería, Berik, and Floro 2016). Since their first appearance, time-use data have been collected and used in a variety of ways in ethnographic, economic, and feminist literature. For example, some anthropologists use observation-based time-use data to study various aspects of human behavior and transitions from subsistence to nonsubsistence economies (Paolisso and Hames 2010). From the mid 1960s, economists took an interest in time as a factor for household production, and economic theorizations of time have been an integral part of the development of household economics (Becker 1965; Gronau 1977). By the 1980s, it became evident that time-use data could capture unpaid activities, a central issue

for feminists concerned with extending the definition of the economy as measured by GDP estimates by making women's unpaid work visible (Budlender 2007; Gammage 2010; Chang, MacPhail, and Dong 2011; Benería, Berik, and Floro 2016). Feminist scholars became the most vocal advocates of time-use research, signaled by their involvement in the International Association for Time Use Research (IATUR; Benería, Berik, and Floro 2016).

Parallel developments can be traced between feminist scholarship, gender analyses, and time-use research. Feminists' interest in time use in the 1980s reflected feminist approaches of the late 1970s that precipitated a change in focus from productive activities to the invisible and unpaid sphere of reproduction. With the subsequent affirmation of the Gender and Development (GAD) paradigm, issues of gender equality and women's empowerment were mainstreamed, not only in academia but in policy and development circles as well (Benería, Berik, and Floro 2016). The process of gender mainstreaming paved the way for instrumentalist approaches to gender equality (for a critique, see O'Laughlin [2007]; Gideon and Porter [2016]; Stevano [2017]), whereby women's empowerment via access to productive resources is seen as being conducive to poverty reduction and enhanced well-being of future generations, summed up by the World Bank's slogan "gender equality as smart economics" (World Bank 2012). These historical trajectories help us understand the current resurgence of interest in time-use research. Unpaid care work remains an unresolved concern, and, in addition, some scholars are now interested in understanding if women's greater participation in the labor market and access to productive resources via various development projects have unintended negative consequences on well-being.

Agriculture-nutrition research is concerned with time trade-offs, especially for women (Berti, Krasevec, and FitzGerald 2004; Arimond et al. 2011; Jones et al. 2012), as one factor that could potentially offset some of the nutritional gains sought through agricultural interventions. Time is needed for farming, waged work, buying food, and domestic activities of food preparation and childcare. Time must be divided between these activities, so trade-offs exist between them. A common hypothesis in agriculture-nutrition literature is that if women increase their time spent in food production, they may have less time to prepare nutritious foods and feed children. However, trade-offs can be complex and unpredictable and depend on a range of factors. For example, women's employment in agriculture may not always reduce time for childcare, especially when there are other people in the home who take on this responsibility (Kadiyala et al. 2014).

Our conceptual framework draws on the findings of a recent systematic review (SR)<sup>1</sup> on the time-use pathway linking agriculture and nutrition (Johnston et al. 2018). The findings of the SR are discussed in a separate

overview paper (Johnston et al. 2018) and only summarized here to explain and support our conceptual framework. The SR analyzed existing literature with the aim of exploring three hypotheses: whether women spend significant amounts of time performing agricultural work and are at risk of high time burdens, whether time burdens lead to time constraints and trade-offs with negative repercussions on nutrition, and whether agricultural interventions unintentionally increase participants' time burdens with negative consequences for nutritional outcomes.

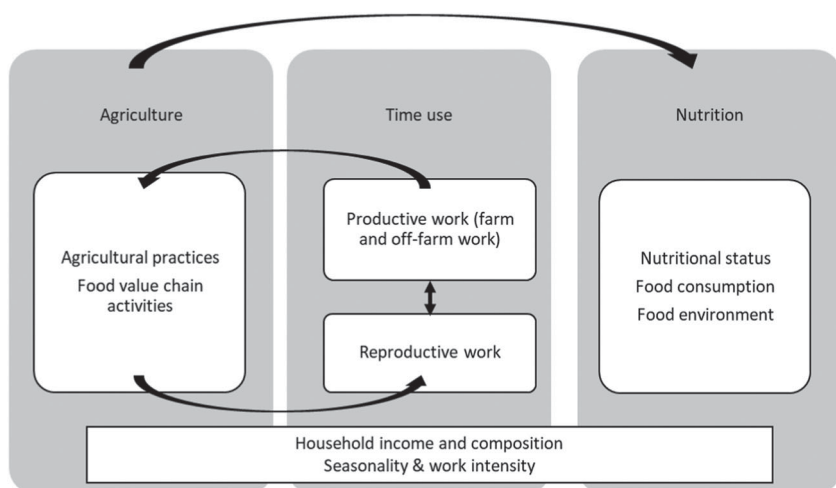
The main findings of the SR suggest that women play a key role in agriculture, which is reflected in their time commitments to agricultural work. In addition, a small number of “good quality” studies on agricultural interventions included in the SR suggest that interventions tend to increase the time burdens of women, men, and children.<sup>2</sup> However, the nutritional implications are not clear-cut. The SR found that nutritional impacts are varied because households and household members respond to increased time burdens and workloads in different ways. Piecing together evidence from the studies graded as “best quality” in the SR, we find that household responses differ due to important differentiating factors. These include household income and ability to purchase food, household type and composition (in particular, the presence of members who can take up domestic work), seasonality in the organization of agricultural labor, and work intensity, which refers to energy expenditure.

By drawing on the SR as well as the body of critical perspectives on the economics of rural households (Low 1986; Evans 1991; O’Laughlin 2014), our framework maps the micro-level linkages between agricultural work, gendered time use, and nutrition. In this conceptualization, time use is not a linear pathway with deterministic outcomes, but is an important linkage that itself embodies broader factors at play in the intrahousehold allocation of labor. Two interlinked aspects are at its core: first, the centrality of reproductive labor and how it intersects with productive labor, which can be highlighted through a focus on time use to capture unpaid work and gain a better picture of agricultural work, and, second, the ways in which household income, household composition, seasonality, and work intensity shape the organization of farm and off-farm work and of productive and reproductive labor. In this paper, we use this conceptual framework to examine the studies included in the SR from a critical conceptual and methodological perspective (see Figure 1).

## METHODS

We look at the body of literature collected in the SR – a group of eighty-nine quantitative, qualitative, and mixed-method studies (see the Supplemental Online Appendix) – and address two questions: How are time-use data conceptualized, operationalized, and interpreted in agriculture-nutrition

## TIME-USE ANALYTICS



*Figure 1* Conceptual framework: Gendered time use, agriculture, and nutrition. *Source:* Adapted from Johnston et al. (2018).

research? What are the methodological and analytical improvements needed to strengthen the potential of time-use data in agriculture-nutrition research?

The time-use component of the eighty-nine studies retrieved for the SR was analyzed using three guiding principles: First, we looked at how time use is conceptualized, using our conceptual framework as a benchmark. By conceptualization, we refer to the employment of any definition of time use or conceptual framework of which time allocation is a part.

Second, we considered operationalization and reporting. With this exercise, we compiled descriptive information on essential aspects of methodology, such as sampling strategy, recall period, and instrument selection. In addition, we considered key aspects identified in our conceptual framework as enhancing the accuracy of time-use data. These are household socioeconomic status, composition, seasonality, and work intensity. We consider household socioeconomic status as being measured by any indicator of education, assets, income, or consumption. With regard to household composition, we looked at respondents' selection (that is, household members for whom time-use data were collected) and whether it allowed for intrahousehold analysis. We checked whether seasonality was taken into account by repeating time-use data collection at different times of year. We also considered whether the studies measured work intensity, which refers to energy expenditure or any indicator of effort spent to perform specific activities.

Finally, we looked at how time-use data are interpreted, particularly considering the types of analyses that they are used for. The rationale for this process of data extraction and analysis is based on the expectation that a common thread would run from conceptualization, through operationalization, to interpretation.

## RESULTS

### Conceptualization

A crucial issue in conceptualizations of time use is the definition of work. In LMICs, time-use studies are used not only to capture unpaid care work, as is often the case in advanced economies, but also to record productive work (Charmes 2010; Hirway 2010; Floro and Komatsu 2011; Hirway and Jose 2011; Charmes 2015).<sup>3</sup> Agricultural data and employment statistics suffer from many biases recognized in the literature and are considered to be especially ill-suited to describe seasonal or irregular employment and multiple occupations, which are often distinctive features of agricultural and/or women's employment (Pearson 2007; Bardasi et al. 2011; Beegle, Carletto, and Himelein 2012; Oya 2013). Berik (1997) explains that when the notion of labor force is broadened, or when an open-ended format for each person's activities is used, then women's participation in the labor force is found to be higher.

Time use is considered primarily as a metric, or a type of data, and elaborations of the conceptual underpinnings are lacking, which constitutes a problem. Consider an analogy: failure to conceptualize the notion of "household" can lead to erroneous data in household surveys (Berik 1997; Randall, Coast, and Leone 2011). It is also necessary to clarify concepts in exercises of time-use data collection. Any decision on how to select the respondents, what type of activity to record, when to collect it, and what type of contextual and complementary information to include should reflect the role of time use in the underlying theoretical framework.

The conceptualization of time use in the studies we reviewed reflects the broader reticence to think about time use from a conceptual perspective. In many studies, conceptualization exercises are rather vague, narrowly developed, or left implicit.

In a group of studies, time use captures women's paid and unpaid work in the agricultural sector. However, the reviewed studies do so in different ways. For instance, some studies measure women's work in agriculture in isolation, others in relation to men's, and yet another group assesses women's work in agriculture in relation to unpaid care work and work in nonagricultural sectors. Therefore, although time use is used to gain a picture of women's work in agriculture, the literature does not always define this work in relation to other reproductive and productive labor.

A second pattern is delineated by the conceptualization of time use in relation to other variables, as either an input or an output.<sup>4</sup> Time allocation is used to uncover activities and impacts that tend to be invisible, thus reflecting a concern with unintended consequences or unseen barriers. When time use is considered as an output, some studies look at the time-use impacts of agricultural commercialization, including specific interventions and processes of intensification of export-led agriculture, on the organization of productive and reproductive work (Riley and Krogman 1993; Gunewardena 2010). When it is considered as an input, some studies rely on Becker's New Household Economics to conceptualize time use as a factor of household production and integrate it in household production functions (Gurven and Kaplan 2006). Other studies instead look at the impact of maternal employment on child nutrition (Nti, Inkumsah, and Fleischer 1999; Bamji and Thimayamma 2000).

In sum, the conceptualization of time use in the agriculture-nutrition literature is rather loose and diverse. We therefore note that more developed theoretical frameworks would contribute to strengthening time-use data treatment and collection.

### **Operationalization and reporting**

The observed limitations at the conceptual level have implications for the operationalization of time use, which is characterized by mixed practice and poor connections with underlying concepts. Nevertheless, we will also highlight the work that suggests promise in terms of how to move forward. These studies show that a variety of methods can be used to collect time-use data. However, the lack of guidance on best practice, especially for qualitative methods, poses a challenge to assess the accuracy of time-use data.

We start by looking at sampling strategy, instrument selection, and recall period. The review includes studies that employ quantitative methods (fifty-two), qualitative methods (nineteen), and mixed methods (eighteen) to collect time-use data. With regard to the sampling process, three studies used data from nationally representative samples, thirty-eight used random sampling representative at different sub-national levels, twenty-five used purposive samples, and in twenty-three cases, the sampling techniques were unclear based on the information articulated in the publications.

The selection of instruments reflects the broader methodological approach. The majority of the studies, fifty-one, used structured interviews as the primary instrument to collect time-use data. In only six studies, time use was recorded using nonstructured or semi-structured interviews. A group of sixteen studies employed (participant) observation to collect time-allocation data, and a set of twelve used mixed instruments – typically



*Table 1* Number of studies by sampling strategy, instrument, recall period

<i>Sampling strategy</i>		<i>Instrument</i>		<i>Recall period</i>	
Nationally representative sample	3	Structured interview (survey)	51	24-hr recall	19
Random	38	Non-structured interview	6	Longer than 24 hrs	10
Purposive	25	Observation	16	Mixed recall	4
Unclear	23	Mixed instruments	12	N/A (observation based)	16
		Unclear	4	Unclear	40

*Source:* Created by authors.

involving the combination of structured interviews, qualitative interviews (such as focus groups), and observation. Due to reporting issues, the instrument used for time-use data collection remains unspecified for four studies.

When considering the recall period, which is relevant for all interview-based studies, we see different practices. Although 24-hour recall is recommended for time-use surveys (UNSD 2005), a recall period of this length was used in only nineteen studies. Other studies used seven-day (six), thirty-day (three), one-year (one), and mixed recall periods (four).<sup>5</sup> The length of the recall period is unspecified for a high number of studies, forty, which once again speaks to shortcomings in reporting (see Table 1).

Only by considering these three basic characteristics, it is apparent that the sources of time-use data are very diverse. It is interesting to note that, although national time-use surveys have been conducted in several LMICs (Esquivel et al. 2008), only one reviewed study used data from India's National Time Use Survey (Hirway 2010). This suggests that national time-use survey data may be underexplored in agriculture-nutrition research. However, a reason for underusing national time-use surveys could be that they are not easily matched to nutrition data, except at higher levels of aggregation. Multipurpose surveys have the advantage of collecting various outcomes of interest for the same households, although this may come at the cost of less accurate time-use data.

A strand of ethnographic research included in this review uses a specific observation-based technique called "instantaneous scan observation" (Crittenden and Marlowe 2008) or "spot-check behavioral sampling" (Quinlan, Quinlan, and Flinn 2005). The method consists of observing and recording the activity (or activities) performed by a number of individuals in a selected village or community at regular time intervals (for example, every hour). In agriculture-nutrition literature, this technique for data

collection has been used to study practices related to food provisioning, childcare, and infant feeding practices.

Only a few studies mention the benefits of mixing methods to overcome barriers encountered with the implementation of surveys in contexts where life is not organized by the clock, which is an issue recognized in time-use survey literature (Budlender 2007; Esquivel et al. 2008). Linda Szeto and E. A. Cebotarev (1990) use four approaches, including a socioeconomic survey of a purposive sample of households, random visits, participant observation, and timing of women's activities because, they explain, in the studied context of rural St. Lucia, diaries and recall methods had to be rejected due to low levels of literacy.

Time-use data per se are of little use for academic research and policy making alike unless they are accompanied by socioeconomic and demographic information about the household (Budlender 2007). In addition, household socioeconomic status is an important differentiating factor, as wealthier households have more resources to respond to time burdens (Johnston et al. 2018). In the family of reviewed studies, a majority (fifty-five studies) included some socioeconomic or demographic data. However, twenty-seven studies did not include any such data, and seven were marked as unspecified due to reporting gaps.

The selection of respondents is crucial because household composition shapes intrahousehold division of labor and the potential for substitution in caregiving (Hallman et al. 2005; Jones et al. 2012; Johnston et al. 2018). The reviewed literature is heavily concerned with women; twenty-seven studies look exclusively at women's time allocation patterns. This may be seen as reflecting wider tendencies in development research to focus on women rather than on gender relations. However, we also positively note that a larger group of studies (thirty-eight) present and discuss time-use data for both women and men in the household. The relationship between women and men is not always homogeneous; they could be spouses, siblings, or linked by other familial or non-familial ties, depending on the configuration of the household, which may create analytical inconsistencies. A few studies (seven) look specifically at children, mostly having to do with concerns for child labor. Finally, seventeen studies look at time-allocation data for all household members.

The importance of simultaneous activities is emphasized in time-use survey literature because caring activities often take place alongside others, and, therefore, a focus on primary activities may lead to the underestimation of unpaid care work (Esquivel et al. 2008; Rost, Bates, and Dellepiane 2015). In the reviewed literature, only eleven studies considered simultaneous activities, nineteen studies did not collect this type of data, and in fifty-nine studies, it was impossible to determine if simultaneous activities were recorded, which shows problems with reporting.

Two issues that are critical in time-use, well-being, and agriculture-nutrition literature are seasonality and work intensity (Jackson and Palmer-Jones 1998; Charmes 2015; Johnston et al. 2018). The two matter separately and together: the seasonal organization of agricultural work means that time spent on agricultural work is likely to vary significantly throughout the year, and seasonality is also at the basis of varying work intensities in agriculture, which may have implications for nutrition. A good number of reviewed studies take seasonality into consideration (thirty-five), mostly distributing data collection over different times of the year. However, a majority of the studies in this review (forty-nine) do not take seasonality into account, and for five studies, it is unspecified. Work intensity emerged as a particularly overlooked aspect in the literature reviewed, with only fourteen studies taking it into consideration. Knowing the amount of time spent on different activities does not say anything about the intensity that different types of work entail, which is a severe limitation, especially if the broader concern is about well-being (Jackson and Palmer-Jones 1998).

In the reviewed studies, time use was operationalized in diverse ways. We have highlighted different practices in both study design for time-use data collection and key features of time allocation data itself. The use of a range of methods to collect this data is important to gain a better picture of how people use and relate to time. At the same time, more solid theoretical frameworks would provide the basis for developing guidance on best methodological design and practice for all methods – qualitative and quantitative – that are used to collect time-use data.

### **Interpretation**

The last category we consider for the analysis of time-use data is interpretation: How are time-use data interpreted? What is the purpose of time-use data? As much as time-allocation data can offer useful descriptive insights, as they can shed light on activities that would otherwise remain unrecorded, they can also serve wider analytical scopes. What are the determinants of time distribution in the household? What are the impacts of different or changing time-allocation patterns? When do time constraints arise? In the following, we identify three interpretation patterns along these lines.

A group of thirty-five studies provide descriptive analyses of time-use data. The studies that look at women's participation in agriculture are examples of this type of analysis. A larger set of studies (fifty-two) goes beyond a descriptive scope and offers analyses of the determinants of time use and/or of its impacts. This is not surprising, if it is considered that agriculture-nutrition research is primarily interested in time use to determine the time-use effects of agriculture and the nutritional impacts of time use. In these studies, we find that the most important issues

explored include the relationship between women's work and (child) nutrition (for example, Ricci et al. [1996]; Choudhary and Parthasarathy [2007]), and the impact of agricultural commercialization or interventions on gendered division of labor (for example, Newman [2002]) or on child labor (for example, Agbonlahor et al. [2007]). Other studies look at specific determinants of time allocation, such as the adoption of labor-saving technologies (McSweeney 1979), men's migration (Mu and van de Walle 2009), and extra-household social norms (Kevane and Wydick 2001).

Arguably, the most interesting finding of this review is that only two studies – Quentin Wodon and Kathleen Beegle (2006) and Indira Hirway (2010) – use time-use data to analyze time poverty. Hirway defines the concept as follows:

Time poverty is understood in the context of the burden of competing claims for individuals' time that reduce their ability to make unconstrained choices on how they allocate their time, leading frequently to work intensity and to trade-offs among various tasks. (2010: 26)

Investigating the origins and nature of time constraints and time scarcity is a different analytical exercise because it requires the adoption of some criteria to identify at which point time becomes scarce and who the time poor are. Wodon and Beegle (2006) use a time poverty line, set at 70 hours of work per week,<sup>6</sup> to identify the time poor in their study on agricultural work in Malawi. Hirway (2010), while mentioning the relevance of a time-poverty line as a reference point, performs a different exercise. Hirway conducts an analysis of time use of the income poor and ultra poor in India, using data from the India Time Use Survey. This leads her to make an assessment of time poverty based on time spent on certain activities as a share of individuals' total available time, and by income group. This offers a glimpse of the different ways in which analyses of time poverty can be approached. The scarcity of studies that address questions on time constraints and time poverty from LMICs suggests that this area can be expanded and refined in agriculture-nutrition research.

## DISCUSSION

Methodological and analytical improvements in the collection and use of time-allocation data in agriculture-nutrition research rely on stronger conceptualizations of gendered time allocation as a linkage between agriculture and nutrition. The conceptual framework previously introduced suggests that time-use research can help explore agriculture-nutrition connections if it sheds light on trade-offs between farm, off-farm,

and reproductive work, and considers household income, composition, seasonality, and work intensity.

### **Methodological considerations and improvements**

In agriculture-nutrition research, time-use data can help us understand two crucial aspects: the heterogeneity of agricultural work and the organization of care and food practices. It can help unpack the agriculture domain in agriculture-nutrition research, as suggested by Webb and Kennedy (2014), by capturing different types of agricultural work – whether it is farming one’s own land or one’s family’s land or waged work in agriculture – and gendered patterns of participation. In addition, time-use data can provide information on the organization of daily food activities, including food preparation and feeding practices, thus shedding light on the nutrition domain. However, time-use data need to be fit for purpose to accomplish these tasks effectively. Data adequacy can be assessed against the conceptual framework we previously discussed.

Time-use data should be accompanied by socioeconomic and demographic information on the household as well as contextual information (Budlender 2007; Hirway 2010). In the time-use survey literature, contextual or background information refers to additional data that helps interpret and classify time-use data. It can include questions on location, means of transportation, with whom the activity was carried out, and for whom it was carried out (UNSD 2005). We have seen that many studies in this review did not collect and/or report on this type of information, so this is an aspect that needs to be strengthened.

Time-use data provide a snapshot but may be less suitable to capture changes over time, unless collection is repeated over time. The problem of snapshot-based approaches for data collection is that they obscure seasonal patterns and temporal dynamics (Charmes 2015). The use of a 24-hour recall period is useful to reduce recall bias, but it also needs to be considered in relation to seasonal and temporal dynamics to make sure the time allocation during the recall period carries meaningful insights on the patterns of time use more broadly. As seasonality is a critical crosscutting feature of the interactions between agriculture, time use, and nutrition, improving the collection of time-use data in this direction would benefit agriculture-nutrition research.

The criteria for selecting the appropriate respondent depend on the objectives of the study at hand. The studies we reviewed reflect a strong concern for women’s time. The literature does suggest that women’s time is particularly relevant in agriculture-nutrition pathways (Ruel, Alderman, and the Maternal and Child Nutrition Study Group 2013), however, moving beyond an overwhelming and narrow focus on women is necessary. While it may be true that women’s time is critical, it is important to

know how women organize their time in relation to other household members, whether they are women of different ages, men, or children. Agriculture-nutrition research may gain useful insights from the literature on intrahousehold gendered dynamics in low-income economies (Darity 1995; Warner and Campbell 2000; Arora 2015; Arora and Rada 2017) to conceptualize gendered time allocation as a linkage between agriculture and nutrition.

Finally, time-use data that offer information on time spent in paid work in the nonagricultural sector is crucial because we cannot assume that time spent in agriculture is necessarily the most significant. Agriculture-nutrition research needs to consider that time spent in agriculture may not be the most important variable to take into account for farming households, in terms of livelihoods diversification and widespread engagement with formal and informal employment outside the agricultural sector in rural areas (Bryceson 1999; O’Laughlin 2007; Meagher 2010; Arora 2015). Studying the gendered time-use pathway between agriculture and nutrition in contexts of rural livelihood diversity is more challenging. Overcoming this difficulty entails addressing empirical questions that are context specific. However, a first step is to capture the relative weight of agricultural activities in relation to others.

In sum, the collection of time-use data can be improved in a number of directions to enhance its potential in agriculture-nutrition research. These include improving the accuracy and coverage of contextual information, seasonal and longitudinal data, a wider selection of respondents, and consideration of employment in the off-farm sectors.

### **Implications for the analysis of time constraints and time poverty**

In order to fully understand the unintended consequences or unseen barriers that time allocation can generate in the relationship between agriculture and nutrition, it is crucial to analyze trade-offs among activities, time constraints, and the prevalence of time poverty. Insights on time poverty are very limited in the reviewed literature. Time-use data per se do not indicate when time becomes scarce, what specific activities are affected when time burdens increase, or what consequences arise. However, accurate time-use data offer a starting-point for these types of analyses.

Stronger conceptual frameworks for time use in agriculture-nutrition research can facilitate a shift from descriptive analyses of time use to analytical interpretations of trade-offs and time constraints. These would conceptualize the use of time in relation to the intrahousehold allocation of reproductive and productive activities and as interacting with household income, composition, seasonal cycles, and the intensity of work.

Methodologically, a combination of survey and qualitative interviews can be effective to develop insights in this area. On the one hand, we need

to know more about trade-offs and the causes of time constraints. On the other hand, we need to identify the time poor. This is often done by using time poverty lines, but, in order to not reproduce the limitations of income and consumption poverty lines (Hanmer, Pyatt, and White 1999), in-depth context-specific evidence is needed to establish meaningful cut-off points.

There are two areas that are currently underexplored in agriculture-nutrition research and should be addressed. First, it is crucial to identify the turning-points. How many more hours spent on agricultural work begin to produce negative effects on nutrition? The reviewed studies are completely silent on this issue. However it can be hypothesized that even when agricultural interventions entail spending additional time on agricultural activities, this will not necessarily put nutrition at risk, as is evident from the findings of the SR. For example, agricultural income can be used to purchase food and increase the use of healthcare services and medical treatment. However, more evidence is needed to shed light on this point and identify the turning-points, which are likely to be intervention and context specific.

Second, time-use data per se do not suggest which areas of time use are most critical to nutrition. What aspects of care, feeding, and food preparation practices are more relevant to ensure adequate nutrition? Investigating these issues requires understanding the intrahousehold organization of care work, as well as the trade-offs that longer or more intensive work in agriculture may generate in relation to care practices for oneself and other household members. To understand how time for unpaid care work is distributed within the household, we need to look beyond raw time-use data and study gendered perceptions on what constitutes work, social and gender norms, and decision making on time allocation (Rost, Bates, and Dellepiane 2015).

Work intensity is an aspect of time use that is critical for well-being (Floro 1995; Jackson and Palmer-Jones 1998). Multitasking is a source of increased work intensity that is especially important for women (Arora 2015), although it is only one aspect of intense work. This consideration is very relevant in the context of agriculture-nutrition research because agricultural work can be energy demanding and labor intensive, and also because nutritional outcomes are an integral part of well-being. In the evidence reviewed, consideration for work intensity is lacking. However, the few studies that consider work intensity confirm its importance. For instance, Fami, Veerabhadraiah, and Nath (2002) and Higgins and Alderman (1997) show that women's energy balance is in deficit when they engage in intensive agricultural work.

We highlight two projects that are currently fostering advancements in the areas of time use and nutrition and/or care. The International Food Policy Research Institute is building on the Women's Empowerment in



Agriculture Index (WEAI) with the development of Project WEAI (pro-WEAI), aimed at making the WEAI indicator more relevant in nutrition-sensitive agricultural projects. Particular emphasis is placed on decision making and aspects of nutrition where women's empowerment plays a significant role.<sup>7</sup> Oxfam brings together analyses of time use and unpaid care work through the Women's Economic Empowerment and Care (WE-Care) project, which makes use of two novel methodological tools: the Household Care Survey, containing a rigorous time-use diary, and the Rapid Care Analysis, structured around focus-group discussions.<sup>8</sup> By combining these tools, they explore social norms related to time allocated to unpaid care and how care work is valued by different groups of respondents.

Innovative approaches in time-use research have the potential to shed light on critical issues we need to know more about in order to draw crucial insights in agriculture-nutrition research. This seems to be a first step to potentiate the analytical scope of time-use research and make a qualitative shift from descriptive uses to the understanding of time constraints and the relevance of time poverty, especially when combined with other manifestations of poverty.

## CONCLUSION

A resurgence of interest in time-use research is currently underway, spurred by concerns, among others, with the unintended negative consequences that time burdens in agriculture may have on nutrition. But are time-use data useful to explore agriculture-nutrition pathways? In this paper, we have looked in-depth at how time use is conceptualized, operationalized, and interpreted in agriculture-nutrition studies. Based on this analysis, we make suggestions on the conceptual and methodological improvements that are needed to enhance the usefulness of time-use data in agriculture-nutrition research.

With regard to methods, we ascribe mixed practices of data collection to loose conceptualizations of time use, mostly treated as a type of metric and with little elaboration of the underlying concepts. Diversity in methods and instruments used to collect data is enriching because both quantitative time-use diaries and qualitative investigations of time-use patterns have a role in understanding how people organize their daily lives. However, it also creates heterogeneous outcomes with regard to data quality, with scarce attention paid to crucial factors. In particular, we note that more importance should be given to contextual information, work intensity, and seasonality; we need to move away from a narrow focus on women and embrace gendered analyses of time use; and, despite a primary concern with agriculture, off-farm employment should not be ignored, as it may also be a source of time constraint.




Conceptualizations of the use of time need to capture the intertwined intrahousehold allocation of reproductive and productive work. In addition, they need to provide the basis to understand how other household factors (income, composition) and extra-household factors (seasonality, work intensity) shape the use of time and the associated nutrition outcomes. These stronger conceptual grounds offer a way to move beyond descriptive analyses of time use, which, despite being useful to provide a picture of inequality, do not tell us anything about trade-offs, time constraints, and, eventually, the incidence of time poverty. These are all issues that currently remain underexplored in agriculture-nutrition literature, and future research should embrace the need to push these analyses beyond descriptives. A perspective on time constraints is necessary to understand when agriculture can produce unintended negative consequences for nutrition.

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TIME-USE ANALYTICS  
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NOTES

- <sup>1</sup> We refer to the background systematic review as SR to distinguish it from the review we present in this paper.
- <sup>2</sup> In the SR, the quality of studies was assessed using a quality appraisal tool. This tool combined a risk-of-bias assessment tool for quantitative evidence (Cirera, Willenbockel, and Lakshman 2011) with peer-review status and a checklist to assess the quality of qualitative and time-use data, respectively (Thomas and Harden 2008; Snilstveit 2012).
- <sup>3</sup> Productive work refers to paid and unpaid work in primary, secondary, and tertiary activities, which is normally accounted for in GDP estimates.
- <sup>4</sup> The review includes fifty-two studies that look at time use as an outcome of agricultural practices or interventions, fifteen studies that treat time use as an input factor that may have consequences on nutrition, and twenty-two studies where time use is a mediating factor in the relationship between agriculture and nutrition.
- <sup>5</sup> Mixed recall periods are observed in studies using mixed instruments to collect time-use data, which may entail the use of different recall periods, depending on the instrument used.

- <sup>6</sup> This discretionary cut-off point was previously used by Elena Bardasi and Quentin Wodon (2006). Hirway (2010) instead refers to the International Labour Organisation (ILO) prescription of not exceeding 40 working hours per week.
- <sup>7</sup> IFPRI is developing Project WEAI under the second phase of the Gender, Agriculture, and Assets Project (GAAP2). For more information, see GAAP2 (n.d.).
- <sup>8</sup> Resources and information on Oxfam’s WE-Care project can be found at Oxfam (n.d.).

## SUPPLEMENTAL DATA

Supplemental data for this article can be accessed at <https://doi.org/10.1080/13545701.2018.1542155>.

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