



## Not your average job: Measuring farm labor in Tanzania



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### ARTICLE INFO

#### JEL codes:

C8  
O12  
Q12

#### Keywords:

Recall error  
Measurement error  
Farm labor  
Agricultural productivity

### ABSTRACT

Understanding the constraints to agricultural growth in Africa relies on the accurate measurement of smallholder labor. Yet, serious weaknesses in these statistics persist. The extent of bias in smallholder labor data is examined by conducting a randomized survey experiment among farming households in rural Tanzania. Agricultural labor estimates obtained through weekly surveys are compared with the results of reporting in a single end-of-season recall survey. The findings show strong evidence of recall bias: people in traditional recall-style modules reported working up to four times as many hours per person-plot as those reporting labor on a weekly basis. Recall bias manifests both in the intensive and extensive margins of labor reporting: while hours are over-reported in recall, the number of people and plots active in agricultural work are under-reported. The evidence suggests that this recall bias is driven not only by failures in memory, but also by the mental burdens of reporting on highly variable agricultural work patterns to provide a typical estimate. All things equal, studies suffering from this bias would understate agricultural labor productivity.

### 1. Introduction

Of the 1.4 billion people living in extreme poverty, the majority reside in rural areas and rely on agriculture as a source of income and livelihood (Olinto et al., 2013). In Sub-Saharan Africa, nearly 75 percent of the extreme poor reside in rural areas, and over 90 percent participate in agriculture. Smallholder agriculture is the predominant form of farm organization, with 33 million small farms holding less than two hectares and representing 80 percent of all farms in Africa (FAO, 2009). On these farms, agricultural practices are typically labor intensive, and the majority of the labor is provided by household members.

Accordingly, the labor of household members in agriculture is a key asset for poor households, and its accurate measurement is essential to the development of sound policy. Despite the importance of the agricultural sector in reducing poverty and food insecurity (Chen and Ravallion, 2007; Irz et al., 2001; Ligon and Sadoulet, 2007), serious weaknesses in agricultural statistics persist.<sup>1</sup> In this study, we examine one aspect of this issue: measures of family farm labor. Specifically, we test for bias related to the length of the recall period over which labor must be reported.

To assess the degree of recall bias in household farm labor, we

conducted a survey experiment in Mara Region, Tanzania, over the long rainy season, January–June 2014. Smallholder farming households were randomly assigned to one of four survey designs, varying the mode (face-to-face versus phone) and frequency of interview, and, thereby, the recall period. Household labor information collected in weekly visits—our resource-intensive gold standard—is then compared with data reported after the harvest. After establishing the magnitude of recall bias, we investigate the mechanisms by which it arose.

We find recall bias in the reporting of family farm labor; however, because of competing forms of recall bias in the reporting of hours of labor, the number of plots, and the number of farming-active household members, the degree of distortion in reporting depends on the level of data aggregation. Labor data collected on a weekly basis, whether in person or by phone, are similar, albeit sometimes moderately statistically different. There are, however, striking and economically meaningful differences between the weekly and recall data. Respondents in recall-style modules report working up to nearly four times as many hours per person per plot, compared with respondents reporting labor on a weekly basis. Meanwhile, recall-surveyed households under-report both the number of household members and plots active in farm cultivation. Evidence suggests that these sources of recall bias are driven not only by

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<sup>1</sup> See ABCDQ (Agricultural Bulletin Board on Data Collection, Dissemination, and Quality of Statistics) (database), Statistical Division, Food and Agriculture Organization of the United Nations, Rome, <http://faostat.fao.org/abcdq/>.

failures in memory where farm inputs are non-salient, but also by the mental burdens of computing data on a typical situation if agricultural work patterns are highly variable during the season.

Our results have important implications for development policy and fill key gaps in the literature concerning survey methods and the quality of agricultural labor data. Ours is one of the few studies to test the accuracy of agricultural labor data in developing-country settings. While labor data have been an essential ingredient in a broad range of important studies on smallholder agriculture in developing countries, scant attention has been paid thus far to the quality and robustness of the underlying data on family farm labor. Evidence that agricultural labor inputs may be substantially overestimated calls into question the reliability of the traditional end-of-season labor estimates commonly collected in household surveys measuring such labor.

These findings also contribute to academic and policy debates concerning the agricultural productivity gap and the degree to which rural labor may be misallocated in developing economies. Several studies have been engaged in this debate. Two in particular, [Gollin et al. \(2014\)](#) and [McCullough \(2016\)](#), question the accuracy of current labor measures and reconsider the agricultural productivity gap after adjusting for labor data quality. By conducting comparisons at the per-hour level ([McCullough, 2016](#)) and by adjusting for sectoral differences in hours worked as well as for levels of human capital ([Gollin et al., 2014](#)), both studies find that the difference in the productivity between the agricultural and non-farming sectors is narrower than usually thought. Our study suggests that surveying irregular labor through recall may result in an upward bias in the reported hours of farm labor, which would further help explain this productivity gap.

Although our results call into question the accuracy of current farm labor data, they also suggest specific ways to improve the accuracy of labor measurement. For instance, the consistency of labor reporting across face-to-face and phone surveys suggests that season-long phone surveys are one option for reducing error in the measurement of rural agricultural labor.

The rest of the paper proceeds as follows. In Section 2, we offer background on labor measurement. In Section 3, we provide an overview of our empirical approach, including details on the survey experiment. In Section 4, we present the results and outline the mechanisms by which bias manifests in recall data through both the extensive and intensive margins of labor reporting. Section 5 concludes.

## 2. Measuring labor

### 2.1. Current practice

The wealth of evidence on the quality and reliability of labor statistics in household surveys comes largely from the United States (for a thorough review, see [Bound et al., 2001](#)). In developing and agriculturally-driven countries, for contrast, little is known about the extent to which the design of surveys influences labor statistics. Clearly, it is difficult to extrapolate from studies conducted in the United States to the African context. Moreover, the existing literature on data quality and survey methods in low-income settings rarely pertains to farm labor (see [Bardasi et al., 2011](#)). It has been noted that International Labour Organization recommendations for measuring labor are likely to be inadequate in settings such as rural Tanzania, where the majority of labor is found in the informal, self-employed, and farm sectors ([World Bank, 2014](#)).

Our review of over 35 recent household surveys that collect labor data in Africa shows that, in practice, the capture of labor market statistics in household surveys varies widely. The recall period, the sequencing of questions, the use of screening questions, the seasonal timing, the granularity of reporting requested, the unit over which labor is reported, and the choice of respondent can vary across surveys both within and across countries. Differences in household survey design have been shown to have substantial implications for statistics and analysis of welfare, poverty, and hunger ([Backiny-Yetna et al., 2014](#); [Beegle et al., 2012b](#),

[2016](#); [De Weerd et al., 2016](#)), as well as labor measurement ([Bardasi et al., 2011](#)) and a range of other socioeconomic conditions.

National integrated or multi-topic household surveys in Africa generally collect data on agricultural labor in two ways.<sup>2</sup> In one approach, general labor information, including agricultural labor, is collected in a labor module. In another, specific agricultural labor data are collected in a dedicated agriculture module, such as in the Living Standards Measurement Study–Integrated Surveys on Agriculture (LSMS-ISA). In the former case, information on labor involving each household member above some specified age is collected in reference to the last seven days or, perhaps, the last 12 months ([Anderson Schaffner, 2000](#)). The person's labor input is not differentiated by plot, by crop, or by farm activity (such as weeding, harvesting, and so on). Instead, in the agricultural module outlined by [Reardon and Glewwe \(2000\)](#), the total days of labor at the household level over the last completed season are collected for each plot and by specific farming activity. An expanded agricultural module would have the same questions for each household member (as in the LSMS-ISA).<sup>3</sup> A common feature in these surveys is that labor information is collected from a single interview.

Though they are considered an improvement over surveys with more general labor force questions, surveys like the expanded LSMS-ISA agricultural module have several potential drawbacks. First, it is time-consuming to collect this very detailed information. Second, the burden on respondents is substantial: respondents are asked to provide information that they may never have considered (for instance, about labor by activity for each plot). Third, there is potential for problems in recall and memory. In our study, we show that these last two points in particular may contribute to inaccuracy in farm labor reporting.

### 2.2. What complicates the measurement of smallholder farm labor?

#### 2.2.1. Features of smallholder farming

The estimation of labor inputs on smallholder farms is complex and vulnerable to misreporting.<sup>4</sup> Smallholder farms typically employ mostly family labor, and so there is no wage income on which to anchor recall. Written records are rarely kept, and the respondent must rely on recall strategies to report on past events. To arrive at the total amount of labor allocated by a household to farming, the household must accurately report the plots under cultivation, the specific household members who worked on each plot, the activities performed, and the timing and duration of these activities. Farming is a seasonal activity, and work patterns are irregular during the season. Reporting on the typical or average amount of time spent farming requires, after the completion of the season, remembering distant events and performing complicated mental calculations. Alternatively, reporting hours worked in the last seven days at any single point during the agricultural season will not necessarily be indicative of total labor during the season, if labor inputs vary greatly during the season—particularly if respondents report on what “typically” happens in a given week, rather than what actually happened in the preceding week. Accordingly, farm labor measures can

<sup>2</sup> Apart from multi-topic household surveys, smallholder information can be collected through specialized farm surveys. These often entail visiting the household at multiple times, particularly those surveys utilizing resident enumerators (for example, agricultural extension agents or other ministry of agriculture staff). However, these surveys typically do not collect details on household farm labor.

<sup>3</sup> The LSMS-ISA program has been conducted in Burkina Faso, Ethiopia, Malawi, Mali, Niger, Nigeria, Tanzania, and Uganda. See LSMS (Living Standards Measurement Study) (database), World Bank, Washington, DC, <http://www.worldbank.org/lsmis>.

<sup>4</sup> Measurement problems are not restricted to labor. For instance, intercropping, continuous planting, extended harvest periods, and multiple plots of small sizes and irregular shapes can make reporting on most inputs and outputs difficult. Although several strategies are proposed in the literature to account for mixed-stand crops, no method has yet gained wide acceptance ([Fermont and Benson, 2011](#)). The introduction of Global Positioning System devices has improved the measurement of landholdings, but the methods for collecting production and input data are not much different now than in the last several decades ([Deininger et al., 2011](#)).

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