



**Fantasyland:
Comparing Subjective and Objective Measures of Farm Land Area in Household Surveys**

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The importance of accurate land area measurement in surveys in developing countries cannot be overstated. In rural societies land is a major measure of wealth, a critical input in agricultural production, and a key variable for assessing agricultural performance and productivity. In the absence of cadastral information to refer to, measures of land plots have historically been taken with one of two approaches: traversing (very precise, but cumbersome), and farmers' self-report (cheap, but marred by large, systematic measurement error). Recently, the advent of inexpensive handheld GPS devices has held promise of balancing cost and precision concerns, and is increasingly being adopted by survey practitioners. There are, however, concerns about how GPS measures may perform on certain types of plots, or under given measurement conditions, and we are not aware of any large, experimental validation exercise that has formally assessed the performance of competing methods under real survey conditions. Using purposely collected data from methodological validation studies conducted in Ethiopia, Nigeria, and Tanzania, this paper analyses the use of farmer self-reported area estimation against the primary objective measurement alternatives: GPS measurement, and the traditional traversing (or "compass and rope") method. Our data are unique in that they include alternative measures taken on the same plots, as well as extensive information on plot and respondent characteristics, the enumerators, and the measurement conditions. The potential for the use of remote sensing imagery is also considered.

We consider traversing to be the 'gold standard' in land area measurement, and compare that to GPS and self-reported measures of the same plots controlling for a range of factors that can influence the quality of area measurement. Bivariate and multivariate analysis is employed to assess how the magnitude and direction of measurement error varies with each of these factors. We also provide a detailed account of how the three measures compare in terms of time intensity (and hence cost), which is a crucial concern for large scale national household surveys under the severe budget constraints faced by statistical offices and ministries of agriculture in developing regions. Guided by analytical results, and with consideration for practical household survey implementation, the paper proposes a set of recommendations for plot area measurement with a focus on self-reported estimates, GPS measurement, compass and rope measurement, and the use of remote sensing imagery. Results largely point to the support of GPS measurement, with simultaneous collection of farmer self-reported areas.

Keywords: GPS measure; land measurement; survey design; methodological validation.