Livestock Data Innovation in Africa BRIEF

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Issue 19

Testing New Approaches to Mapping Livestock Variables in Uganda: Integrating Census and Survey Data

There is evidence that livestock provide a multitude of livelihoods services to farm households. They are a source of food, cash income, draught power and hauling services, saving and insurance, dung and social capital. There is also evidence that a large share of rural households keep livestock, including the poor. Targeted investments in the sector could thus definitely contribute to improved livelihoods and a decline in rural poverty.

Data integration, the combined use of data from different sources, is an effective way to derive detailed policy and investment indications, which could not be obtained by using individual datasets on their own. Indeed, the second pillar of the Global Strategy to Improve Agricultural and Rural Statistics targets integration of different data systems for more effective policies and investments.

This brief summarizes the results of a livestock mapping exercise whereby household survey and livestock census data are integrated to generate highly spatially-disaggregated maps for Uganda. It is the result of a joint work undertaken by IFPRI/HarvestChoice, the LSMS-ISA project of the World Bank and FAO-WB-ILRI Livestock Data Innovation in Africa Project. More details are available in C. Azzarri and E. Cross (2012) *Testing New Approaches to Mapping Livestock and Livestock Income in Uganda*, available at www.africalivestockdata.org/afrlivestock/content/papersreports

Methodology and Data

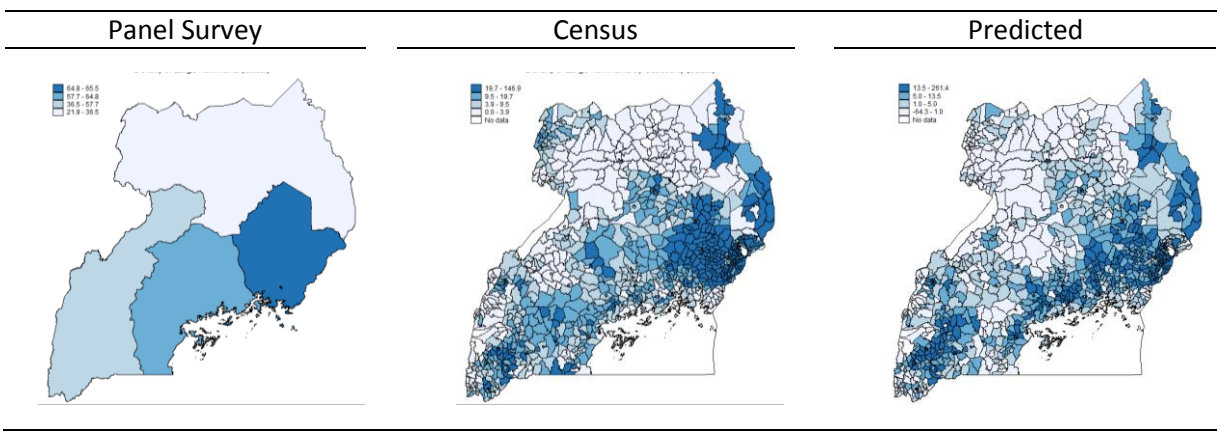
Household sample surveys are rich in information but collect information from a relatively small sample of households, which is rarely if ever large enough to produce statistically reliable estimates at lower levels of disaggregation, such as for districts or wards. For instance, multi-topic household surveys could provide information to estimate livestock income for some representative household, but cannot provide details on the districts where households benefit the most (or less) from their farm animals.

Censuses collect data on a limited set of variables but on a complete enumeration basis, i.e. from all farm holdings/rural households in case of an agricultural census, or from a sample large enough to produce estimated at lower administrative units. However, the collected data are, on their own, insufficient for formulating effective investments. For example, a livestock census provides detailed information on the distribution of the cattle population at village level, but not enough information to estimate livestock income at household level.

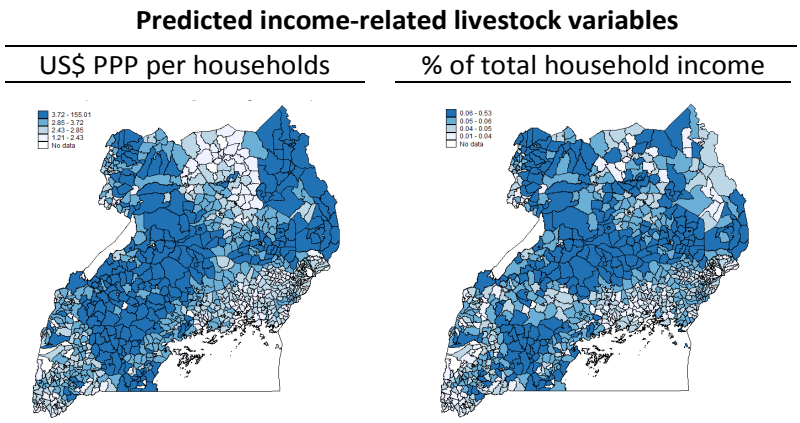
Small Area Estimation (SAE) technique can be used to integrate household sample surveys and Census Data. The method behind SAE is relatively straightforward. First, comparable variables are selected from the survey and the census. These variables must be similar in mean, standard deviation, frequency distribution at the national level, collection method, and definition. Second, an estimation model is fitted on the survey, where the dependent variable is one missing in the census data (e.g. income). Third, parameters estimates from survey data are applied to census data, allowing mapping at the lower administrative unit indicators generated in the survey. The method is explained in detail by Elbers, Lanjouw, Lanjouw (2003; Micro-Level Estimation of Poverty and Inequality, Econometrica, 71:1, pp. 355-364).

SAE has been predominantly used to impute measures of consumption or income into census data using estimates based on survey data. Here, the 2009/2010 Uganda National Panel Survey and the 2008 Uganda National Livestock Census are integrated using SAE technique to draw highly spatially-disaggregated maps targeting livestock related variables than would have been possible using survey or census data alone.

Large ruminants: number/skm



Predicted income-related livestock variables



Results

Three sets of results are presented. First, the density of large ruminants (heads/sqkm) at the sub-county level are predicted and then compared to actual values in the census. This allows testing the reliability of the prediction method used. The model has a relatively high explanatory power (see top figure above), which suggests that SAE can be a viable and reliable method to estimate spatial distribution of missing information through prediction.

The other two estimated models allow predicting and mapping livestock per capita income (US$ 2005 PPP) and household's share of income from livestock at sub-county level. Even though statistical diagnostics are not fully satisfactory, the two maps provide evidence that by virtue of survey-to-census prediction, it is possible to draw higher spatially-disaggregated maps and for more indicators than using census or survey data on their own. These and similar maps could be valuable tools for decision makers.

Conclusions

Data integration is essential for effective investment decisions as it allows generating information than different surveys, on their own, could not produce. SAE represents an effective method to integrate data from different sources, including from the 2009/10 Uganda National Panel Survey and the 2008 Livestock Census.

For data integration to be feasible it is important that the various methods of data collection be consistent. For instance, the statistical unit should be the same, as well as definitions and classifications; even questions should be formulated consistently. Finally, the timing of the various surveys is also relevant as it may be of little use to compare data from surveys undertaken in different years, particularly when addressing issues pertaining to fast, or relatively fast growing sectors.

For further information please visit:
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