

Acknowledgments

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Preface

Around 2.6 billion people in the developing world are estimated to have to make a living on less than \$2 a day and of these, about 1.4 billion are ‘extremely’ poor; surviving on less than \$1.25 a day. Nearly three quarters of the extremely poor – that is around 1 billion people – live in rural areas and, despite growing urbanization, more than half of the ‘dollar-poor’ will reside in rural areas until about 2035. Most rural households depend on agriculture as part of their livelihood and livestock commonly form an integral part of their production system. On the other hand, to a large extent driven by increasing per capita incomes, the livestock sector has become one of the fastest developing agricultural sub-sectors, exerting substantial pressure on natural resources as well as on traditional production (and marketing) practices.

In the face of these opposing forces, guiding livestock sector development on a pathway that balances the interests of low and high income households and regions as well as the interest of current and future generations poses a tremendous challenge to policymakers and development practitioners. Furthermore, technologies are rapidly changing while at the same time countries are engaging in institutional ‘experiments’ through planned and un-planned restructuring of their livestock and related industries, making it difficult for anyone to keep abreast with current realities.

This ‘Working Paper’ Series pulls together into a single series different strands of work on the wide range of topics covered by the Animal Production and Health Division with the aim of providing ‘fresh’ information on developments in various regions of the globe, some of which is hoped may contribute to foster sustainable and equitable livestock sector development.

This paper follows on from a previous FAO study that used remotely sensed and other environmental data to map poverty in Uganda (FAO, 2006) and extends it to the Horn of Africa, incorporating additional environmental and sociological variables. Furthermore, instead of using a direct measure of poverty, this study investigates the use of the Demographic and Health Survey (DHS) Wealth Index (WI) as a proxy for a regional welfare measure.

Abbreviations

AGAL	FAO Livestock Information, Sector Analysis and Policy Branch
AVHRR	Advanced Very High Resolution Radiometer
CIAT	Centro Internacional de Agricultura Tropical
CIESIN	Center for International Earth Science Information Network
DCW	Digital Chart of the World
DHS	Demographic and Health Survey
DMSP	Defence Meteorological Satellite Program of the United States
EARS-NL	A high-tech remote sensing company, based in the Netherlands
EC	European Commission
ERGO	Environmental Research Group Oxford
EVI	Enhanced Vegetation Index
FAO	Food and Agriculture Organisation
FAO-FSNAU	FAO Food Security and Nutrition Analysis Unit - Somalia
GIS	Geographic Information System
GLW	Gridded Livestock of the World
GPS	Global Positioning System
GPW	Gridded Population of the World
GRUMP	Global Rural and Urban Mapping Project
HF	Human Footprint
HII	Human Influence Index
IGAD	Inter-Governmental Authority on Development
IGAD LPI	IGAD Livestock Policy Initiative
ILRI	International Livestock Research Institute
IRD	Institute for Resource Development
JRC	Joint Research Center of the European Commission
LST	Land Surface Temperature
MIR	Middle Infra-Red
MODIS	Moderate Resolution Imaging Spectroradiometer
NDVI	Normalised Difference Vegetation Index
NGO	Non-Government Organisation
NIMA	US National Imagery and Mapping Agency (former name of the National Geospatial-Intelligence Agency)
NOAA	National Oceanic and Atmospheric Administration
PCA	Principal Component Analysis
PAAT	Programme Against African Trypanosomiasis
PPLPI	Pro-Poor Livestock Policy Initiative
SAE	Small Area Estimate
TALA	Trypanosomiasis And Land-use in Africa
USAID	United States Agency for International Development
WCS	Wildlife Conservation Society
WI	Wealth Index

Executive summary

Poverty measures are usually based on economic indicators, such as income or expenditure, or on a number of social indicators such as life expectancy, under-five mortality, nutritional status, and so on, usually collected through household surveys. Recently, researchers and policy makers started to analyze poverty through the use of geographically disaggregated indicators that provide information about the spatial distribution of inequality and poverty within a country: these are usually referred to as ‘poverty maps’. The most common approach to poverty mapping is the small area estimation technique, developed by the World Bank, which combines census and survey data to provide sub-national estimates of welfare.

Another, more recent approach involves the combination of household survey data with a suite of environmental and other spatial variables not only to map but also to try and explain and possibly predict the distribution of poverty. In Uganda, satellite data have proved useful in understanding and possibly predicting the causes of poverty. Such imagery, when appropriately processed, captures habitat seasonality associated with the growing seasons for crops, or transmission seasons for vector-borne and other diseases. These seasonal signals were used within a discriminant analytical framework to describe the different levels of household expenditure.

By using an appropriately reconstructed Wealth Index (WI) from the Demographic and Health Survey (DHS) data as a proxy for poverty, the same approach can be extended to larger regions. The results of the present study conducted in the Horn of Africa indicate that the lowest levels of Wealth Index are associated with dry conditions; intermediate Wealth Index levels are associated with moister, greener conditions; and high Wealth Index levels are associated with less green conditions and human activity - high population densities and proximity to population centres. The detailed nature of the relationships remains to be investigated.

The approach described here shows that it is possible to use the DHS WI as a regional poverty indicator, provided that it is reconstructed from a set of common indicators from the individual, national DHS surveys. Many questions remain to be addressed in developing the environmental approach to poverty mapping, but the present analysis confirms that environmental variables are important correlates of human welfare and may be used to describe welfare levels across climatically and sociologically diverse regions.