

**Are common points shaping groundwater access on rural water supply systems?
Comparative Statistical Analysis in four countries in Eastern Africa In: World
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Groundwater is a crucial resource for rural development worldwide. Despite the widespread implementation of handpumps in rural areas, particularly in low and middle-income countries, many areas still have limited or no water access. As an attempt to address the complexity and heterogeneity that characterise the human-groundwater interaction in rural water supply systems, we propose a multivariate approach that combines different variables, such as water point functionality and groundwater quality characteristics, here including both physicochemical and hydrochemical parameters. Furthermore, social and economic parameters variables, such as water point maintenance, finance, governance system, and the main occupation of the villagers. The combination of variables of different types and ranges of values is better suited using Multiple Factor Analysis (MFA) to formally determine the main variables that affect water access and the relationship among them.

We applied the methodology in four countries where rural areas are mainly supplied with hand pumps. The analysis was performed on datasets collected during a waterpoint census between 2015 and 2016 by the UPGro "Hidden Crises" and "Grow for Good" Projects from Kenya (data point, n=165), Uganda (n=146), Malawi (n=200), and Ethiopia (n=170). The results of the analysis indicate the existence of common trends (or a combination of a number of variables), indicating that water access in Eastern African rural areas can be described mainly by three main components: one representing the hydrogeological environment, a second comprising water point management agreements, and a third component linked to the sustainable functionality of handpumps. We further suggest an individual methodology to evaluate each one of the components, involving hydrogeological modelling to waterpoint surveys or a demographic study, allowing for the overall multidisciplinary project to be attacked separately into small disciplinary-specific approaches