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Domestic Water Use by Rural Households without Access to Private Improved Water Sources: Determinants and Forecast in a Case Study for Benin

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Abstract

Accessibility to safe water remains a major concern in Benin, where only 23 % of the population have improved drinking water within the residence. The problem is even more important in rural areas where households have no access to private improved water sources. Based on Benin's good level of per capita water availability (3815 m^3 per year), it is argued that efficient water management can highly contribute to increase the level of access to safe water. However, better understanding of factors explaining domestic water use, including forecasting how these variables will affect future water use, is an important step of efficient water management policy for rural developing countries. Accordingly, this study combines a Seemingly Unrelated Tobit (SURT) approach and Geographic Information System (GIS) techniques to determine factors affecting domestic water use in dry season, when water is at its scarcest level in rural areas. The focus is on rural households without access to private improved water sources in Benin. These households use either only free water sources, only purchased sources or combine both free and purchased sources. Both socio-economic and geographic data were collected from 325 households in 27 villages.

Results confirm that SURT is appropriate to account for both censored nature of water demand and the correlation of error terms between free and purchased water use equations. Contrary to the importance of price effect on residential water demand, we find that purchased water demand is perfectly own-price inelastic due water scarcity in rural areas. Rather, the important determinants of water use are household size and composition, access to water sources, wealth and time for fetching water. However, the effects are different for households which use only free sources, households which rely only purchased sources and those which combine both free and purchased sources. Moreover, econometric and spatial analysis shows that the effect of population growth on future water scarcity will not be similar for all districts in the study area. We conclude that water management policy at district level is likely to produce better impact as compared to the usual national or basin based approach.

Keywords: Benin, censored models, domestic water management, dry season, GIS, rural households, seemingly unrelated regression

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