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Multidimensional Poverty in Ethiopia: Capturing New Health Measures Through Water Quality Measurement

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Multidimensional poverty index (MPI) is being increasingly used to measure poverty and well-being in developing countries. The Alkire-Foster methodology developed by the Oxford Poverty and Human Development Initiative (OPHI) is guiding the analytical framework in this area. The index is now used to monitor national and global goals. For instance, the Sustainable Development Goals (SDGs) explicitly included a target on reducing multidimensional poverty. Target 1.2 refers to reducing by half the proportion of women, men and children living in poverty in all its dimensions, according to national definitions, by 2030.

The Alkire and Foster (AF) approach aggregates MPI using 18 selected indicators categorized in three dimensions including health, education and living standards (Alkire and Foster 2011). The approach is aimed at complementing the traditional income-based poverty measures by capturing the individual deprivations with respect to education, health and living standards dimensions. The index has several desirable properties. First, it can be adopted to different contexts and for different purposes given its different dimensions and indicators. Second, the methodology could also be used to examine one sector, to represent for example, the quality of education or dimensions of health. Third, ordinal, categorical, and cardinal data can be used. Fourth, this measure is highly decomposable. The measure can be broken down into its individual dimensions to identify which deprivations are driving multidimensional poverty in different regions or groups. Fifth, it is a powerful tool for guiding policies to efficiently address deprivations in different groups.

However, how each indicator was captured is key for the accuracy of the MPI metric in measuring poverty. For example, the water indicator is measured based the household's access to improved drinking water sources. In this arrangement, households with improved drinking water sources are regarded as non-deprived or non-poor with respect to that indicator. However, an improved source is not necessarily a safe source. An improved source could be contaminated by microbial or chemical agents.

In this study, we capture the water quality indicator using an objective measure of water contamination (contamination as well as high contamination) both at source and household. This measure is a more precise indicator of water quality and is based on E coli contamination. The

contamination is measured at source (fetching point) and at the household level (point of use). We generate a new MPI by replacing the baseline water indicator-which is based on access to improved sources- with the water quality indicator. We further analyze the new indicators effect on the MPI and compare these MPI's to the standard AF MPI which is based on the household's access to improved water sources.

We use the 2016 Ethiopia Socioeconomic Survey data that also included a water quality module and aimed to measure the quality, availability, and sufficiency of drinking water in all parts of the country. Drinking water samples were collected from 4,688 households and 4,533 source points all statistically representative at the regional level. The data collected made it possible to identify both the extent of contamination of water sources and contamination occurring during water collection, transport, and handling.

MPI poverty results to be high with rates above 50% in both baseline and MPI using water quality indicator at household and at source, respectively. Both MPI using water quality indicators exhibit higher poverty rates compared to the baseline AF MPI. MPI poverty is highest when we utilize the water quality indicator for contamination at household compared to contamination at source and baseline MPI. We find that replacing the water indicator with a more objective measure increases MPI poverty by 5 percentage points. The increase is consistent in all regions, though we observe regional differences. Small towns and urban households are the key drivers of the increase in MPI.

To check the robustness of our results we run the above models focusing on a sub sample of the households who are deprived in the water quality indicator. We define a high contamination indicator which captures the households with high contamination of water at source and household. We then run robustness checks on the MPI compare to the baseline MPI measure. The checks are robust for all our results and confirm the above obtained results on the significant role of water quality in defining both the living conditions dimension and the overall poverty measure. These results emphasize the importance of the water contamination indicator in better capturing households deprived in this indicator as well as defining the poverty index.