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ESTIMATING URBAN POVERTY CONSISTENTLY ACROSS COUNTRIES

Pierre-Philippe Combes, Shohei Nakamura, Mark Roberts, Benjamin Stewart

Global poverty monitored by the World Bank for the Sustainable Development Goals (SDGs) is reported only at the national level, lacking a breakdown between urban and rural areas. A key challenge to producing globally comparable estimates of urban poverty is the need for consistent definitions of urban areas and poverty. This note illustrates an innovative approach to integrating globally consistent urban and poverty measurements to estimate urban poverty statistics that are directly comparable across countries. Two approaches to quantifying urban—the Degree of Urbanization and the Dartboard approaches—are applied in seven case countries. By combining these delineations with official household budget survey data, poverty is estimated with international poverty lines. The empirical illustrations demonstrate that the proposed approach is potentially useful to improve the monitoring of global poverty.

INTRODUCTION

Global poverty is currently monitored only at the national level, lacking its breakdown at the urban and rural levels.[1] The spatial distribution of extreme poverty is not well known—whether it is predominantly a rural or urban phenomenon, and/or whether poverty is urbanizing.[2] A key challenge to the comparable estimation of urban poverty across countries is the need for consistent definitions of urban areas and poverty. This note presents preliminary results from an ongoing analytical project by the World Bank's Poverty & Equity and Urban Global Practices to estimate comparable urban poverty by integrating globally consistent urban and poverty measurements. For an empirical illustration, the approach is applied to the following seven countries: Angola, Bangladesh, Egypt, Ethiopia, Ghana, Tanzania, and Vietnam.

[1] SDG Target 1.1. Global poverty is reported by the World Bank at http://iresearch.worldbank.org/PovcalNet/povOnDemand.aspx

[2] Ravallion, Chen, and Sangraula. 2007.

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METHODOLOGY

The methodology employs two urban delineation approaches: The Degree of Urbanization (DOU) and the dartboard (DB) approaches. The DOU is an approach endorsed by the United Nations Statistical Commission, classifying contiguous groups of pixels as either urban centers, urban clusters or rural areas based on absolute population and population density thresholds (Table 1).[3] Urban centers are denser cities, whereas urban clusters can be considered as suburbs and towns.[4] The DB approach is to classify areas as urban which have higher population density than the 95th percentile of the counterfactual density of randomly re-distributed populated pixels in a country (Table 2).[5] Urban areas are classified as either cities, suburbs, or towns.

Table 1. Degree of Urbanization definitions

Classification	Definitions
Urban centers (cities)	Spatially contiguous sets of 1km2 grid cells for which population density of each cell ≥ 1,500 people per km2 and aggregate settlement population ≥ 50,000.
Urban clusters (towns and suburbs)	Spatially contiguous sets of 1km2 grid cells for which population density of each cell ≥ 300 people per km2 and aggregate settlement population ≥ 5,000.
Rural areas	Areas not classified as either urban centers or urban clusters.

Note: See Dijkstra et al. (2021) for details.

Table 2. Dartboard definitions

Classification	Definitions
Urban areas	Sets of contiguous pixels with population density > 95th percentile of counterfactual.
Cities	Urban areas that possess a core, where cores are identified as contiguous second-order urban pixels based on re-shuffling within urban areas.
Suburbs	Non-core parts of cities
Towns	Urban areas without a core
Rural areas	Areas not classified as urban areas.

Note: See de Bellefon et al. (2021) for details.

[3] Dijkstra et al. 2021.
[4] Non-monetary poverty indicators are reported based on the Demographic and Health Survey (DHS) and the DOU classifications by Henderson et al. 2019.
[5] de Bellefon et al. 2021.

Both the DOU and DB approaches are consistent but in different ways. The DOU measures urban areas consistently by applying the same absolute population and population density thresholds to all countries. The DB approach is statistically consistent, measuring urban areas in locally relative terms by applying the same statistical procedures to each country's own density distribution.

The DOU and DB approaches are applied to two sets of gridded population datasets to delineate urban areas: GHSPOP and WorldPop.[6, 7] While both datasets are prepared based on each country's population census data, the way census-based population is spatially distributed over grid cells is different. For each gridded population dataset, 250m and 1km resolutions are used for the purpose of comparison. Given the limited space, this note presents only the results based on WorldPop 1km.

Gridded layers with new DOU/DB classifications are overlaid with each country's official household budget surveys (HBS). The most geographically disaggregated location information available in HBS is household-level GPS coordinates. Among the countries analyzed for this study, Ethiopia and Tanzania have such information. The second-best information is the locations of primary sampling units (Ghana). Other countries have community or subdistrict location information (Angola, Bangladesh, Egypt, Vietnam). Once overlaid, urban and rural populations based on the new DOU/DB classifications are calculated by using the HBS sampling weights.

Poverty is measured with international poverty lines by using the HBS with the new DOU/DB classifications. Per capita daily consumption expenditures calculated based on the HBS is compared to international extreme and middle-income poverty lines ($1.9 and $3.2 in 2011 PPP terms respectively). Poverty rates are estimated for urban and rural areas, as well as at the national level.

To better estimate urban poverty, a few modifications are made, in addition to the update of urban classifications. First, housing rents are added to consumption expenditures in the countries where global poverty is measured without housing rents (Ghana and Tanzania). Second, consumption expenditures are spatially deflated to take account of subnational cost of living differences. Table 3 summarizes each country's spatial price deflator.[8] Because of these modifications, the poverty

[6] GHSPOP https://ghsl.jrc.ec.europa.eu/ghs_pop.php
[7] WorldPop https://www.worldpop.org/. We focus on unconstrained WorldPop data.
[8] The principle is to adopt and modify the spatial deflation approach used for each country's poverty measurement with the national poverty line.

rates presented in this note deviate from the official global poverty numbers even at the national level.

Table 3. Spatial price deflators used for analysis

Country (year)	Spatial price deflator
Angola (2018/19)	Fisher spatial price index based on food and non-food unit values, combined with a housing price index.
Bangladesh (2016/17)	Ratio of regional poverty lines, calculated based on the cost of basic needs approach.
Egypt (2017/18)	Ratio of regional poverty lines, calculated based on the cost of basic needs approach.
Ethiopia (2015/16)	Laspeyres spatial price index, accounting for both food and non-food prices.
Ghana (2016/17)	Weighted country product dummy index based on CPI price data, combined with a housing price index.
Tanzania (2017/18)	Paasche spatial price index based on food unit values, combined with a housing price index.
Vietnam (2016)	Tornqvist spatial price index based on a price survey data.

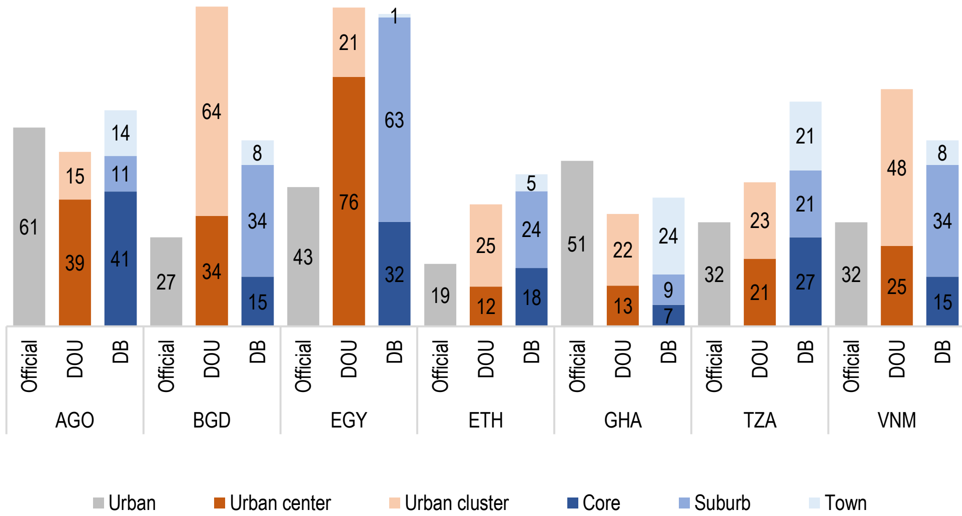
RESULTS

The application of the DOU/DB classifications results in higher urban population shares than the official shares in most cases (Figure 1). Particularly wide gaps are found for Bangladesh and Egypt. For Bangladesh, DOU-based urban population share is 98 percent, substantially higher than the share based on the official urban definition (27 percent). Similarly, Egypt is predominantly urban (97/96 percent) with the DOU and DB classifications, while its official urban population share is only 43 percent.[9]

Another important result is the wide gap in Bangladesh's urban population shares between DOU and DB classifications. Because of the overall high population density, the DOU approach classifies almost all population as urban (98 percent). On the other hand, the DB approach detects only 57 percent of population as urban. This contrast highlights the difference between the DOU's absolute and the DB's relative approach to delineating urban areas.

[9] For Egypt, the high urban share estimated using the DB approach is likely because the approach does not consider deserts as unlivable areas in deriving a country's counterfactual density distribution. Work is underway to incorporate deserts into the approach.

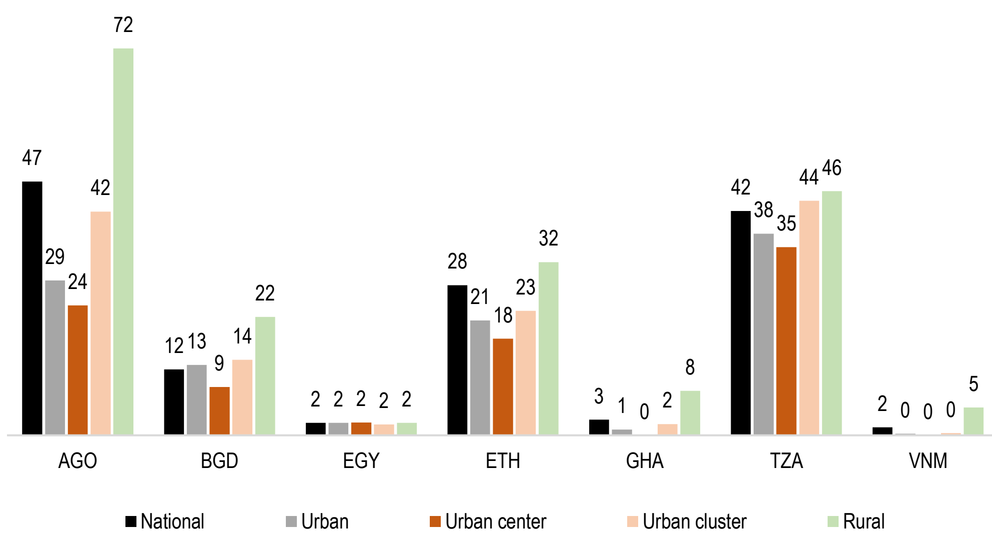
Figure 1. Urban population shares (%)



Source: Calculations using WorldPop and each country's HBS.

With the globally consistent urban measures, poverty rates are estimated to be lower in urban areas–particularly in urban centers–than in rural areas. When the DOU classification is applied, urban poverty rates measured with $1.9 international poverty line are lowest in urban centers, followed by urban clusters and rural areas (Figure 2). For example, in Angola the poverty rates are 24 percent in urban centers, 42 percent in urban clusters, and 72 percent in rural areas.

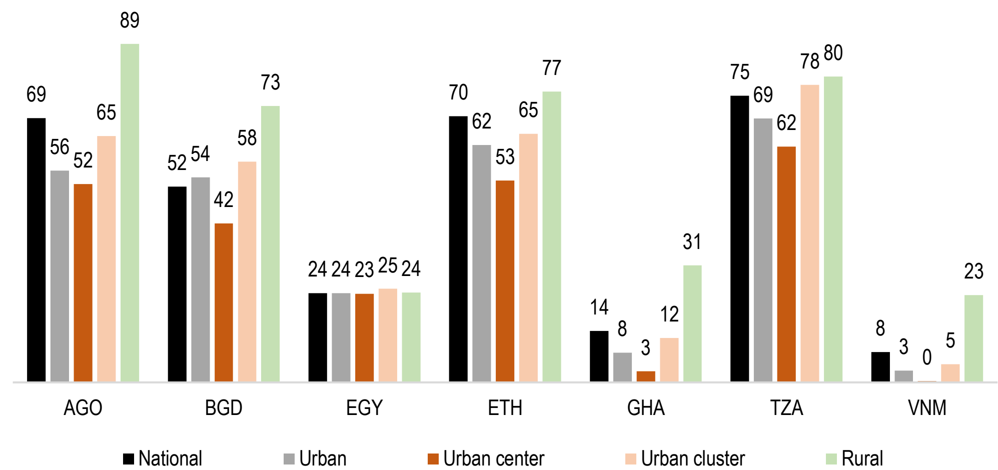
Figure 2. $1.9 poverty rates with DOU classifications (%)



Source: Calculations using WorldPop and each country's HBS.

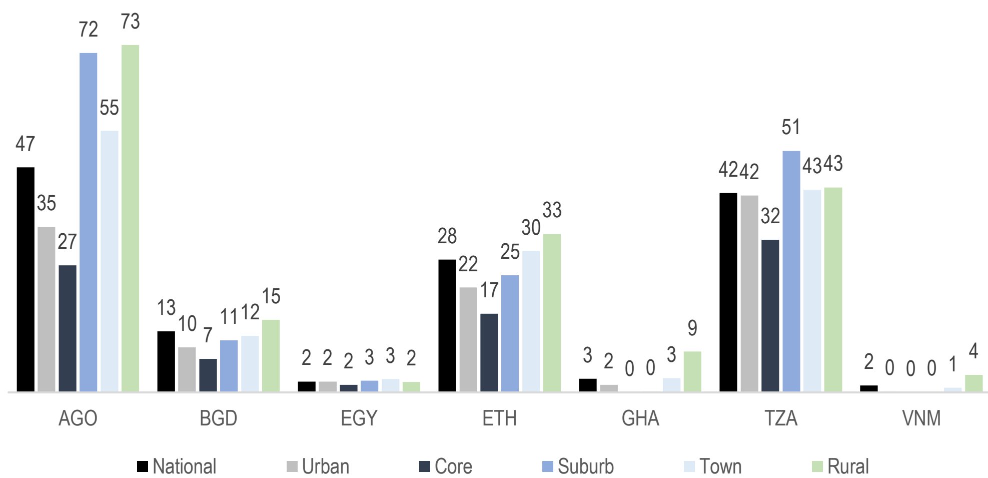
Application of higher poverty lines (such as $3.2 line in Figure 3) also indicates that denser areas have lower poverty rates. Broadly similar patterns are observed when the DB classification is applied (Figure 4).

Figure 3. $3.2 poverty rates with DOU classifications (%)



Source: Calculations using WorldPop and each country's HBS.

Figure 4. $1.9 poverty rates with DB classifications (%)

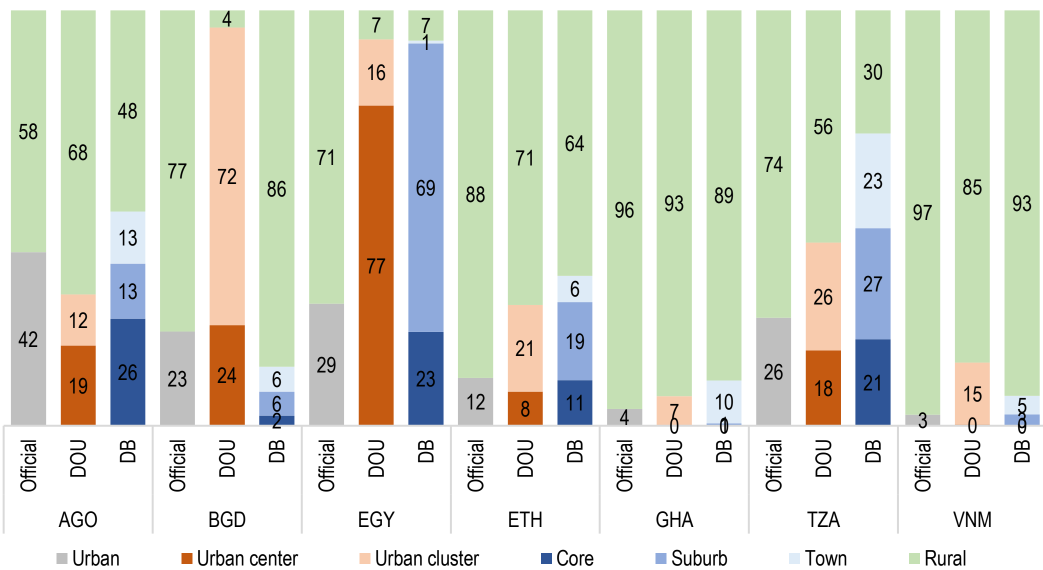


Source: Calculations using WorldPop and each country's HBS.

Adopting globally consistent measures of urban areas and poverty makes it possible to directly compare urban poverty across countries. For example, while Angola has a higher poverty rate than Tanzania at the national level, Angola's urban poverty rate is lower than Tanzania's (Figure 2). However, even Angola's poverty rate in urban centers is higher than Bangladesh's rural poverty rate.

The analysis also uncovers global extreme poverty more concentrated in urban areas than previously thought. In addition to poverty rates in each type of geographic area presented above, it is important to examine how poor populations are spatially distributed. As shown in Figure 5, with the official urban definitions, rural areas accommodate more than half of poor populations in all the analyzed countries. For instance, 74 percent of poor populations in Tanzania live in rural areas. In other words, urban poverty accounts for only 26 percent of the country's poverty. With the DOU and DB classifications, urban shares of poverty increase to 44 percent and 70 percent, respectively. It is also worth mentioning that while poverty rates tend to be relatively low in denser urban areas (such as urban centers and urban cores), those areas account for a non-negligible share of poor populations.

Figure 5: Geographic shares of poor populations (%)



Note: Poverty is measured with $1.9 international poverty line.
Source: Calculations using WorldPop and each country's HBS.

CONCLUSIONS

This note illustrates how to measure globally comparable urban poverty by integrating new urban delineation approaches into global poverty measurement. To conclude, a few methodological remarks are highlighted. First, the implementation of the presented approach requires reliable location information about households or reasonably geographically disaggregated units in HBS. Second, spatial deflation of household consumption expenditures or incomes needs to be improved to better account for subnational cost of living differences. Third, the proposed approach is not a small area estimation method; thus, it does not provide poverty rates for specific cities and towns. Finally, the microdata approach allows various interesting analyses, such as the relationship between monetary poverty and non-monetary poverty, as well as the profile of the poor by location—particularly economic activities from a perspective of structural transformation.

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About The Authors

Pierre-Philippe Combes is CNRS Professor at the Department of Economics of Sciences Po.

Shohei Nakamura is an Economist at the Poverty and Equity Global Practice of the World Bank.

Mark Roberts is a Lead Urban Economist and co-Global Lead of the Territorial and Spatial Development Global Solution Group in the Urban, Disaster Risk Management, Resilience, and Land Global Practice of the World Bank.

Benjamin Stewart is a Senior Geographer at the Development Economics (DEC) of the World Bank.

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