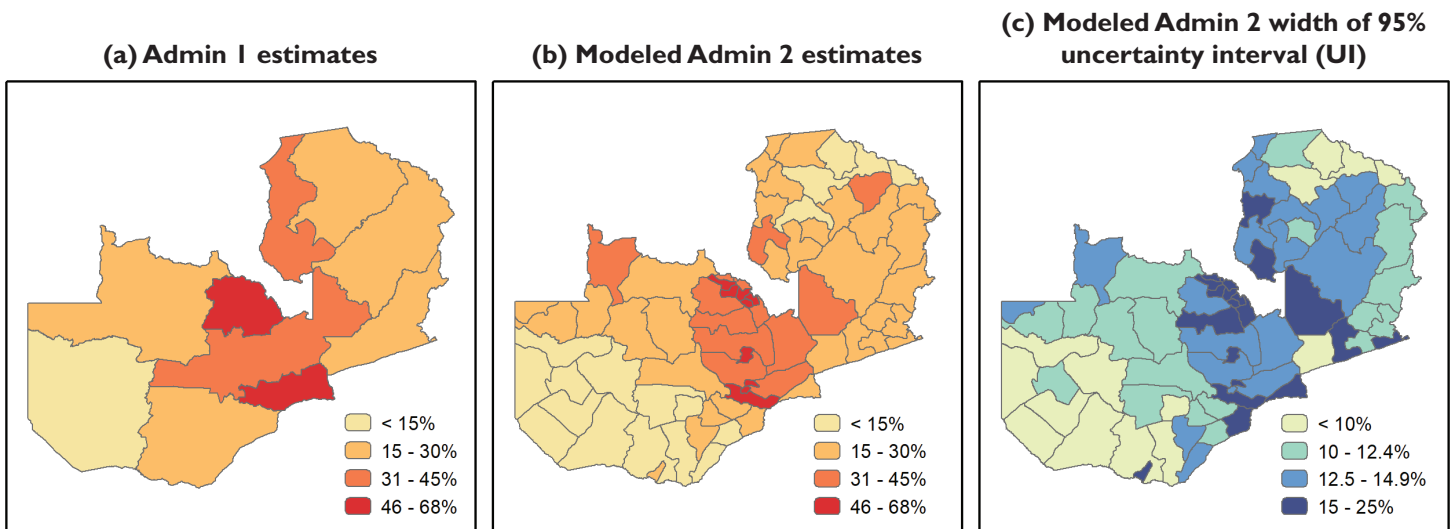




## What are modeled Admin 2 estimates?

DHS Program surveys provide estimates for indicators at the first subnational administrative level (Admin 1), often referred to as provinces or regions (**Figure 1a**). But DHS indicator estimates at this level can obscure inequalities that exist at the smaller second subnational administrative level (Admin 2), often referred to as districts or municipalities. By using a geospatial modeling approach, The DHS Program can produce modeled Admin 2 estimates (**Figure 1b**) and an associated uncertainty metric (**Figure 1c**).

**Figure 1** Percentage of population living in households using an appropriate water treatment method in Zambia, 2018 DHS



## Why produce modeled Admin 2 estimates?

Constrained by limited resources, program planning needs to ensure that geographic areas are targeted effectively. As program planning and implementation often occur at the Admin 2 level, modeling indicators at this level provides a reliable smaller area estimate that is less costly than the alternative of increasing the survey sample size.

## How are modeled Admin 2 estimates produced?

The DHS Program produces modeled Admin 2 estimates using a Bayesian model-based geostatistics (MBG) approach. This approach leverages the spatial relationship between survey clusters and the relationship with environmental and socioeconomic covariates to predict DHS indicators in areas that were not surveyed. The model produces indicator estimates at a 5 x 5 km resolution. This output is then aggregated using a population-weighted approach to the Admin 2 level.

## How can modeled Admin 2 estimates be interpreted?

Modeled Admin 2 estimates can be interpreted in the same way as the Admin 1 subnational estimates already included in DHS Program surveys. Like the Admin 1 estimates, modeled Admin 2 estimates are given as rates or percentages with an uncertainty interval representing the degree of confidence in the estimate.

All statistical and modeled estimates have an associated degree of uncertainty. The uncertainty associated with the Admin 2 estimates is quantified using the width of the 95% uncertainty intervals (UI). The data user can be highly confident that the true value of the indicator falls between the lower and upper values. A detailed explanation of the interpretation of the modeled estimates and their associated uncertainty can be found in *DHS Spatial Analysis Report 20 (SAR 20)*.<sup>1</sup>

## How can modeled Admin 2 estimates be used?

Admin 2 estimates are a useful tool in evaluating geographic disparities within subnational and national boundaries. When Admin 2 estimates are produced for multiple surveys over time, program planners can see how indicators change for individual Admin 2s, making the estimates a useful tool for monitoring and evaluating subnational progress. (See *SAR 20* for a detailed explanation of the use of Admin 2 estimates.)

Policymakers and program planners can use Admin 2 estimates in the following ways:

- Ranking Admin 2 estimates
  - Admin 2s can be ranked from the best-performing to the worst-performing. This information can then be used to target smaller geographic areas for intervention. For example, policymakers might consider targeting resources to the worst-performing districts.
  - These rankings can also inform research questions. Policymakers might want to investigate the differences between the best- and worst-performing districts to understand the factors driving these differing results. The outcomes of this research could be used to inform policymakers on the factors that need to be changed to improve districts with the worst outcomes.
- Comparing Admin 2 estimates to Admin 1 or national averages
  - Admin 2s can be categorized into those falling above or below the national or Admin 1 averages. This allows policymakers to see which districts are performing relatively better or worse.
- Comparing Admin 2 estimates over time
  - Admin 2 estimates from multiple surveys can be compared over time to monitor subnational progress. This data would be particularly useful for district-level program planners in gauging and monitoring their district's performance over time.

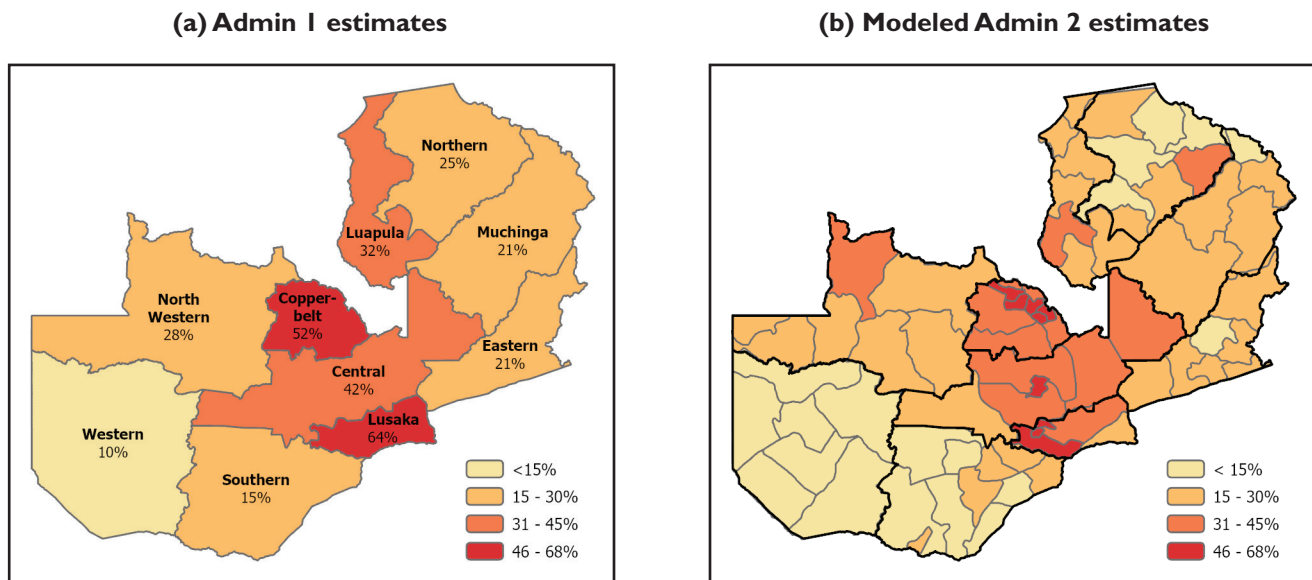
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<sup>1</sup> <https://dhsprogram.com/pubs/pdf/SAR20/SAR20.pdf>

## Case study: Using Admin 2 estimates at the national level

Countries can use Admin 2 estimates for many purposes. In this case study, a policymaker working at the national level in Zambia has received the following Admin 1 and Admin 2 estimates on the percentage of households using an appropriate water treatment method. The policymaker might note that, when comparing the Admin 1 and Admin 2 maps visually, the variation between Admin 2s (**Figure 2b**) is concealed by the Admin 1 map (**Figure 2a**).

**Figure 2** Percentage of population living in households using an appropriate water treatment method in Zambia, 2018 DHS



The national-level policymaker received the table of estimates and ranked the Admin 2s by the estimates. **Table I** shows the 10 best- and worst-performing Admin 2s within Zambia. The policymaker might first note the wide disparity between the best-performing district (with an estimate of 68%) and the worst-performing district (with an estimate of 7%). The policymaker could then consider targeting additional resources to the worst-performing Admin 2s. The policymaker could also use these rankings to explore if there are other factors that might explain the outcomes in the best-performing districts and whether these could be replicated in the worst-performing districts. Or the policymaker could see if any of the factors driving poorer outcomes in the worst-performing districts could be altered or removed.

**Table I** Ranked Admin 2 estimates and uncertainty intervals (UI) for percentage of population living in households using an appropriate water treatment method in Zambia

Top 10 performing Admin 2s							Bottom 10 performing Admin 2s						
Rank	Admin 1	Admin 2	Mean	UI			Rank	Admin 1	Admin 2	Mean	UI		
				Lower	Upper	Width					Lower	Upper	Width
1.	Lusaka	Lusaka	68	61	74	13	63.	Northern	Mbala	11	7	16	9
2.	Central	Kabwe	61	53	70	17	64.	Northern	Nakonde	11	7	15	8
3.	Copperbelt	Kitwe	54	45	62	17	65.	Southern	Kazungula	11	8	15	7
4.	Copperbelt	Chingola	53	41	63	22	66.	Southern	Namwala	11	7	17	10
5.	Lusaka	Kafue	52	43	59	16	67.	Southern	Itezhi-tezhi	10	6	16	10
6.	Copperbelt	Ndola	51	42	61	19	68.	Western	Senanga	9	6	13	7
7.	Copperbelt	Luanshya	50	41	59	18	69.	Western	Lukulu	8	5	11	6
8.	Copperbelt	Kalulushi	47	38	55	17	70.	Western	Sesheke	8	5	13	8
9.	Copperbelt	Masaiti	46	38	54	16	71.	Western	Shangombo	8	5	13	8
10.	Copperbelt	Chililabombwe	45	33	58	25	72.	Western	Kalabo	7	4	10	6

The policymaker might note that the bottom 10 districts are within three Admin 1s—Western, Southern, and Northern Provinces. While Northern Province’s Admin 1 estimate is ranked 5th out of the 10 Admin 1s (**Figure 2a**), two of the worst-performing districts are in Northern Province (ranked 63rd and 64th). This is an example of how the Admin 2 estimates give the policymaker additional information—information that is initially concealed by the Admin 1 estimates alone. With the information from the Admin 2 estimates, the policymaker might consider targeting additional resources to the Northern Province districts with poor outcomes.

## Further Resources

*For more information on the modeling process, see:*

Mayala, B. K., T. Dontamsetti, T. D. Fish, and T. N. Croft. 2019. *Interpolation of DHS Survey Data at Subnational Administrative Level 2*. DHS Spatial Analysis Reports No. 17. Rockville, Maryland, USA: ICF. <https://dhsprogram.com/pubs/pdf/SAR17/SAR17.pdf>

*For more information on the use of Admin 2 estimates, see:*

Janocha, B., R. E. Donohue, T. D. Fish, B. K. Mayala, and T. N. Croft. 2021. *Guidance and Recommendations for the Use of Indicator Estimates at Subnational Administrative Level 2*. DHS Spatial Analysis Reports No. 20. Rockville, Maryland, USA: ICF. <https://dhsprogram.com/pubs/pdf/SAR20/SAR20.pdf>