

## Rwanda

**EquityTool: Released November 1 2016**

**Source data:** [Rwanda DHS 2014-15](#)

**# of survey questions in original wealth index: 37**

**# of variables in original index: 126**

**# of survey questions in EquityTool: 15**

**# of variables in EquityTool: 21**



### Questions:

	Question	Option 1	Option 2	Option 3
	DETERMINE IF THE RESPONDENT LIVES IN AN URBAN OR RURAL AREA	Urban	Rural	
Q1	Does your household have ... a mobile telephone?	Yes	No	
Q2	... a television?	Yes	No	
Q3	... a radio?	Yes	No	
Q4	... electricity?	Yes	No	
Q5	Does any member of this household own ... a bicycle?	Yes	No	
Q6	... a watch?	Yes	No	
Q7	Does any member of this household have a bank account?	Yes	No	
Q8	How many of the following does your household have... chickens?	None	1-19 chickens	20 or more chickens

Q9	... goats?	None	1-4 goats	5 or more goats
Q10	... cows (traditional)?	None	1-4 cows	5 or more cows
Q11	What is the main source of drinking water for members of your household?	Piped to yard / plot	Other source of drinking water	
Q12	What kind of toilet facility do members of your household usually use?	Pit latrine with slab (not shared with other households)	Other type of toilet	
Q13	What is the main material of the floor in your household?	Cement	Earth / Sand	Other floor material
Q14	What is the main material of the exterior walls in your household?	Covered adobe	Bamboo with mud	Other wall material
Q15	What type of fuel does your household mainly use for cooking?	Charcoal	Wood	Other type of fuel

#### Technical notes:

We were unable to achieve agreement of  $\kappa \geq 0.75$  between the original DHS wealth index and a simplified index using our standard simplification process (detailed in [this article](#)). Using a revised approach, detailed below, high agreement ( $\kappa \geq 0.75$  for both urban and national indices) was achieved. The data used to identify important variables comes from the [factor weights](#) released by ICF.

We were unable to achieve a reduction in questions or an agreement of  $\kappa \geq 0.75$  between the original DHS wealth index quintiles and quintiles created using factor weights from the 'Common' tab of ICF's factor weight file for Rwanda DHS 2014-15. The factor weights in the common tab come from an analysis of the national population, and contain only those variables which are related to the construct of wealth in the same way in both rural and urban areas. These variables are usually used in EquityTools to calculate national quintiles, as they reduce some known areas of respondent error in the survey.

To overcome this problem of low agreement, we instead used the factor weights from the rural and urban tabs, which select variables that relate to wealth differently in urban and rural areas. For example, in an urban area, ownership of chickens may be associated with being relatively poor, while in rural areas, it may be associated with being relatively wealthy. This is the case in



Rwanda. Selection of variables specific to urban and rural areas is already provided in the factor weight file. A short list of variables, common to both urban and rural areas, are iteratively selected to find those which result in high agreement ( $\kappa \geq 0.75$ ) against the original wealth index quintiles for national and urban populations. For Rwanda, the scores for urban and rural residents were combined into a national score using linear regression, in a process similar to that used by ICF. Specifically, a score from the simplified index for urban residents (U<sub>score</sub>) was regressed against the wealth index score variable in the dataset (HV271), the same was done for rural residents (R<sub>score</sub>), and the resulting coefficients are used to create a single national score (NatScore).

$$HV271 = \beta_1 U_{score} + \alpha_1$$

$$HV271 = \beta_2 R_{score} + \alpha_2$$

$$NatScore = \beta_1 (U_{score})(Urban) + \alpha_1 (Urban) + \beta_2 (R_{score})(Rural) + \alpha_2 (Rural)$$

Where Urban=1 if respondent lives in urban area and 0 if otherwise, and Rural =1 if respondent lives in rural area and 0 if otherwise.

Respondents quintile assignments resulting from NatScore, the national wealth index score created from a simplified list of questions, were compared to the quintile assignments resulting from the original wealth index with 126 variables using the kappa statistic.

The questions in the simplified index which resulted from this process differ from our standard approach in two important ways. First, the index for Rwanda includes questions on livestock ownership. Their inclusion was essential to create a reliable index, but responding to these questions may not be easy for all potential respondents, or when outside of the house. Since skipping a question is not advisable in this shortened list, we suggest asking a respondent to make their best guess from the choices provided, if they are unsure of a response. Second, we need to know whether the respondent lives in an urban or rural area. An additional question was added to the EquityTool: 'DETERMINE IF THE RESPONDENT LIVES IN AN URBAN OR RURAL AREA'. In principle, the definition of 'urban' and 'rural' should match the definition used in the Rwanda DHS 2014-15. In reality, the user needs to decide how to determine if each respondent lives in an urban or rural area. Three approaches are presented below, with some notes on each. Whichever method is chosen, it should be uniformly applied across all surveys conducted.

1. Ask the respondent directly - 'is your home in an urban or rural area'. This relies on the respondent's understanding of what 'urban' and 'rural' is.
2. Allow the data collector to determine, based on guidance provided. This will work best if interviews take place in or very near to people's homes, and if the data collectors can be trained on the same rules to determine if an area is urban or rural. One example of a rule is to classify 'peri-urban' areas on the edges of a city or town as urban. Another rule might be to classify an area as urban if it has a market center which operates daily.



- If the interviews are taking place outside the home, then classify respondents based upon the location of the interview. For example, if interviews occur in health facilities, classify respondents as urban if the facilities are located in urban areas. Individuals may travel, so this method is also subject to error.

**Level of agreement:**

	National Population (n=12,699)	Urban only population (n=2895)
% agreement	84.4%	88.2%
Kappa statistic	0.756	0.816

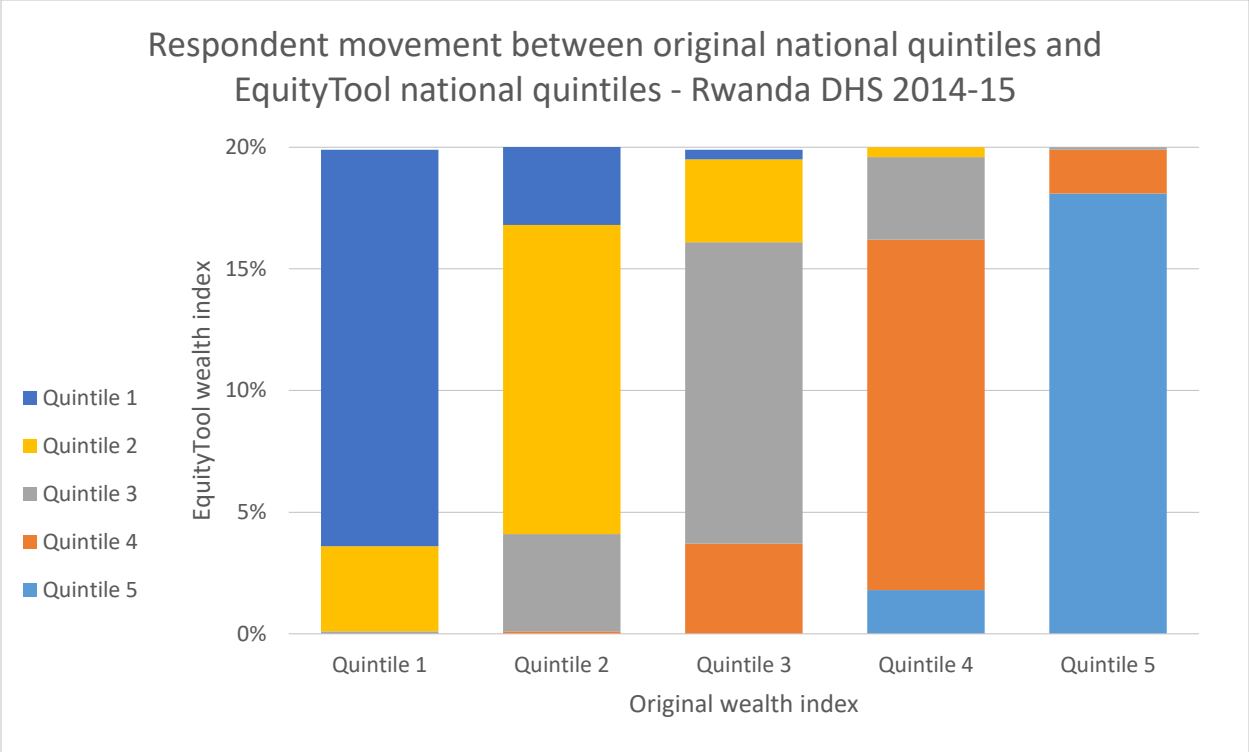
Respondents in the original dataset were divided into three groups for analysis – those in the 1<sup>st</sup> and 2<sup>nd</sup> quintiles (poorest 40%), those in the 3<sup>rd</sup> quintile, and those in the 4<sup>th</sup> and 5<sup>th</sup> quintiles (richest 40%). After calculating their wealth using the simplified index, they were again divided into the same three groups for analysis against the original data in the full DHS. Agreement between the original data and our simplified index is presented above.

**What does this mean?**

When shortening and simplifying the index to make it easier for programs to use to assess equity, it no longer matches the original index with 100% accuracy. At an aggregate level, this error is minimal, and this methodology was deemed acceptable for programmatic use by an expert panel. However, for any given individual, especially those already at a boundary between two quintiles, the quintile the EquityTool assigns them to may differ to their quintile according to the original DHS wealth index.

The graph below illustrates the difference between the EquityTool generated index and the full DHS wealth index. Among all of those people (20% of the population) originally identified as being in the poorest quintile, approximately 82.5% are still identified as being in the poorest quintile when we use the simplified index. However, approximately 17.5% of people are now classified as being in Quintile 2. From a practical standpoint, all of these people are relatively poor. Yet, it is worthwhile to understand that the simplified index of 15 questions produces results that are not identical to using all 37 questions in the original survey.



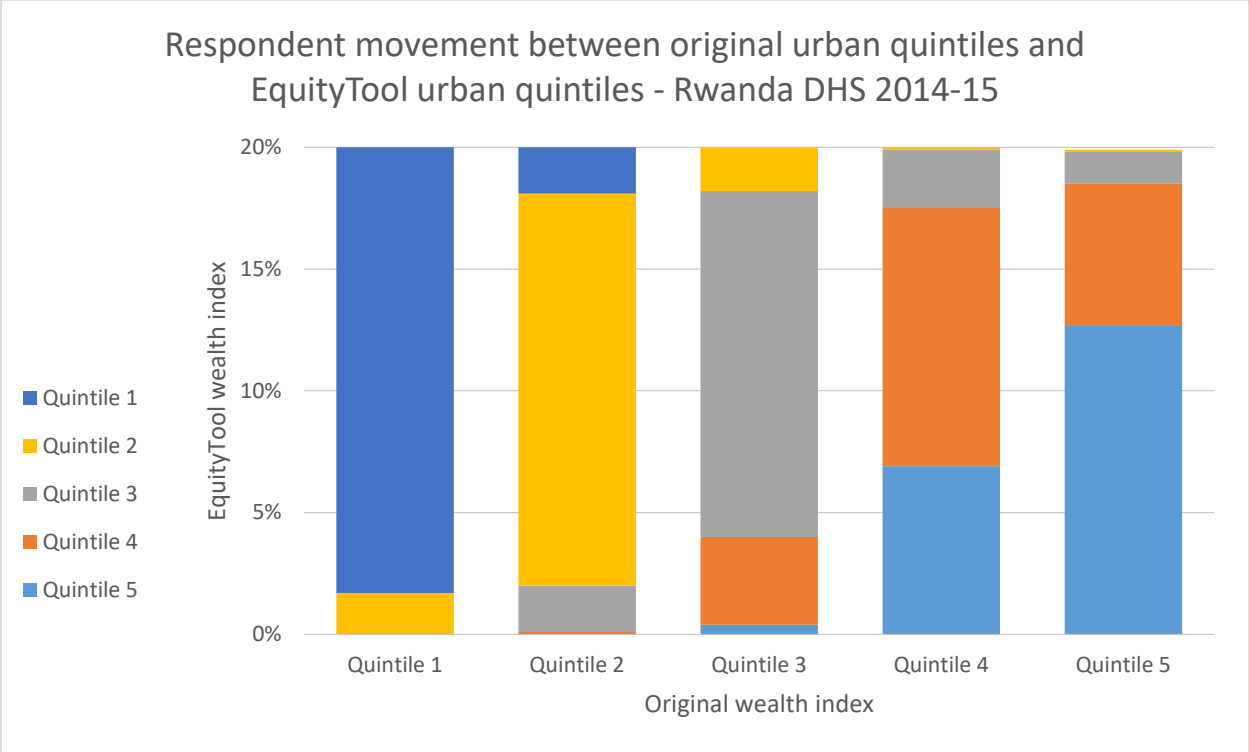


The following table provides the same information on the movement between national quintiles when using the EquityTool versus the original DHS wealth index:

		EquityTool National Quintiles					Total
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	
Original DHS National Quintiles	Quintile 1	16.30%	3.50%	0.10%	0.00%	0.00%	20%
	Quintile 2	3.30%	12.70%	4.00%	0.10%	0.00%	20%
	Quintile 3	0.40%	3.40%	12.40%	3.70%	0.00%	20%
	Quintile 4	0.00%	0.40%	3.40%	14.40%	1.80%	20%
	Quintile 5	0.00%	0.00%	0.10%	1.80%	18.10%	20%
	Total	20.00%	20.00%	20.00%	20.00%	20.00%	100%

The following graph provides information on the movement between urban quintiles when using the EquityTool versus the original DHS wealth index:





The following table provides the same information on the movement between urban quintiles when using the EquityTool versus the original DHS wealth index:

		EquityTool Urban Quintiles					Total
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	
Original DHS Urban Quintiles	Quintile 1	18.30%	1.70%	0.00%	0.00%	0.00%	20%
	Quintile 2	1.90%	16.10%	1.90%	0.10%	0.00%	20%
	Quintile 3	0.00%	1.80%	14.20%	3.60%	0.40%	20.1%
	Quintile 4	0.00%	0.10%	2.40%	10.60%	6.90%	20%
	Quintile 5	0.00%	0.10%	1.30%	5.80%	12.70%	19.9%
	Total	20.20%	19.80%	19.90%	20.10%	20.00%	100%

**Data interpretation considerations:**

1. This tool provides information on relative wealth – ‘ranking’ respondents within the national or urban population. The most recent available data from the WorldBank



indicates that 60.3% of people in Rwanda live below \$1.90/day<sup>1</sup>. This information can be used to put relative wealth into context.

2. People who live in urban areas are more likely to be wealthy. In Rwanda, 75.2% of people living in urban areas are in the richest national quintile, compared to only 8.9% of those living in rural areas<sup>2</sup>.
  - a. If your population of interest is predominantly urban, we recommend you look at the urban results to understand how relatively wealthy or poor they are, in comparison to other urban dwellers.
  - b. If the people you interviewed using the EquityTool live in rural areas, or a mix of urban and rural areas, we recommend using the national results to understand how relatively wealthy or poor they are, in comparison to the whole country.
  - c. If you want results for rural residents only in comparison to other rural dwellers, contact the EquityTool support team to receive instructions on how to do this calculation yourself.
3. Some districts in Rwanda are wealthier than others. It is important to understand the country context when interpreting your results.
4. In most cases, your population of interest is not expected to be equally distributed across the five wealth quintiles. For example, if your survey interviewed people exiting a shopping mall, you would probably expect most of them to be relatively wealthy.

Metrics for Management provides technical assistance services to those using the EquityTool, or wanting to collect data on the wealth of their program beneficiaries. Please contact [equitytool@m4mgmt.org](mailto:equitytool@m4mgmt.org) and we will assist you.

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<sup>1</sup> From [povertydata.worldbank.org](http://povertydata.worldbank.org), reporting Poverty headcount ratio at \$1.90/day at 2011 international prices.

<sup>2</sup> From the Rwanda DHS 2014-15 dataset household recode, available at <http://dhsprogram.com/>

