

Internet Poverty Index methodology

How is Internet Poverty Calculated?

To measure internet inequality, the World Data Lab (WDL) team first set out to draft a consistent definition of internet poverty. On that account, three main parameters determine whether a person has the possibility to access and readily use mobile internet. These three variables include: affordability, quality, and quantity. First, affordability refers to the price of a mobile broadband service and is set with a person's total expenditure. The Internet Poverty threshold of affordability is set to a maximum of ten percent of a person's total expenditure. Second, quality describes a multitude of factors such as download and upload speed, bandwidth, latency, 2G, 3G, and 4G coverage, as well as the number of servers per 100,000 inhabitants. Third, quantity refers to the amount of data that can be sent or received per theoretical user.

In order to create a comparable measure of internet poverty, all three parameters are fixed at reasonable thresholds. This is mainly based on information from regions with very low rates of internet access, such as the countries of the West African Economic and Monetary Union. According to Rodríguez-Castelán et al. (2021), around 20 percent of the population in these countries have access to mobile internet. Combining this information with collated data on internet prices, it becomes evident that people in these countries might be spending up to 10 percent of their total expenditure on mobile internet services. Regarding a minimum amount of data, 1GB per month was set as a reasonable threshold that is also used by the International Telecommunication Union (ITU). The third threshold was set referring to internet quality; as there is not a lot of literature available on this subject and a set of different sub-indicators are used, it is hard to find a specific minimum level of quality.

The third threshold refers to internet quality. The benchmark was set such that 25% of countries have a worse connection and 75% have a better one. Based on data from Ookla, this corresponds to a download speed of 10Mbps and an upload speed of 5Mbps.

Once these thresholds on internet affordability, quality, and quantity are defined, a hedonic pricing model attempts to explain internet prices based on internet quality, infrastructure, and socioeconomic parameters on a global scale. To estimate this model, input data is combined from a variety of sources. For the dependent variable, internet prices are based on data from ITU, containing country-level information on the price of 1GB or 1.5GB of mobile data for the years 2013 to 2019. To estimate the prices of 1GB in years for which ITU only provides data on the prices of 1.5G, a transformation that is based on the difference in prices of 1GB and 1.5GB in data from the Alliance for Affordable Internet is applied.

To identify a suitable method for the estimation of our hedonic pricing model, WDL applies different approaches and evaluates their ability to predict actual prices for out-of-sample observations. Specifically, Lasso-regressions, Bayesian model averaging, and Random Forests are attempted, where it was determined that the latter is most suitable in this application. Next, all covariates are fixed related to internet quality at the corresponding 25%-quantile, allowing for each country to predict the price of 1GB of data-only mobile broadband at this quality. This approach allows for estimation of prices that are comparable across all countries.

Combining these numbers with World Data Lab global spending data, the estimates on how many people can afford mobile internet are assessed. Therefore, the predicted prices are first merged with national spending distributions. Following this, the number of people for which the predicted price is below or equal to ten percent of their total expenditure is computed. Setting this number in relation to each country's total population, the Internet Poverty Index can now project the number of people who can or cannot afford mobile internet in almost every country of the world.

References

Rodríguez-Castelán, C., Ochoa, R., Lach, S., & Masaki, T. (2021). Mobile Internet Adoption in West Africa.

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