# Intersecting inequities in energy consumption, decent living standards and risk of climate change exposure in Ghana, India, and Brazil

**A descriptive analysis combining living standards surveys, consumer expenditure surveys and spatial climate exposure data**

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## 1) Household energy choices and consumption vary by income

We study household survey microdata sets from Ghana, India and Brazil over two survey periods. The surveys include disaggregate expenditures and consumption of clean and unclean fuels for energy services and private mobility, as well as household characteristics and access to services.

We see large differences in consumption of clean fuels and especially private mobility fossil fuels (petrol, diesel) across deciles (Fig. 1).

Comparing affordability and consumption (Fig. 2), we find that lower levels of clean fuel access in Ghana and India limit consumption and expenditures. Data from Brazil highlights challenges of affordability for poorer households once clean fuel access improves.

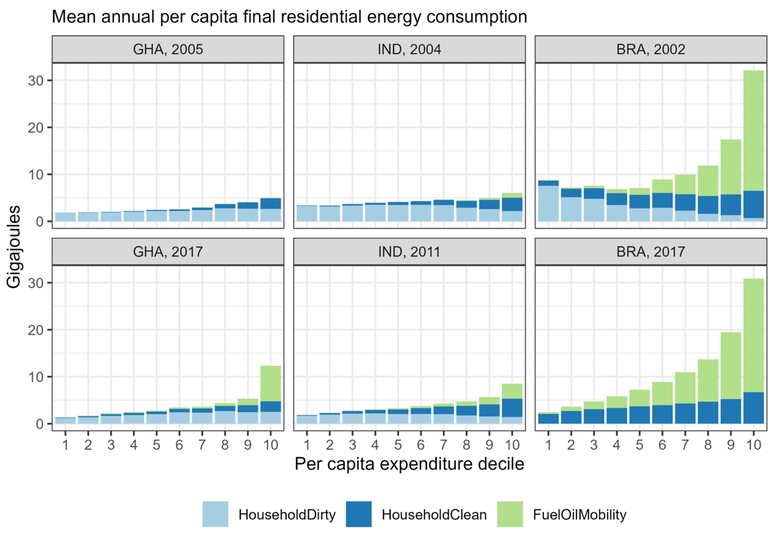


Figure 1. Energy consumption per fuel type by population decile.

## 2) Low access / high costs

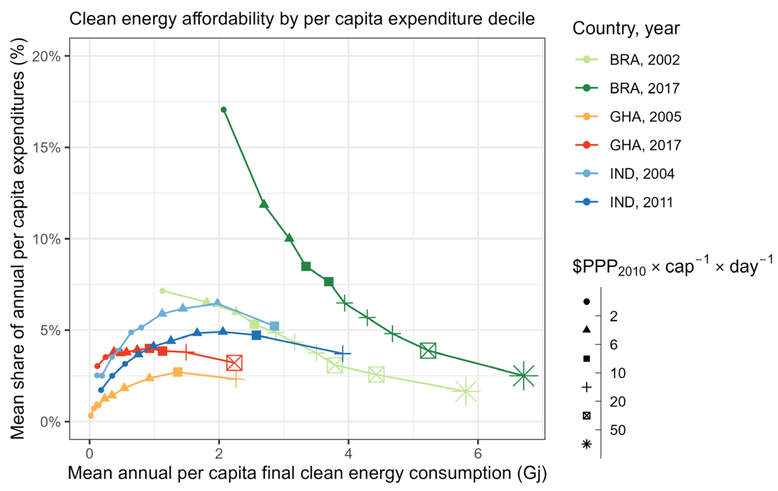


Figure 2. Energy affordability and consumption by income decile.

## 3) Access to Decent Living Standards is improving

Next, we determine household access to decent living standards (see Table below for heuristics)[1].

Trends indicate heterogeneous progress across countries, dimensions and deciles over time (Fig. 3).

Some dimensions appear more challenging to achieve than others. Notably, access to health insurance and secondary education are among the slowest to improve, even among wealthier deciles.

Table 1. Decent Living standards dimensions.

| Needs group[1] | Dimension[1] | Heuristic |
|---|---|---|
| Shelter | Housing | Solid construction housing, and maximum 2 persons per room |
| Shelter | Thermal comfort | Access to thermal comfort devices (fans or space heaters, as required) |
| Shelter | Clothing | *not covered* |
| Nutrition | Preparation | Access to clean cookstoves |
| Nutrition | Nutrients | *not covered* |
| Nutrition | Storage | Access to a fridge or a freezer |
| Health & Hygiene | Water | Piped water connection into at least one room |
| Health & Hygiene | Sanitation | Permanent flush toilet or similar in the home |
| Health & Hygiene | Healthcare | All household members over the age of 16 have health insurance |
| Socialization | Education (Basic) | All household adults have completed at least 6 years of education |
| Socialization | Education (Senior) | All household adults have completed at least 12 years of education |
| Socialization | Connectedness | Access to either a phone, smart-phone or computer |
| Mobility | Roads | *not covered* |
| Mobility | Connectedness | Access to a motorbike/scooter, car or public transport |

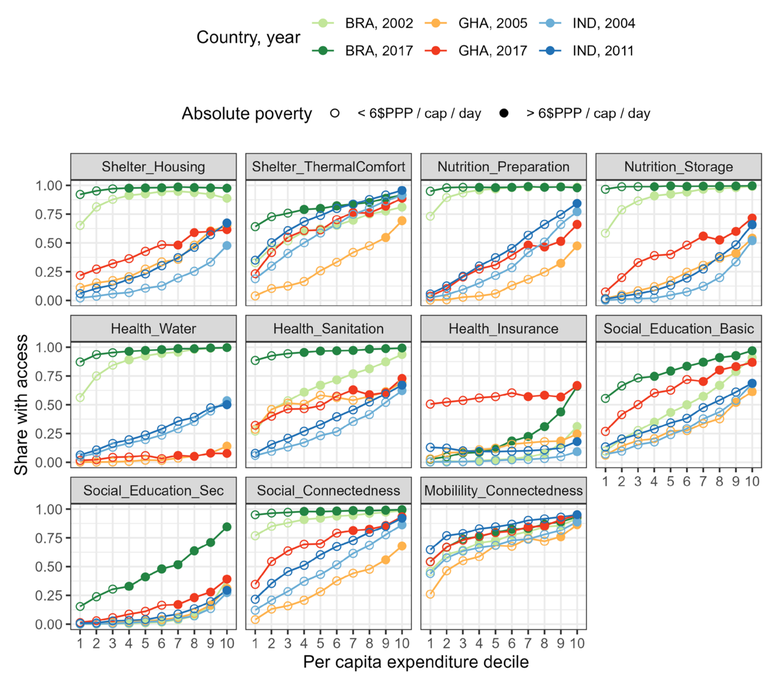


Figure 3. Trends in access to dimensions of the Decent Living Standards.

## KEY FINDINGS

Poorer households face either limited access to clean energy sources or unaffordable supply once this improves.

The same households are likely deprived of multiple dimensions of Decent Living Standards (DLS).

Intersecting risks of climate exposure, DLS deprivation and energy unaffordability require urgent adaptation policy intervention.

## 4) DLS deprivation and climate exposure intersect

Finally, we merge survey microdata with a spatial climate exposure dataset[2] taking the number of people exposed to climate change through the water, energy and land sectors in 2030 under SSP2 and assuming warming of 1.5ºC.

Merging is done both by decile (Fig. 4 below) and by geographic location (Fig. 5 right). The former describes the share of each decile exposed to climate risk through the water-energy-land sectors versus the average decile DLS deprivation, where we focus on especially vulnerable populations (with average incomes below 6$ PPP / capita / day). The latter describes the spatial extent of DLS deprivation and climate exposure, highlighting where these intersect across each country.

Our results describe wealth-related and spatial trends in populations deprived of DLS and facing climate exposure risks across distinct sectors. This analysis reveals the extent of the inequities and can support targeting urgent adaptation support mechanisms and policy interventions to provide DLS for the most vulnerable.

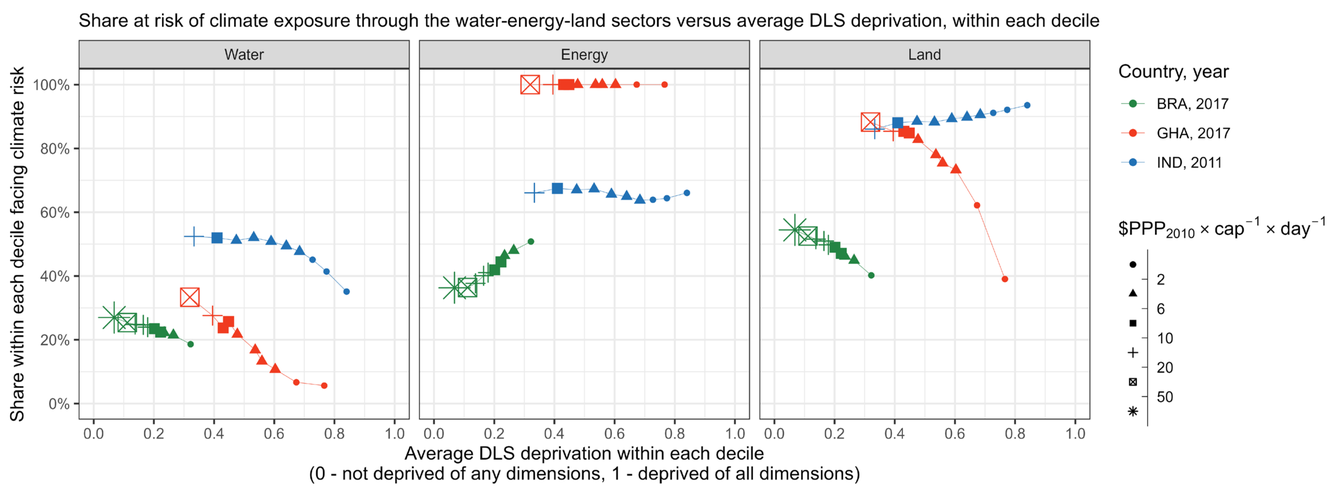


Figure 4. Intersecting DLS deprivation and climate exposure across water, energy and land (food) sectors, by per capita expenditure decile.

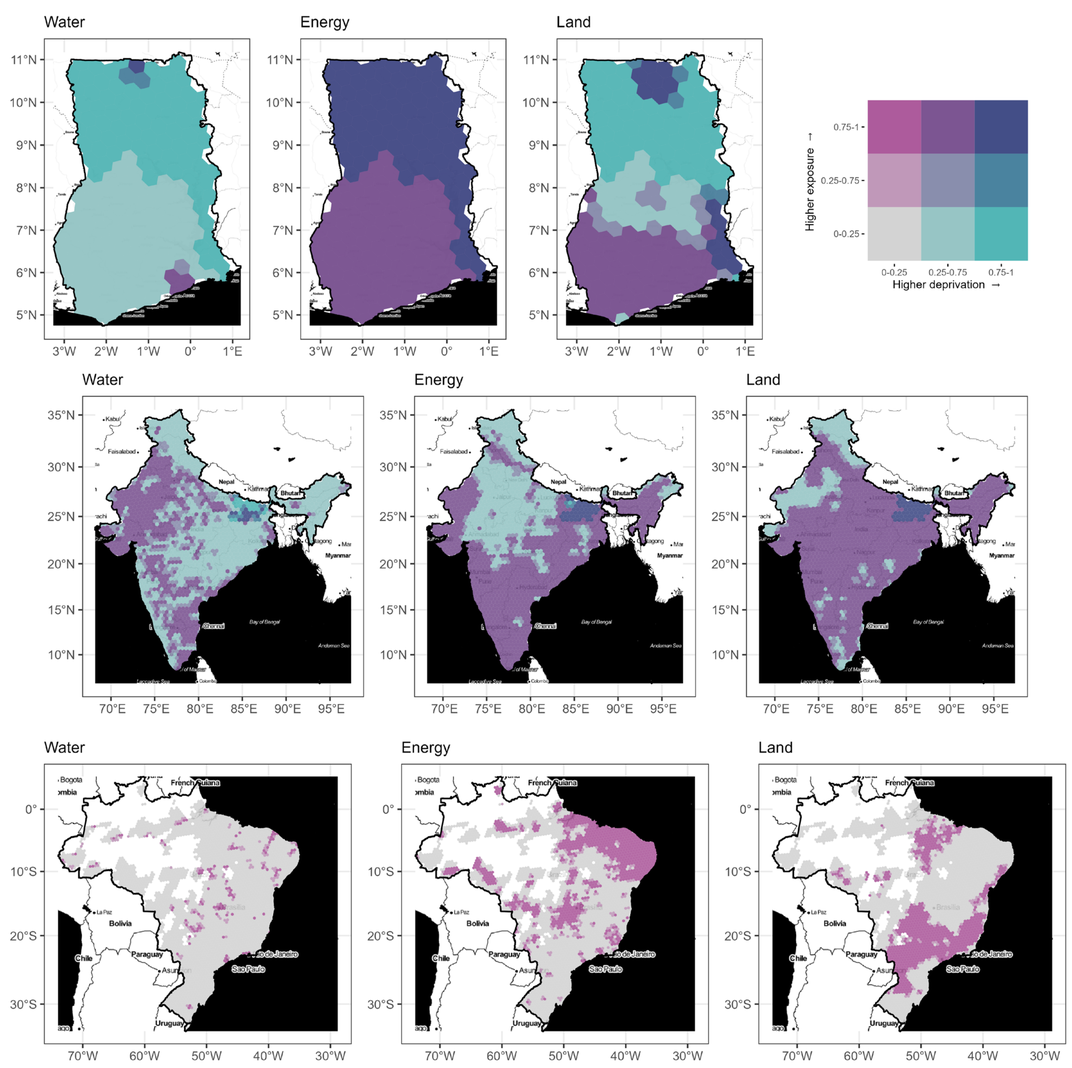


Figure 5. Intersecting DLS deprivation and climate exposure risk across water, energy and land (food) sectors.

[1] See Rao, N. D., & Min, J. (2018). Decent Living Standards: Material Prerequisites for Human Wellbeing. *Social Indicators Research*, *138*(1), 225–244. https://doi.org/10.1007/s11205-017-1650-0

[2] See Byers, E., et al. (2018). Global exposure and vulnerability to multi-sector development and climate change hotspots. *Environmental Research Letters*, *13*(5), 055012. https://doi.org/10.1088/1748-9326/aabf45