

# ***HOUSEHOLD ENERGY EFFICIENCY BEHAVIORS AND INVESTMENTS IN EGYPT: THE ROLE OF ENERGY AND FINANCIAL LITERACY***

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## **Overview**

In this paper we examine factors related with household stated energy efficiency behaviors and energy efficiency investments in the capital city of Egypt, Cairo. In particular, we focus on the role of energy and financial literacy. To this end, we had face-to-face interviews conducted among representatively selected individuals in Cairo.

Previous studies investigating the role of energy literacy or financial literacy on household energy-efficiency measures focused on developed countries (e.g., Asmare et al, 2023, Blasch et al., 2017a,b, 2021, 2022, Boogen et al., 2021, Brent and Ward, 2018; Brounen et al., 2013). To our knowledge, the only exception is Filippini et al. (2020) who examine the relation between energy-related financial literacy and attitudes towards replacement of energy-inefficient appliances in Nepal.

## **Methods**

We conducted an original interviewer-administrated face-to-face survey in Cairo, which was conducted by a professional survey company. The fielding of 1002 individuals took place in 2021 between 15 May and 15 June using stratified sampling. The survey questionnaire includes screening questions gathering socio-demographic information to ensure quota requirements (age, gender, district of living), dwelling information, items on energy efficiency behaviors and energy technology adoption, attitudes, and additional items on socio-demographic characteristics. Only individuals who were involved in household purchasing and expenditures decisions were interviewed.

Our survey includes three types of energy efficiency measures, which differ by the level of investment costs required: energy efficiency behaviors, adoption of light-emitting diodes (LEDs), and adoption of top-energy efficiency rated household appliances. To elicit individuals' energy efficiency behaviors, interviewees were asked how often they (i) typically turn off lights when leaving a room, (ii) turn down the air conditioning/ventilation when leaving the dwelling (and nobody else is in the dwelling), (iii) wait for a full load before using the washing machine, (iv) switch off the T.V. (or use a power strip) rather than leaving the T.V. on stand-by, (v) turn off the screen of their computer when taking a break for more than 10 minutes, and (vi) unplug the charger after charging the phone. Response options comprised of 'never or almost never', 'sometimes', 'always or almost always', and 'don't know/not applicable'. Drawing on Schleich et al. (2019), participants were asked whether the most recent light bulb purchased was a LED, and whether the most recent appliance purchased had a top energy efficiency rating (high investment cost measure).

To capture energy literacy, we use four items, including those originally developed by DeWaters and Power (2011). They refer to knowledge about the unit electricity is measured in (i.e., kWh), knowledge about how to calculate the electricity used by an electric appliance (i.e., power rating (in W or kW) multiplied by the time it is used), knowledge about the relative electricity consumption by typical household appliances (i.e., refrigerators typically consume more than computer, TV, phone, lights, electric cooking stove, or washing machine), and which of three options causes the lowest electricity consumption to bring one liter of water to boil (i.e., using an electric kettle rather than a microwave or a cooking pot on an electric stove).

To measure financial literacy, we use three standard items from Lusardi and Mitchell (2011). They pertain to individuals' ability to understand the meaning of receiving interest on financial savings, and to the relative riskiness of buying a single company's stock compared to buying a stock mutual fund.

Attitudes included environmental identity, measured via a six-items scale adapted from Whitmarsh and O'Neill (2010), and social norms, measured via a one-item scale ("In general, what do you think your family's, friends' or colleagues' views would be of you purchasing energy-efficient products").

We employ OLS to estimate a linear model for the share of energy efficiency behaviors participants stated to do 'always or almost always' (excluding 'don't know/not applicable') and maximum likelihood methods to estimate probit models for the adoption of LEDs and of top-rated appliances. The covariates comprise dummies capturing energy literacy (below median score of correct responses in our sample) and financial literacy (below median score of correct responses in our sample), socio-demographic characteristics, and scores for environmental identity and social norms.

Finally, we estimate a probit model to relate individuals who are both below-median energy literate and below-median financial literate in our sample to socio-demographic characteristics.

## Results

Our preliminary results for the energy efficiency measures suggest that energy literacy is positively related with energy efficiency behaviors and with the adoption of LEDs, *ceteris paribus*. Likewise, financial literacy is positively related with all three types of energy efficiency measures, yet for energy efficiency behaviors, and for the adoption of LEDs the corresponding coefficient is just shy of being statistically significant (*p*-values are 0.12 and 0.15). We further find that men are less likely to engage in energy efficiency behaviors than women, that older participants are more likely to engage in energy efficiency behaviors and to have adopted LEDs than younger participants. For income, we find that participants from households in the lowest income quartile are more likely to engage in energy efficiency behaviors than participants from household in higher income quartiles. In comparison, individuals from households in the fourth income quartile are more likely to have adopted a top-rated appliance than individuals from households in lower income quartiles. We further find income to be positively associated with stated LED adoption. Larger households are less likely to engage in energy efficiency behaviors and they are less likely to have adopted an LED. For education, we fail to find a statistically significant relationship with either of the three types of measures considered. Finally, environmental identity is positively associated with energy efficiency behaviors and with the adoption of top-rated appliances, while our measure of social norms is positively related with the adoption of LEDs.

As for the antecedents of energy and financial literacy, on average and *ceteris paribus*, women, people living in larger households, and - somewhat surprisingly - individuals with at least a high school degree are found to be less energy- and also less financially literate.

## Conclusion

Our findings provide evidence that individuals' energy literacy and financial literacy are positively related with energy efficiency measures in Cairo, Egypt. For high-cost energy-efficient technology adoption, energy literacy was not found to play a role. Finally, our findings suggest that energy efficiency measures are also related with gender, age, income, household size, environmental identity and social norms, but their relations appear to differ across measures. Finally, our results imply that policies aimed at improving both energy and financial literacy may target women, individuals living in larger households, and also higher educated individuals, *ceteris paribus*.

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