

ENERGY CONSUMPTION BEHAVIOUR AND WORK FROM HOME (WFH): A SURVEY STUDY FROM INDIA

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Overview

We study energy consumption behaviour and transportation behaviour of households during the peak of restrictions and lockdowns in India and attempt to find possible relations with them working from home in that period. With the initial phase of lockdowns imposed by the government in March 2020, there were other spells of severe lockdowns in India especially after the second wave of the pandemic in March-April 2021. We conduct a primary survey in the city of Ahmedabad, Gujarat, India and ask respondents about their energy consumption behaviour including transportation during the period of March 2020 – May 2021 when a significant number of jobs moved to Working from Home (WFH). As a number of energy consumption behaviour and corresponding decisions are taken at a household level, responses were considered from the head of the household. Households were selected randomly from a population after excluding heads of households working in the primary care sector and essential services sector such as doctors, nurses, construction sector jobs etc. for whom WFH was not an option.

In India, as the central and various state governments advised corporates, educational institutions and others to move their activities online, prescriptions were issued for a smooth transition from office-based work to virtual work. But reports such as from the Employers' Federation of India (EFI) and paper by Elangovan et al. (2021) document the disruption faced by various employees in terms of managing work and household responsibilities and untimely eating habits. de Wind et al. (2021) study unequal access to WFH in terms of lack of workplace environment for employees and call it Work-Home Interference (WHI) which may lead to fatigue and burnout. Our focus is to understand the relation between individuals spending more time at home and whether it primes them towards being more energy conscious in terms of the energy and transportation choices they make. This is a first study that analyzes this relation between WFH and energy saving behaviour and is of importance in the Indian context where workplace like conditions such as a separate office space and ergonomic furniture at home are largely absent. WFH can be considered to be a natural experiment for the period of study under consideration and we analyze questions such as if households' reduced their consumption for certain electrical appliances such as air conditioners, microwaves, refrigerators and whether households in general demonstrated greater awareness by turning off lights and fans when not in use, closing doors and windows when the air conditioner is on, not loading washing machines until full etc. We aggregate this latter behaviour in terms of energy saving behaviour under one category of "energy consciousness". These choices may depend on the age, gender, education of the head of the household and family income, age distribution of family members and we collect that information. Distribution of household family members is especially important as presence of children and/or older members may make it difficult to have energy consciousness at a household level. An interesting study on two Indian cities analyzing electricity consumption during the lockdown shows reduced consumption of large electrical appliances in certain cases due to uncertainty in getting the appliance repaired in case of damage or overuse (Pathak, Agrawal, Adhikary, Batra, & Ganesan, 2020).

We also ask questions on whether respondents like to WFH, the number of daily screentime hours spent and whether they would like to continue WFH in future when offices reopen and things are back to normal. There is a similar question on online/offline grocery purchases and whether households would like to continue making online purchases in future. If possible, we would want to understand if people exercise the option of attending online meetings and seminars, working from home and making online grocery and other purchases even when things are back to normal as this would greatly help in reducing emissions from energy consumption and transportation needs.

Methods

We carry out analysis at the household level. We employ cross section regression analysis to test for households' energy saving behaviour and if the head of the household is WFH. Demographic controls are age, years of education above a certain threshold, number of working adults in family and age distribution of household members. A linear probability model (LPM) is employed to find the log odds ratio of reduced energy consumption in general associated

with WFH. We also undertake an ordinal logit regression with ordinal ranking for various modes of transportation to work (green, less green etc.) to check the association with demographic controls and WFH. Our work does not attempt to find the cause of such energy saving or green behaviour. Possible causes could be to save on expenses or an expected future income shock. We cannot prove any causation from the analysis we undertake but strong associations between WFH and various forms of energy behaviour and spending behaviour. Probabilistic choice models for testing more than one energy saving behaviour at once or persistence of choosing WFH in future may be used.

Results

Initial results indicate that proportion of heads of households' who show energy conscious behaviour in terms of unplugging/turning off chargers and turning off lights and fans when not in use are mostly in their mid to late 40s. This age group of individuals also tend to demonstrate greater reduction in use of household energy appliances in general during the period of March 2020 – May 2021 for the period of study controlling for factors such as education. We find strong association between households' being energy conscious and WFH enjoyment. In turn, both energy consciousness and WFH are positively influenced by education whereas the effect of gender is insignificant. Results also differ for WFH when looking at various sectors where individuals are working as in the data. Testing for the association of choosing greener modes of transportation to work and various controls, we find WFH satisfaction to decrease the probability of choosing greener modes of transportation during the occasional day at work and respondents working at firms with more employees (greater than 200) to be more likely to choose greener modes of transportation. An interesting finding is that respondents in the age group of 26 – 43 and having distance to work between 4 to 10 km are significantly less likely to choose for greener modes of transportation to go to work. Energy consciousness is somewhat negatively associated with the presence of children and elderly in the family.

Conclusions

The study attempts to link energy consumption and transportation behaviour during the peak of lockdowns and restrictions in India to working from home. Taking a random sample from Ahmedabad, Gujarat, India we find energy saving behaviour to be prevalent mostly for household heads in their mid to late 40s but choice of energy efficient transportation modes during occasional office visits to be less likely amongst middle aged individuals and having a distance to work of less than 10 km. Reduction in use of household appliances in general and individuals' preference for WFH is associated with the age distribution of family members. This study hints at correlation and further research using causal analysis is needed to make specific policy prescriptions.

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