A bottom up approach to sustainable living: Can informed kids inform their parents?*

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Pre-Analysis Plan

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1 Introduction and background

Literature on the economics of human capital suggests that early childhood interventions seem to have the most lasting effects over an individual's lifespan. We wish to explore the impact of reverse intergenerational learning on households' choice of environmentally friendly practices. This is relevant as the recent literature on inter-generational learning offers evidence that school-going children influence parent behaviour in marine debris management (Hartley et al., 2021)[1], energy saving (Wang et al., 2022)[2], and wildlife conservation (Marchini & Macdonald, 2020)[3]. In this connection, we want to study whether children can inspire their parents to learn from their environmentally conscious behaviour and adopt sustainable practices in the household.

In essence, this study will allow us to investigate if a reverse transmission of learning happens from children to their parents, as opposed to vice-versa. If such a channel indeed exists, this would provide a low-cost solution to create environmental consciousness for policymakers and governments, as creating awareness at younger ages is relatively easier. Also, running campaigns in schools reaching out to large groups of kids is more cost-effective than reaching each and every household individually.

2 Research question and hypotheses

Children are highly receptive to new information and behavioural patterns in their formative years. By instilling ecologically conscious habits and awareness of the consequences of single-use plastics early in their lives, we can shape a generation of individuals who will make environmentally responsible choices for the rest of their lives. These choices can ripple through society, influencing their families, peers, and future generations.

The primary research question of this study is whether creating environmental awareness

[1]Hartley, J. M., Stevenson, K. T., Peterson, M. N., Busch, K., Carrier, S. J., DeMattia, E. A., Jambeck, J. R., Lawson, D. F., and Strnad, R. L. (2021). Intergenerational learning: A recommendation for engaging youth to address marine debris challenges. Marine pollution bulletin, 170:112648.

[2]Wang, J., Long, R., Chen, H., and Li, Q. (2022). How do parents and children promote each other? the impact of intergenerational learning on willingness to save energy. Energy Research & Social Science, 87:102465.

[3]Marchini, S. and Macdonald, D. W. (2020). Can school children influence adults' behavior toward jaguars? evidence of intergenerational learning in education for conservation. Ambio, 49(4):912– 925.

about sustainable lifestyles among preschoolers can influence household-level behaviour. For instance, can children convince their parents and guardians within the household to engage in environmentally sustainable behaviour based on what they learn in school?

Our main hypotheses are the following:

H1: Environmental awareness among preschoolers increases household adoption of environmentally sustainable practices (essentially this will be measured by usage of single-use plastics for shopping and usage of plastic bottles for water storage etc.)

H2: Environmental awareness among preschoolers will increase households' willingness to pay for environmentally sustainable products

H3: The effects of environmental awareness akpng preschoolers on household decisions will be mediated through household interactions between parents and kids on sustainable practices (usually when kids find something engaging and stimulating in a classroom environment, they are likelier to discuss these with their parents)

3 Experimental design

The Institutional Review Board (ethics approval by the Research sub-committee as part of the Doctoral Program and Research Committee) of the Indian Institute of Management Calcutta approved the experimental protocol in December 2023.

We propose to conduct a randomized control trial (RCT) on single-use plastic consumption through an intervention targeted at young children to address the single-use plastic crisis. RCTs are considered one of the robust research designs used to identify causal linkages in the empirical economics literature. Educating and fostering awareness among young children is paramount, as it offers the potential for a lasting impact.

The primary objective of this RCT is to assess the effectiveness of reverse inter-generational learning through an intervention program among children aged 4-6 aimed at reducing the use of single-use plastics in the household. By intervening at an early age, we strive to shape environmentally conscious behaviours and attitudes toward single-use plastics.

We chose to target Anganwadi[4] preschool kids in the state of Uttar Pradesh in an attempt to study whether they can inspire their parents to learn from their environmentally conscious behaviour and adopt sustainable practices in the household.

We propose to use a randomized control trial (RCT) design to perform our analysis. This will essentially be a field experiment where our sample would include 1000 student-parent pairs (10 each from about 100 Anganwadi schools). We will randomly assign 40 schools (about 400 students) to the control condition where we will not make any intervention. This control group will enable benchmark comparisons to get causal estimates of our proposed treatments. The remaining 60 schools will be randomly assigned to either of two treatment arms (300 students in each treatment arm).

The treatment arms are described below:

T1 (information arm): We will provide detailed information on the harmful effects of using plastic or polythene shopping bags which can cause environmental hazards. We propose to hold multiple 30-minute sessions teaching these students about the perils of disposing of such shopping bags and the associated environmental costs.

T2 (information and transfer arm): We will repeat T1 but make an in-kind transfer in addition to it. We will provide the kids with a set of environmentally friendly shopping bags (jute and paper bags) that they could use as alternatives to the more commonly used plastic/polythene bags.

Our estimation will depend on first establishing a balance between the treated and control groups across various observed characteristics.

Additionally, to test our survey instruments, we conducted a pilot survey of 126 mothers in five Anganwadi Centres (AWCs), Jehta Mini, Katara, Raypur, Salempur- Patoora, and Surykunden Kheda, in Lucknow districty of Uttar Pradesh.

[4]Anganwadi Services Scheme (ICDS Scheme), sponsored by the Government of India, for children up to six years to provide pre-primary education and arrange basic physical activities.

4 Power Calculations

We are severely constrained by budget, therefore the project is being run under tight budgetary restrictions. Nonetheless, for ensuring the quality of the academic contribution, we performed some brief power calculations based on the following parameters, using the CLINCALC tool (https://clincalc.com/stats/samplesize.aspx).

Using our fundamental research question and the following information on the *Minimum Detectable Effect* we make the assumptions as outlined below.

- Approximately we assume a treatment/control enrolment ratio of 0.75. Given budgetary constraints - we propose to have a larger control group.
- We look at our main first stage research question. Do households use sustainable shopping bags instead of single-use plastic bags? We expect a minimum incidence of such sustainable practices to be around 75% in the combined treatment groups and around 25% in the control group, eitherway.
- Using an α value of 0.5 which is the standard assumption for the probability of Type-I error and a sufficiently high power of 95% wich is $1 - \beta$ where β is the probability of Type-II error, we calculate the sample size requirements.

To achieve this, we need a sample size of around 47 clusters with around 20 treatment clusters and 27 control clusters.