Leveraging **behavioural nudges** to **encourage recycling** behaviours in the **Global South**

Key Words: recycling behaviors, experimental testing, waste management, nudging, behavioral science

The Cognitive Path to Recycling: An Empirical Study from Kenya

1 Introduction and Objective

Effective waste management in low-income countries presents unique challenges due to various socio-economic, infrastructural, and cultural factors.

- **Limited access to recycling services and infrastructure**
- **high cognitive demands**
- **competing priorities**
- **negative attitudes towards waste management**

Most existing research on recycling habit formation focuses on the Global North, overlooking factors unique to the Global South. The growth of consumerism and the rising middle class highlight the need for targeted, context-specific recycling solutions for low-income communities. Our research aims to bridge this gap by employing a human-centered design approach to create nudge interventions that increase participation in recycling, particularly waste separation.

2 Formative Research

Primary barriers to recycling identified in Kenya

- **a lack of information on the importance of recycling**
- **a lack of information about which items can be recycled**
- **recycling being a tedious and unappealing task**

The application of behavioural science is crucial in addressing the behavioural and cognitive challenges to recycling. We leveraged the Theory of Planned Behaviour (Ajzen, 1991), EAST framework (BIT, 2014), and Nudge Theory (Thaler & Sunstein, 2008) to design interventions to address recycling behaviours at the point of waste disposal.

The niche in literature:

The **Theory of Planned Behavior (Ajzen, 1991)** and the **Theory of Reasoned Action (Ajzen & Fishbein, 1975)** highlight the importance of attitudes, perceived norms, and perceived control in shaping recycling intentions and behaviors.

Research underscores that positive recycling attitudes, social support, high self-efficacy, and intrinsic motivation significantly drive recycling behaviors (Nigbur et al., 2010; Miafodzyeva & Brandt, 2013; Oztekin et al., 2017; Wan et al., 2017; Paul et al., 2016; Tabernero & Hernández, 2011; Scafuto et al., 2018).

3 Method

To evaluate the effectiveness of behavioral interventions aimed at increasing recycling behaviors in Kenya

697 participants in the Busara lab in Nairobi involved in the study

RANDOMIZED CONTROLLED TRIAL (RCT)

● 1 control group ★ 3 treatment groups

Control Group (174 participants):

- ➔ Participants were given standard recycling information such as bin labels and engaged in a regular, non-recycling game.
- ➔ No behavioural interventions were present

Treatment 1: Messaging (171 participants):

- ➔ Shown the recycling poster and engaged in the non-recycling game.
- ➔ Posters leveraged social and behaviour change messaging such as cultural nudges, call to action and a visual depiction of correctly categorized waste items with each bin type.

Treatment 2: Recycling Game (182 participants):

- ➔ Shown the recycling poster and engaged in a recycling game.
- ➔ The task in the recycling game was to accurately sort different items into the appropriate waste categories by dragging and dropping them to the correct waste bin on the screen.
- ➔ Leveraged gamification techniques by personalizing the game with waste items identical to those provided during the refreshment break. Additionally, we incorporated social comparison through a leaderboard and implemented feedback mechanisms and rewards using audio sounds and a points system.

Treatment 3: Peer Effects Signaling (170 participants) :

- ➔ Participants were shown the recycling poster, engaged in the non-recycling game, and were exposed to signaled behaviour of their peers.
- ➔ The influence of social norms and peer behavior was signaled by pre-filling the recycling bins with correctly sorted waste items.

Participants were randomly assigned to either the control group or one of the treatment groups. Participants were given a refreshment break and asked to finish their refreshments before returning to the lab. Waste bins were strategically positioned outside the door, becoming visible only when participants exited, encouraging natural disposal of waste as they left the break room. They were presented with a choice between a multi-part waste bin system with four color-coded sections for easy segregation and a standard common waste bin placed a short distance away.

The study was supported by a field team and local waste pickers who assisted with data collection through baseline and endline surveys, direct observations, and tally-based counts of disposed waste items. Regression analysis and ANOVA were used to examine the impact of the interventions on recycling behaviors.

4 Results

- ➔ The recycling game (Treatment 2) significantly improved waste segregation behaviors, with a **19.3% increase in accurate waste segregation** and an **8.8% increase in self-efficacy** compared to the control group ($p < 0.001$).
- ➔ Participants who were signaled with peer effects (Treatment 3) showed a **21.7% increase in accurate waste segregation**, highlighting the impact of perceived peer behavior and signaling. ($p < 0.001$)
- ➔ Conversely, the posters alone had no significant impact on any of the recycling measures evaluated in this study.
- ➔ Among the types of waste segregated, there was a **26.7% increase in accurate organic waste segregation** ($p < 0.001$) and a **10.2% increase in accurate plastic waste segregation** ($p < 0.005$). **Organic waste was more accurately segregated** than other waste categories, likely due to its ease of recognition.

Fig 1. Impact of Treatment on Correct Segregation of Waste

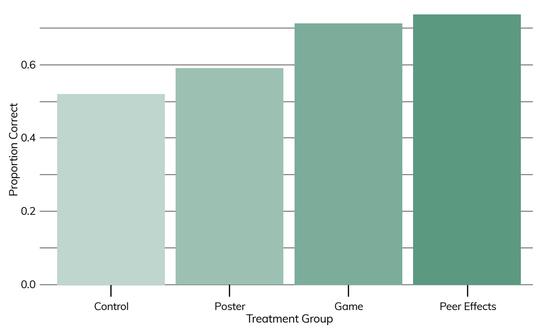
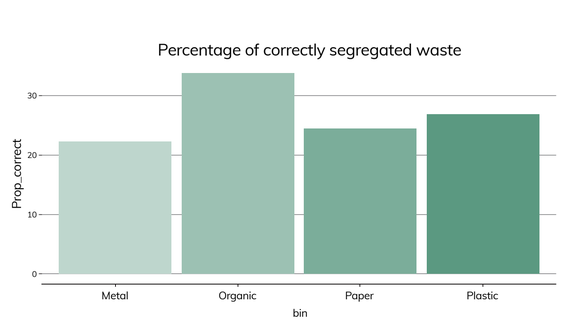


Fig 2. Proportion of Correctly Segregated Waste by Type of Waste Bin



5 Discussion

- ➔ Our study found that both the gamification and peer effects treatments were effective in improving the overall accuracy of waste segregation through nudging effects, particularly for organic and plastic waste. The recycling game notably also increased self-efficacy among participants, aligning with the Theory of Planned Behavior, which posits that higher self-efficacy enhances behavioral intentions and actions.
- ➔ Visual cues and peer signaling were effective in reducing uncertainty and cognitive effort, thereby enhancing recycling participation. Similar results were observed in our field study in India, where social influence and behavioral nudging also effectively improved recycling behaviors. These insights suggest that addressing specific barriers and applying contextual nudges can lead to sustained improvements in waste management behaviors in the Global South.
- ➔ Targeting key waste generation points and tailoring interventions to these contexts through the use of visual cues, at-home waste items for demonstration and supplementary interactive posters or games, can drive significant behavioral change. These insights are vital for designing effective recycling programs that can foster sustainable waste management behaviors.

6 Additional Inforation

Fig 3. Sample Demographic Summary

Age Group	
18 - 35	70%
36 - 50	23%
51 - 79	7%

Education	
Did not go to school	<1%
Primary	18%
Secondary	39%
Tertiary Education	40%
Post Grad Education	3%

Marital Status	
Married	49%
Single	39%
Separated	7%
Divorced	1%
Widowed	4%
Other	<1%

Employment Status	
Unpaid Family work	2%
Formal Paid work	12%
Informal work	36%
Unemployed	20%
Paid Domestic work	8%
Vocational worker	7%
Other	16%

Gender by Treatment Condition	
Control:	56F% 44M%
Treatment 1:	58F% 42M%
Treatment 2:	51F% 49M%
Treatment 3:	66F% 34M%

Other key results from qualitative responses and surveys:

- ➔ **62%** of the participants in the messaging treatment reported that the posters above the bins were very effective in conveying the recycling-related message. **85%** of the participants noticed the placement of the posters and mentioned that they can recall the messaging in the posters.
- ➔ **60%** of the participants in the recycling game treatment condition reported that the use of everyday waste items in the game aided their understanding of waste segregation. **72%** noted the similarity between the bins used in the game and real life and **43%** enjoyed playing the recycling game.
- ➔ **84%** of the participants in the peer effects signaling intervention noticed their fellow peers segregating waste. **93%** of the participants said that they were encouraged to recycle by observing behaviour of others

Busara

Link to the full report

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