KOCHI UNIVERSITY OF TECHNOLOGY

Social Design Engineering Series *SDES-2024-4*

# Does future design induce people to make a persistent change to sustainable food consumption?

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July 3, 2024

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**Abstract**

It is crucial whether or not people make sustainable food consumption (SFC) for resolving climate change, health and environmental problems as well as achieving SDGs. However, little is known about what encourages people to make a sustained shift to SFC. This research considers a future design (FD) approach where people are asked to think of a problem and take actions through taking a perspective of future generations, investigating the question "how does the FD approach impact food consumption?" and the hypothesis "FD induces a lasting shift to SFC." We employ a social experiment with three treatments of "baseline," "deliberation" and "FD," collecting data on organic and nonorganic vegetable consumptions with 300 households in Bangladesh over three months. In baseline, households report the consumptions. In deliberation, they additionally deliberate among their family members to think of a vision, a mission and a strategy for the consumptions. In FD, they additionally take each perspective of past, current and future generations and then deliberate to think of the same issues. The result indicates that FD affects people to have a sustained increase (decrease) in organic (nonorganic) vegetable consumption as compared to any other treatment, and the effect under FD is approximately twice as much as that under deliberation in magnitude and in each round. Overall, FD demonstrates a great potential for inducing people to make a persistent change to SFC.

**Keywords**: Sustainable food consumption; Organic vegetables; Future design; Deliberation; Social experiment; Bangladesh

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# Contents



# Nomenclature

AATT Aggregated average treatment effect on the treated

ATT Average treatment effects on the treated

BDT Taka, Bangladeshi currency

DALYs Disability-adjusted life-years

DID Difference-in-difference

FD Future design

GHG Greenhouse gas

glm Generalized linear model

GSEM Generalized structural equation model

NVCs Nonorganic vegetable consumptions

OVCs Organic vegetable consumptions

RAs Research assistants

SDGs Sustainable development goals

SFC Sustainable food consumption

TEM Total earning members

TFM Total family members under 18

# 1 Introduction

Climate change substantially threatens ecological systems, intensifies severe weather events, reduces biodiversity and presents complex risks to our current societal framework (O'neill et al., 2017). The food system is responsible for more than a third of greenhouse gas (GHG) emissions, directly contributing to climate change (Reisch et al., 2013, Mbow et al., 2020, Crippa et al., 2021). Food is a crucial link between human wellbeing and the planet's health (Sánchez et al., 2021). Household consumptions bear approximately 60 % of global GHG emissions and food is among the most impactful consumption categories in terms of emissions (Wellesley et al., 2015, Ivanova et al., 2016). At the same time, the dietary factor plays a significant role in worldwide burdens of diseases, resulting in 11 million deaths and 255 million disability-adjusted life-years (DALYs) in 2017 (Afshin et al., 2021). Ample evidence exists that nearly every dimension of human health is also affected by food practices and the disease burdens along with aggregate ecosystem alterations have been growing (Myers et al., 2013). In order to mitigate ongoing problems with climate change and health, it is crucial to transition our food consumptions to be sustainable, i.e., sustainable food consumption (SFC) practices (Vittersø and Tangeland, 2015). There are several studies that have examined the determinants of short-term or immediate changes in food consumptions (Vecchio and Cavallo, 2019, Thøgersen, 2000). This research seeks to experimentally address some possible medium-term or long-term behavioral changes to SFC.

Jackson (2006) argues that a SFC concept has emerged recently and it is attributed to the Agenda 21 document, a significant policy suggestion from the United Nations Earth Summit held in Rio in 1992. The SFC is defined to be the use of food products "that respond to basic needs and bring a better quality of life while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations" (Oslo Ministerial Roundtable, 1994). Extensive scientific research and public opinion indicate that current rates and methods of food production and consumption are unsustainable, and such failures for sustainability have resulted in or will result in irreversible negative consequences for future societal wellbeing (Pollard et al., 2010, Grooten and Almond, 2018, Kemper and Ballan-

tine, 2019). Some food consumption is viewed as an effective way towards achieving a transition to SFC, such as an increase in organic and/or plant-based food consumptions and/or reduction in specific meat consumptions (Hoek et al., 2004, Lea et al., 2006, Hughner et al., 2007, Vittersø and Tangeland, 2015).

Human behaviors are argued to be explained via dual-process theories in cognition (Evans, 2008, Kahneman, 2011). The theory posits two distinct cognitive processes that govern decisions and behaviors, i.e., automatic and deliberative ones. The automatic processes are concerned with peripheral routes of information processing, while the deliberative ones are concerned with the central routes that require some cognitive efforts. Thus, the deliberative one is known to be associated with languages and with the capacity to think about future and counterfactual possibilities. It is demonstrated that some interventions on the automatic and deliberative processes can have short-term or immediate effects across different domains, while the long-term effects are not well documented (Allcott and Rogers, 2014, Abrahamse, 2020). Such long-term behavioral changes are known to be achieved through habit formations, a change in mental contents and cognition, recursive social exchanges and benefit calculation in deliberative cognitive processes (Rogers and Frey, 2015, Volpp and Loewenstein, 2020). Rothman et al. (2009) suggests that interventions on deliberative processes shall be effective at maintaining a long-term behavioral change, requiring systematic data collection over sufficiently long time.

Several field and lab experiments have examined some impacts of interventions on automatic processes, such as nudging, labels and visual prompts, in a variety of contexts to alter people's consumption behaviors (Maas et al., 2012, Whitehair et al., 2013, Bucher et al., 2016, Brunner et al., 2018, Hummel and Maedche, 2019, Abrahamse, 2020, Majer et al., 2022, Qi et al., 2022, Segovia et al., 2023). A field experiment by Vandenbroele et al. (2018) investigates whether or not introducing some small-sized commodity to a retailer's assortment encourages consumers to buy, finding that it successfully nudges consumers to do so. Lohmann et al. (2022) estimate the causal effect of some labels on individual food choices through conducting experiments at cafeterias in five different universities, revealing that carbon footprint labels promote climatarian diets. Another

set of studies has carried out a series of experiments to investigate the immediate effects of interventions on deliberative processes by noting descriptive information provisions and social norms to subjects, confirming the existence of such effects on people's decisions and behaviors (Nomura et al., 2011, Monroe et al., 2015, Sparkman and Walton, 2017, Stöckli et al., 2018, Nguyen et al., 2022, Bazoche et al., 2023). A study by Carfora et al. (2019) tests the impact of different messaging interventions on people's attitudes and behaviors about red and processed meat consumptions in field experiments with 350 university students in Italy. They suggest that health and environmental messages have some prolonged effects even after one month of the interventions. Overall, the literature generally establishes that some interventions on automatic and deliberative processes can have short-term effects on consumption behaviors.

Future studies approaches, i.e., visioning, backcasting and scenario planning, have been studied in the past few decades to depict how a group of people or organizations adapt to anticipated future trends and to provide insights into opportunities for changes in behaviors and strategies (Swart et al., 2004, Bell, 2009, Phdungsilp, 2011, Amer et al., 2013, Timilsina et al., 2020). Most of these future studies approaches utilize visioning to share and understand a thorough, robust and consensus-based vision among participants in the workshops (Potschin et al., 2010, Costanza, 2000, Wiek and Iwaniec, 2014). Prior research has applied backcasting and/or scenario planning with visioning in various domains, such as businesses, natural resource management and economies in a society, for various adaptations and changes (Phdungsilp, 2011, Pereverza et al., 2019, Thorén and Vendel, 2019, Sandström et al., 2020). It is claimed that there is little empirical evidence regarding how much such future studies approaches impact people's or organizational behaviors and strategies (Oliver, 2023). A new approach called future design (FD) has gained attention and research interest, empirically establishing the impact on the behaviors and strategies in experiments (Saijo, 2020, Timilsina et al., 2020, Pandit et al., 2021, Shahen et al., 2021). However, the impacts have yet to be proven to persist in the medium or long-term. FD comprises a series of procedures where people read a case-method material and think about a problem by taking each perspective of past, current and future (Nakagawa et al., 2019, Pandit et al., 2021). After

that they take the perspective of future generations, make deliberations and request some visions, missions and strategies to current generations. Finally, taking the current generations perspective, people suggest their own visions, missions and strategies for the problem. To enhance intergenerational sustainability, researchers introduce future ahead and back (FAB) and intergenerational accountability mechanisms as part of FD approaches (Shahen et al., 2021, Timilsina et al., 2023). MacAskill (2022) also proposes a similar idea to introduce "longtermism" as a view that we should do much more to protect the interests of future generations, recognizing that our current actions will have a significant impact on countless future people. Despite that, FD offers a series of procedures to address a problem, developing self accountability through visions, missions and strategies and taking the perspective of different times.

Previous research has primarily focused on examining the immediate or short-term changes in people's behaviors. Little studies have documented sustained behavioral changes and studied how some interventions, such as future studies approaches, affect people in the medium or long run. Some recent researches have presented a great potential of FD approach to induce people to make long-term changes in their behaviors, demonstrating its strong effectiveness for short-term changes through conducting laboratory and field experiments (Timilsina et al., 2020, Pandit et al., 2021, Shahen et al., 2021, Timilsina et al., 2023). In this study, we focus on examining possible impacts on people's food consumption behaviors by FD interventions as an experimental study for long-term behavioral changes, because the persistent shift to SFC is known to be crucial for addressing climate change and health issues at global level. Therefore, we pose a question "how does the FD approach impact food consumption," hypothesizing that FD induces a lasting shift to SFC. We design and institute a 3-round social experiment with three treatments of "baseline," "deliberation" and "FD," collecting data on organic and nonorganic vegetable consumptions with 300 households in Bangladesh over three months. Addressing the question and hypothesis will be beneficial for inducing people to make a persistent change to SFC in tackling issues related to sustainable development goals (SDGs).

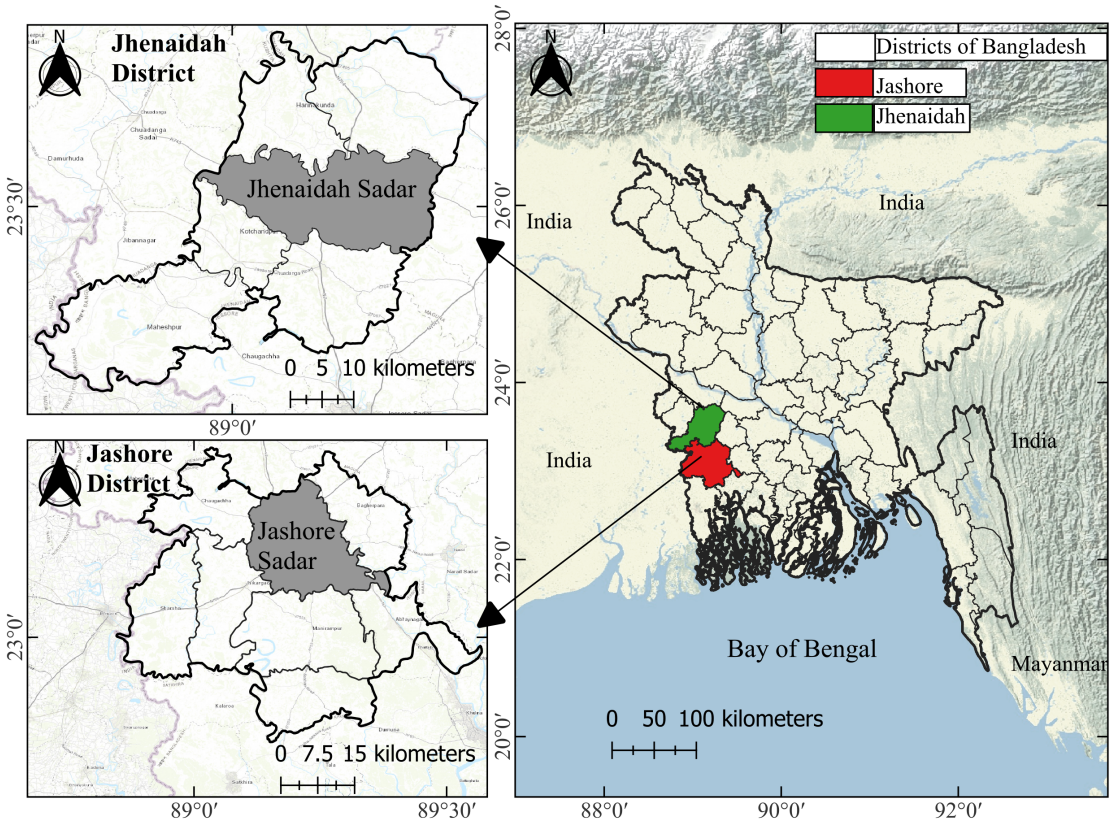
# 2 Methods

## 2.1 Study areas and sampling strategy

We chose Jashore and Jhenaidah as our study areas and they are located in the south-western region of Bangladesh. Figure 1 illustrates the study areas which are recognized as a regional center of agriculture, particularly, vegetable production (BBS, 2022). People's sociodemographic and ethnic profiles in the two areas are homogeneous and close to the country's average (BBS, 2020). In Bangladesh, there are some specific areas where local agricultural production meets certain requirements for organic agriculture, and our study areas are the ones that engage on such organic agriculture (Badgley et al., 2007, Rahmawati et al., 2018). Organic agriculture is a comprehensive approach towards food production that aims to improve the health of agroecosystems including biodiversity, biological cycles and soil activities (Gomez and Thivant, 2017). The approach highlights the utilization of natural inputs, such as minerals and plant-derived products, abstaining from use of synthetic fertilizers and pesticides (Singh and George, 2012, Ferdous et al., 2021). On the other hand, nonorganic agriculture involves modern agricultural practices that heavily rely on synthetic chemical fertilizers, fungicides, insecticides and herbicides (Campion et al., 2020). In the areas, the market prices of organic vegetables are comparable to those of nonorganic vegetables, and farmers can choose how much to produce organic and nonorganic vegetables depending on their production environments, modes and methods in each growing season (FAO, 2023). Therefore, both organic and nonorganic vegetables are produced and traded in agricultural markets at the local vicinity, while local people have some experiences to purchase and consume organic and nonorganic vegetables in the markets or from the farm gates as their daily practices (Dhaka Tribune, 2014, Musa et al., 2015, Seraj, 2019). The features in our study areas are considered appropriate for conducting our social experiments.

Three treatments, baseline, deliberation and future design (FD), are prepared for the experiments over three rounds ($t = 1, 2$ and $3$) between January 2023 and March 2023 that consists of one pretreatment round and two posttreatment rounds (figure 2a). The households were selected

Figure 1: The study areas in Bangladesh, Jashore and Jhenaidah

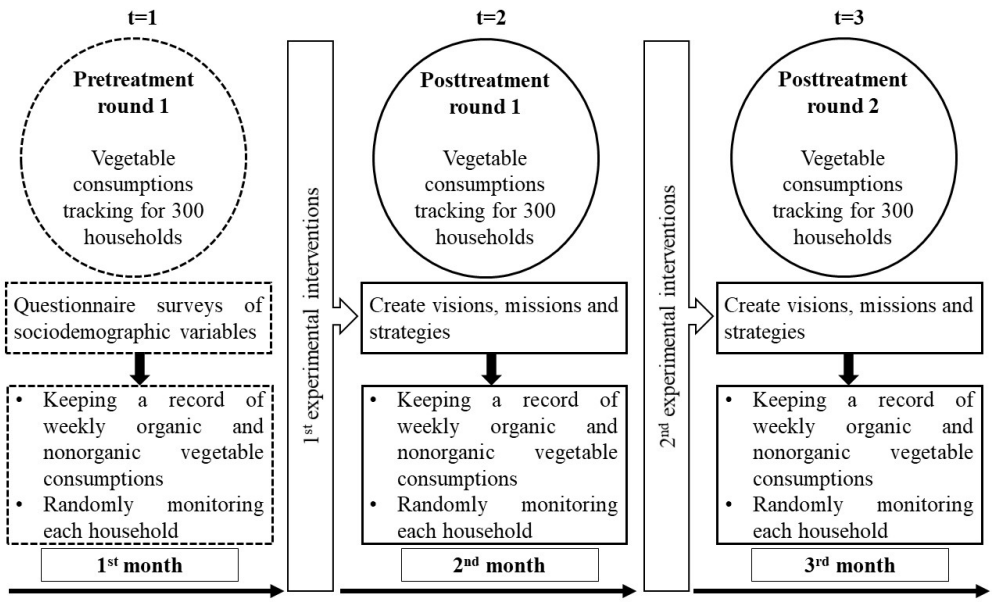


by following the stratified random sampling techniques. We randomly selected 150 households in each of Jashore and Jhenaidah areas by using the residence list and the random number generators, totaling 300 households. The randomization procedures were also employed to assign 50 out of the 150 households to each of the three treatments within one area, and consequently, 100 households are assigned to each treatment. The 1st author administered the experiments, organized and trained local support staff as well as research assistants for the households' recruitment, participation and data collection, explaining our experiments as the programs organized by the university and the Upazila agriculture office to the households. The households received an instruction for an overview of the programs and signed an informed consent for their participation in advance (see the appendix material A for the experimental instructions). Therefore, they participated without noticing that they are part of our experiments, while the participation rate was approximately 85 %.[1] It reflects that a majority of households are familiar with organic and nonorganic vegetables, considering the program participation fee (= 900 BDT) to be good enough. The fees were solely provided as the compensation for their involvement in the programs that contain three rounds of our experiments, and the amount was the same for all the households.

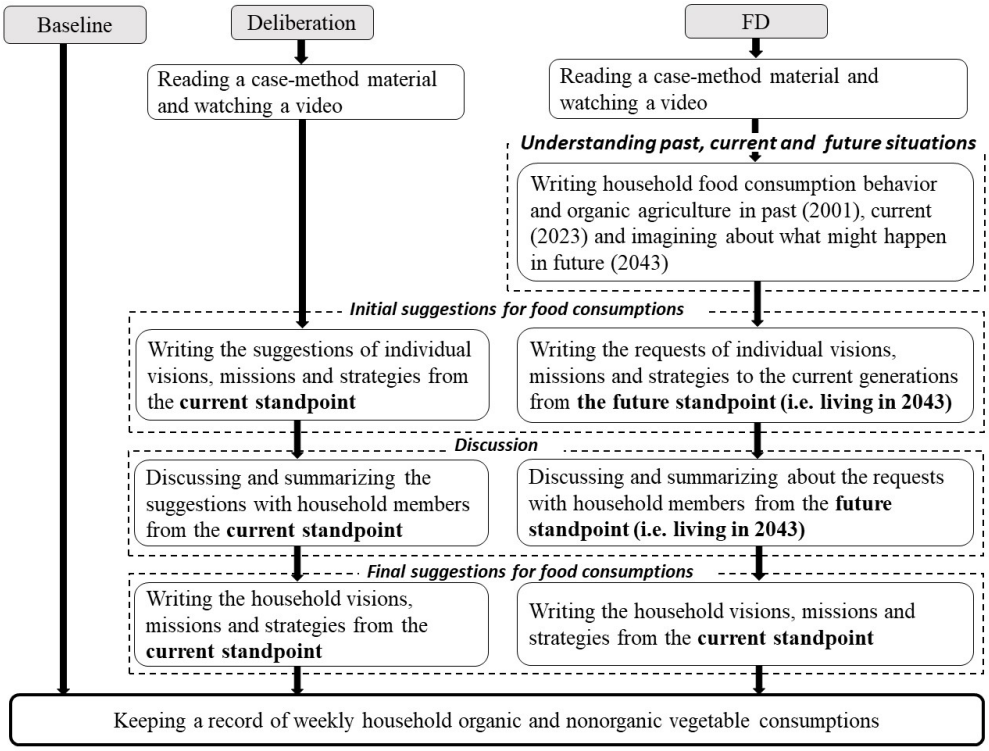
## 2.2 Experimental setup and procedures

The social experiments along with questionnaire surveys were conducted to collect necessary information of the households regarding their sociodemographic variables, daily organic and nonorganic vegetable consumptions in a week in each round to calculate their weekly organic vegetable consumptions (OVCs) and nonorganic vegetable consumptions (NVCs) (figure 4). We collect weekly vegetable consumptions data in each round, implicitly choosing a specific week with an interval of one month. We do so to capture the persistent change precisely, considering the buying culture of Bangladeshi households, as well as the time and cost involved in conducting the

[1] We identified that some households rejected their participation due to several reasons, such as health problems. However, we sought to recruit households for reaching a sample size of 300. The participation rate is considered the ratio between the number of households we invited through sampling processes and the number of households who actually participated in the programs.




(a) The temporal flows of experiments over three rounds, pretreatment round 1, posttreatment round 1 and posttreatment round 2




(b) The procedures in each of the 1st and 2nd experimental interventions for deliberation and future design (FD) treatments as compared to no intervention for baseline one

Figure 2: Experimental procedures over time and the flow of experimental interventions per treatment

research.[2] The sociodemographic variables include the household head's pretreatment knowledge about organic food, age, gender, education, household income, a number of family members under 18 and earning members (see the appendix material B for collecting information of the pretreatmnt knowledge). However, information regarding some time-invariant sociodemographic variables is collected only in the pretreatment round. The prices for OVCs and NVCs are not included as independent variables, because they remain the same for households across treatments over three periods. In the field, there is a lack of access to computers or devices equipped with internet connectivity. Consequently, all the procedures were conducted manually by the experimenter and research assistants. The households in the study were literate and employed traditional writing instruments, namely pens and papers, to respond to the inquiries. Whenever the households had questions, the experimenter or research assistants sought to answer them in a real-time manner.

Deliberation and future design (FD) treatments are set to examine the effects on household food consumptions in each area on top of baseline one, consisting of the 1$^{st}$ and 2$^{nd}$ experimental interventions between two rounds (figure 2b). With this design, we test a hypothesis "FD induces a lasting shift to SFC as compared to the baseline and deliberation." Households in baseline are asked to help in recording and reporting their OVCs and NVCs over three rounds without any experimental intervention, being considered "untreated" over all periods. In deliberation and FD, households receive some experimental interventions that consist of reading case-method materials, watching a video and discussing about their food consumptions regarding OVCs and NVCs between the two rounds (figure 2b). Therefore, households in deliberation and FD are considered "untreated" in pretreatment round 1 ($t = 1$), and "treated" in posttreatment rounds 1 and 2 ($t = 2$ and 3). The case-method materials provide households with a brief history, definitions and current situations of organic and nonorganic foods in their native language for easy comprehen-

[2]Households think that they are under monitoring all the weeks in each round without knowing that experimenters implicitly choose a week for precisely monitoring and measuring food consumptions. At the same time, we admit that there may be an alternative way to quantify a persistent change in food consumptions, such as trying to collect every-day data over months without specifying a week. However, we conclude that these procedures become too demanding for our research team as well as for households in terms of time and cost, and it shall be very difficult to precisely collect all day consumption data. Overall, considering food cultures, practices and the nature of Bangladeshi households, we do believe that the data-collection procedure we use in this research is one of the most effective ways to precisely measure and quantify the persistent change by streamlining the burden, cost and time on several aspects.

sion (see the appendix C for case-method materials). In a video, scientific information and facts for organic and nonorganic foods along with the detailed production and consumption processes in Bangladesh are introduced over 10 minutes, referring to some books, reports and articles (Sarker and Itohara, 2008, Yoshino, 2010, Zulfiqar and Thapa, 2016, Gomez and Thivant, 2017, Ferdous et al., 2021, BBS, 2022).

In deliberation, household heads are first asked to write their initial suggestions for betterment of household food consumptions after reading the case-method materials and watching a video (figure 2b). They are asked to sit for approximately 10 to 20 minutes of discussion with household members and then to summarize the suggestions raised via the discussion. Ultimately, they are requested to write their household visions, missions and strategies as the final suggestions for the betterment. In FD, after reading case-method materials and watching a video, household heads are asked to write their evaluations and understanding about food consumptions and organic agriculture, taking each perspective of people in the past (2001), in the current (2023). Additionally, they are asked to imagine what will possibly happen or they should do on food consumptions in the future, taking both perspectives of people in the current (2023) and in the future (2043) to expand their ways of thinking and viewpoints (Timilsina et al., 2020, Pandit et al., 2021, Shahen et al., 2021) (figure 2b). When household heads and members take the future standpoint, they are asked to think and write possible requests of visions, missions and strategies for food consumptions to the current as if they are people in the future (2043). Therefore, they discuss with household members from the future standpoint and summarize the requests. Finally, household heads and members are asked to get back to the current standpoint, writing their final suggestions of household visions, missions and strategies for food consumptions. In deliberation, household heads and members complete every intervention only from their own current standpoint. However, in FD, household heads and members go through different perspectives of people in the past, current and future to complete every intervention. In particular, they are asked to make the requests to the current from the future standpoint, finally getting back to the current standpoint for finalizing their visions, missions and strategies.

We track and monitor weekly organic and nonorganic vegetable consumptions for 300 households in pretreatment round 1, posttreatment round 1 and posttreatment round 2 over three months. Households are randomly monitored through visits by RAs or the 1st author over a month in each round, and we sought to confirm how their vegetable purchases and consumptions are truthfully reported. In particular, we implicitly pick a specific week for intensive observations and monitoring of each household in each round across treatment to obtain precise OVCs and NVCs, and households never know which week is that specific week. In pretreatment round 1, all households are requested to provide sociodemographic information by completing questionnaires and the weekly vegetable consumptions without any experimental intervention (figure 2a). Just before posttreatment round 1, the 1st experimental interventions take place for the households in deliberation and FD (see the 1st experimental interventions in figure 2a). After the 1st interventions, we track weekly vegetable consumptions and randomly monitor each household over posttreatment round 1. In total, we conduct 12 sessions and organize a session of 20 to 30 households for the experimental interventions in baseline, deliberation and FD treatments that take approximately 30, 80 and 100 minutes, respectively. Just before posttreatment round 2, the 2nd experimental interventions are made, following the same procedures as the 1st experimental interventions. After that, we keep track of the consumptions and monitor each household over posttreatment round 2 as in posttreatment round 1. Upon completing the three rounds, a program participation fee was transferred to the bank accounts of the participating households.

## 2.3 Statistical analyses

The experimental panel data over three rounds of $t = \{1, 2, 3\}$ from 300 households are organized and utilized for the statistical analyses, consisting of OVCs, NVCs, treatment dummies and sociodemographic variables (see table 1 for the definitions of all variables). To estimate the treatment effects, we apply a difference-in-difference (DID) method with multiple-time periods which is one of the most popular approaches to evaluate causal treatment effects (see, e.g., Angrist and Pischke, 2009, Wooldridge, 2010, Chakrabarti et al., 2018, Hossain et al., 2019, Callaway and

Table 1: Definitions of variables

| Variables | Descriptions |
|---|---|
| Dependent variables | |
| Organic vegetable consumptions (OVCs) | Weekly consumptions of organic vegetable in kg |
| Nonorganic vegetable consumptions (NVCs) | Weekly consumptions of nonorganic vegetable in kg |
| Independent variables | |
| Treatments (Base group = Baseline treatment) | |
| Deliberation treatment | It takes 1 when a household is in deliberation treatment, otherwise 0 |
| Future design treatment | It takes 1 when a household is in future design treatment, otherwise 0 |
| *Sociodemographic variables* | |
| Preknowledge | Household head's pretreatment knowledge about organic food from 1 to 7 (completely low = 1, mostly low = 2, somewhat low = 3, neither high nor low = 4, somewhat high = 5, mostly high = 6 and completely high = 7) |
| Age | Household head's age is expressed by years |
| Gender | It takes 1 when a subject is female, otherwise 0 |
| Household income | Monthly income in BDT[a] |
| Education | Household head's education from 0 to 6 (no formal education or no schooling = 0, 1 to 5 years of schooling = 1, 6 to 8 years of schooling = 2, 9 to 10 years of schooling or secondary school certificate = 3, 12 years of schooling or higher secondary school certificate = 4, undergraduate university degree or equivalent = 5 and graduate degree or equivalent = 6) |
| Total family members under 18 (TFM) | Number of persons in a family living together under 18 years old |
| Total earning members (TEM) | Number of earning persons in a family |

[a] BDT stands for Bangladeshi currency "taka."

Sant'Anna, 2021, Braghieri et al., 2022, Cameron and Trivedi, 2022, Kemigisha et al., 2023). With this method, the pre-post difference in the mean vegetable (organic and nonorganic) household consumptions in deliberation or FD is compared with that in baseline, and it enables to identify the aggregated average treatment effects on the treated denoted by $AATT_j^K$ for $K = \{\text{OVCs}, \text{NVCs}\}$ and $j = \{\text{deliberation}, \text{FD}\}$ (Callaway and Sant'Anna, 2021).

The equations are specified as

$$AATT_j^K = \sum_{t=2}^{3} \omega(g,t) \cdot ATT_j^K(g,t) \tag{1}$$

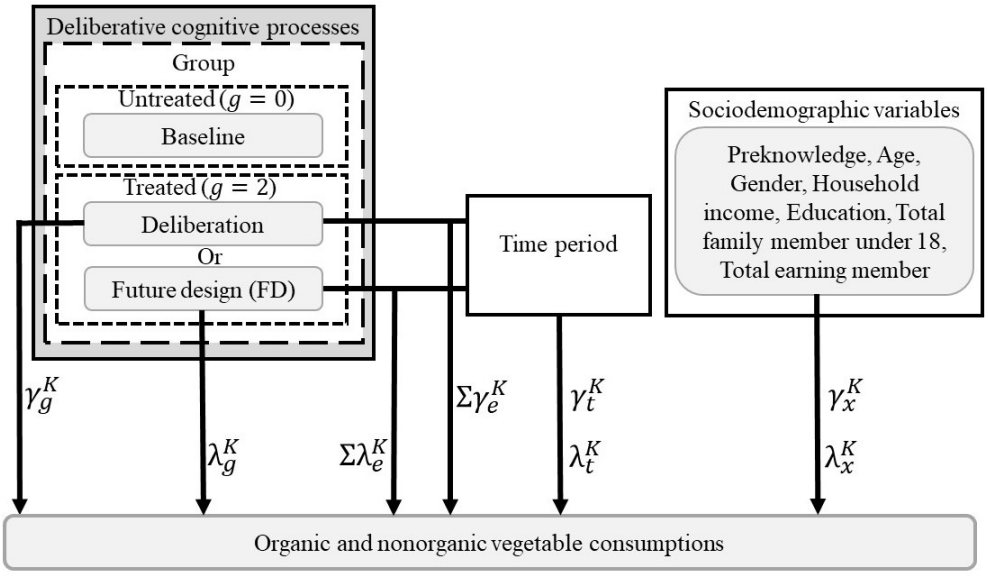
$$Y_{it}^K = \gamma_t^K + \gamma_g^K + \sum_{e=0}^{1} \gamma_e^K \, deliberation_{it}^e + \gamma_x^K \mathbf{X}_i + u_{it} \tag{2}$$

$$Y_{it}^K = \lambda_t^K + \lambda_g^K + \sum_{e=0}^{1} \lambda_e^K \, FD_{it}^e + \lambda_x^K \mathbf{X}_i + \epsilon_{it}. \tag{3}$$

where $g$ is the time period when a household first becomes treated, $\omega(g,t)$ is the weighting function and $ATT_j^K(g,t)$ is the average treatment effects on the treated (Callaway and Sant'Anna, 2021). Households in baseline had remained untreated for all periods, being specified as a group by $g = 0$, while those in deliberation and FD treatments get treated in the periods $t = 2$ and $t = 3$, being specified as a group by $g = 2$. In equations (2) and (3), $Y_{it}^K$s are the dependent variables of OVCs and NVCs from households indexed by $i = 1, \ldots, 300$, $deliberation_{it}^e$ and $FD_{it}^e$ are the treatment dummy variables, taking a value of 1 when household $i$ gets treated at time period $t$, $e$ is the length of a treatment exposure ($e = t - g$), $\mathbf{X}_i$ is a vector of the pretreatment sociodemographic variables, $\gamma_t^K$ and $\lambda_t^K$ are parameters for time-fixed effects, $\gamma_g^K$ and $\lambda_g^K$ are parameters for group-fixed effects, $\gamma_x^K$ and $\lambda_x^K$ are vectors of parameters associated with $\mathbf{X}_i$, $u_{it}$ and $\epsilon_{it}$ are error terms. Finally, $\gamma_e^K$ and $\lambda_e^K$ are the main parameters of our interests to measure the average treatment effects across different lengths of exposure to the treatment, i.e., $ATT_{\text{deli}}^K(2,2) = \mathbb{E}(\gamma_0^K)$ and $ATT_{\text{deli}}^K(2,3) = \mathbb{E}(\gamma_0^K + \gamma_1^K)$, $ATT_{\text{FD}}^K(2,2) = \mathbb{E}(\lambda_0^K)$, $ATT_{\text{FD}}^K(2,3) = \mathbb{E}(\lambda_0^K + \lambda_1^K)$.

Figure 3 is a conceptual framework that visualizes the relationships among groups, time periods, sociodemographic variables and households' consumptions of organic and nonorganic veg-

Figure 3: A conceptual framework describing the relationships among group, time period, sociodemographic variables, organic vegetable consumptions (OVCs) and nonorganic vegetable consumptions (NVCs) where $\gamma_g^K$, $\gamma_t^K$, $\gamma_e^K$, $\lambda_g^K$, $\lambda_t^K$, $\lambda_e^K$ and $\gamma_x^K$, $\lambda_x^K$ are coefficients and a vector coefficients for the corresponding factor; and $K = \{\text{OVCs}, \text{NVCs}\}$.




etables. The relationships among variables represented by plane arrows in figure 3 are statistically identified through estimating parameters in equations (1) to (3). Our focus is on estimating the coefficients of $\lambda_e^K$, $\lambda_g^K$, $\lambda_t^K$ and $\lambda_x^K$ in figure 3 and on comparing the estimates with those in equation (2). Recall our research question "how does the FD approach impact food consumption?"and the hypothesis "FD induces a lasting shift to SFC." The coefficients of $\lambda_e^K$s are the most important key parameters enabling us to answer the research question and the hypothesis. Specifically, the hypothesis can be posed as follows: $H_0 : \lambda_e^K = 0$ and $H_1 : \lambda_e^K \neq 0$ for $e = \{0, 1\}$. In this regard, we expect that households in FD increase (decrease) OVCs (NVCs) over the rounds as compared to those in baseline and deliberation or equivalently $AATT_{FD}^K$ is estimated to be practically and statistically significant.

As a robustness check, we apply a two-part model with random effects using the probit-glm framework (see, e.g., Belotti et al., 2015, Eisenberg et al., 2015, Farewell et al., 2017, Pallegedara, 2020, Jiang and Ni, 2020, Dangerfield et al., 2021, Amore and Murtinu, 2021, Kruse et al., 2021, Cameron and Trivedi, 2022, Bazoche et al., 2023). In the first part, a probit model is estimated

for the probability of observing a positive OVC or a positive NVC versus zero. In the second part, conditional on the positive consumption, a generalized linear model (glm) is estimated with a family of gamma and log links through validating a modified Park and Prigibon test, respectively (see, e.g., Polgreen and Brooks, 2012, Glick, 2015, Ng and Cribbie, 2017). The two-part model is specified as

$$\Phi^{-1}\Pr(Y_{it}^K > 0|\mathbf{W}_{it}) = \alpha_0^K + \alpha_1^K \textit{deliberation}_{it} + \alpha_2^K \textit{FD}_{it} + \alpha_3^K \mathbf{X}_{it} + V_i^K \tag{4}$$

$$\log[\mathbb{E}(Y_{it}^K|Y_{it}^K > 0, \mathbf{W}_{it})] = \beta_0^K + \beta_1^K \textit{deliberation}_{it} + \beta_2^K \textit{FD}_{it} + \beta_3^K \mathbf{X}_{it} + U_i^K \tag{5}$$

where $\Phi^{-1}$ is the probit link function, $Y_{it}^K$s are dependent variables of OVCs and NVCs for household $i$ at time period $t$, $\mathbf{W}_{it}$ is a vector of all the independent variables that follows, $\textit{deliberation}_{it}$ and $\textit{FD}_{it}$ are treatment dummy variables that takes a value of 1 when household $i$ is in deliberation or FD at time period $t$, respectively, $\mathbf{X}_{it}$ is a vector of the pretreatment sociodemographic variables, $V_i^K$ and $U_i^K$ are random intercepts, being assumed to be uncorrelated with $\mathbf{W}_{it}$. The $\alpha_1^K$, $\alpha_2^K$ and $\alpha_3^K$ ($\beta_1^K, \beta_2^K$ and $\beta_3^K$) are parameters to be estimated for the probit model (glm), and our main concerns are on estimating $\alpha_1^K, \alpha_2^K, \beta_1^K$ and $\beta_2^K$ associated with $\textit{deliberation}_{it}$ and $\textit{FD}_{it}$, controlling for other independent variables. We estimate the two-part model of equations (4) and (5) for posttreatment round 1, posttreatment round 2 as well as for the panel data by applying the generalized structural equation model (GSEM) approach (Jiang and Ni, 2020, Cameron and Trivedi, 2022). Finally, the combined marginal effects for each independent variable in all models are computed with the estimated coefficients to quantify the magnitude of the impacts by deliberation and FD treatments on the dependent variables (Wooldridge, 2010, Jiang and Ni, 2020, Cameron and Trivedi, 2022).

# 3 Results

Table 2 reports the summary statistics of the major independent variables for households in baseline, deliberation, future design (FD) and overall sample, respectively. It is observed that the

Table 2: Summary statistics of the independent variables

| | Treatments | | | Overall | p-value |
|---|---|---|---|---|---|
| | Baseline | Deliberation | Future design | | |
| Preknowledge | | | | | |
| Average (Median) [a] | 3.95 (4.38) | 4.08 (4.25) | 4.19 (4.75) | 4.07 (4.50) | |
| SD[b] | 1.39 | 1.25 | 1.34 | 1.33 | 0.32[d] |
| Min | 1.00 | 1.00 | 1.00 | 1.00 | |
| Max | 7.00 | 6.75 | 6.50 | 7.00 | |
| Age | | | | | |
| Average (Median) | 37.89 (35.00) | 35.2 (35.00) | 37.09 (35.00) | 36.73 (35.00) | |
| SD | 13.60 | 10.97 | 11.63 | 12.13 | 0.44[d] |
| Min | 18.00 | 17.00 | 16.00 | 16.00 | |
| Max | 69.00 | 63.00 | 65.00 | 69.00 | |
| Gender | | | | | |
| Average (Median) | 0.43 (0.00) | 0.42 (0.00) | 0.41 (0.00) | 0.42 (0.00) | |
| SD | 0.49 | 0.49 | 0.49 | 0.49 | 0.96[e] |
| Min | 0.00 | 0.00 | 0.00 | 0.00 | |
| Max | 1.00 | 1.00 | 1.00 | 1.00 | |
| Education | | | | | |
| Average (Median) | 3.05 (3.00) | 3.07 (3.00) | 3.62 (4.00) | 3.25 (3.00) | |
| SD | 1.48 | 1.60 | 1.76 | 1.64 | 0.02[e] |
| Min | 1.00 | 0.00 | 0.00 | 0.00 | |
| Max | 6.00 | 6.00 | 6.00 | 6.00 | |
| Total family member under 18 (TFM) | | | | | |
| Average (Median) | 1.15 (1.00) | 1.33 (1.00) | 1.40 (1.00) | 1.29 (1.00) | |
| SD | 0.96 | 1.12 | 0.93 | 1.00 | 0.76[e] |
| Min | 0.00 | 0.00 | 0.00 | 0.00 | |
| Max | 5.00 | 7.00 | 4.00 | 7.00 | |
| Total earning member (TEM) | | | | | |
| Average (Median) | 1.41 (1.00) | 1.32 (1.00) | 1.34 (1.00) | 1.36 (1.00) | |
| SD | 0.67 | 0.51 | 0.64 | 0.61 | 0.87[e] |
| Min | 1.00 | 1.00 | 1.00 | 1.00 | |
| Max | 5.00 | 3.00 | 5.00 | 5.00 | |
| Household income [c] | | | | | |
| Average (Median) | 25825 (20000) | 25258 (20000) | 26825 (20000) | 25969 (20000) | |
| SD | 16854.45 | 14605.83 | 18553.60 | 16706.01 | 0.94[d] |
| Min | 5000 | 6500 | 6000 | 5000 | |
| Max | 100000 | 90000 | 110000 | 110000 | |
| Sample size | 100 | 100 | 100 | 300 | |

[a] Median in parentheses
[b] SD stands for standard deviation
[c] Household income in BDT
[d] Kruskal-Wallis test is applied to examine whether or not the frequencies of the variables are independent among the treatment groups
[e] Chi-squared test is applied to examine whether or not the frequencies of the variables are independent among the treatment groups

averages of the sociodemographic variables conditional on specific treatments are almost similar to the overall (unconditional) averages of taking the same variables. The preknowledges of household heads about organic and nonorganic food are similar among the treatments, and the overall average preknowledge is neither high nor low (4.07). The mean age of the household head in the three treatments does not vary, and the average age is approximately 37 years old. Considering gender, 43 %, 42 %, and 41 % household heads are female in baseline, deliberation and FD, respectively. Regarding education, household heads in baseline and deliberation possess ten years of schooling as a median, while in FD, household heads usually receive twelve years of schooling as a median. Table 2 also indicates that, on average, households in each treatment include one earning member and one family member under the age of 18. The average monthly household income is approximately 26 000 BDT in the overall sample, which does not vary among the treatments. The Chi-squared and Kruskal-Wallis tests indicate that most of the independent variables are not significantly different among the treatments, implying that the random assignments of the treatments through sampling processes are effective enough as initially intended.

Table 3 presents the summary statistics of weekly organic vegetable consumptions (OVCs) and nonorganic vegetable consumptions (NVCs) in three rounds. In the pretreatment round 1, households in baseline, deliberation and FD weekly consume 0.88, 0.82 and 0.64 kg (7.53, 7.21 and 7.31 kg) organic (nonorganic) vegetables, respectively, indicating almost the same amount of vegetable consumptions among the treatments. However, households in baseline, deliberation and FD weekly consume organic (nonorganic) vegetables 1.42, 2.47 and 3.24 kg (6.73, 5.62 and 4.63 kg) in the posttreatment round 1 and 2.18, 3.69 and 4.21 kg (5.25, 3.85 and 3.23 kg) in the posttreatment round 2, respectively. This implies that households in deliberation and FD gradually increase (decrease) OVCs (NVCs) compared to baseline over the two posttreatment rounds and the degree of increase (decrease) is higher in FD. Overall, table 3 reveals that households in different treatments exhibit different OVCs (NVCs) during the posttreatment rounds compared to the pretreatment. It also appears to be true qualitatively in figure 4. In addition, Mann-Whitney tests validate the significant differences in the distributions between baseline and other treatments (deliberation and

Table 3: Summary statistics of the dependent variables

| | Pretreatment round 1 | | | Posttreatment round 1 | | | Posttreatment round 2 | | | Overall |
|---|---|---|---|---|---|---|---|---|---|---|
| | Baseline | Deliberation | FD[b] | Baseline | Deliberation | FD | Baseline | Deliberation | FD | |
| Organic vegetable consumptions (OVCs)[a] | | | | | | | | | | |
| Average | 0.88 | 0.82 | 0.64 | 1.42 | 2.47 | 3.24 | 2.18 | 3.69 | 4.21 | 2.17 |
| Median | 0.00 | 0.00 | 0.00 | 0.50 | 1.50 | 2.50 | 1.50 | 3.00 | 3.75 | 1.00 |
| SD[c] | 1.87 | 1.59 | 1.34 | 1.94 | 2.99 | 2.87 | 2.17 | 3.25 | 2.69 | 2.69 |
| Min | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Max | 9.00 | 7.25 | 7.80 | 8.00 | 20.00 | 13.00 | 9.5 | 23.00 | 18.00 | 23.00 |
| Nonorganic vegetable consumptions (NVCs)[a] | | | | | | | | | | |
| Average | 7.53 | 7.21 | 7.31 | 6.73 | 5.62 | 4.63 | 5.25 | 3.85 | 3.23 | 5.71 |
| Median | 6.63 | 6.50 | 6.50 | 6.50 | 5.50 | 4.13 | 5.00 | 3.25 | 2.50 | 5.00 |
| SD | 4.49 | 3.99 | 3.69 | 3.10 | 3.10 | 3.09 | 3.39 | 2.43 | 2.43 | 3.67 |
| Min | 0.00 | 1.00 | 2.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Max | 27.50 | 24.00 | 20.50 | 20.50 | 15.00 | 14.00 | 28.00 | 11.00 | 17.00 | 28.00 |
| Sample size | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 900 |

[a] Weekly consumptions in kg
[b] FD stands for future design
[c] SD stands for standard deviation

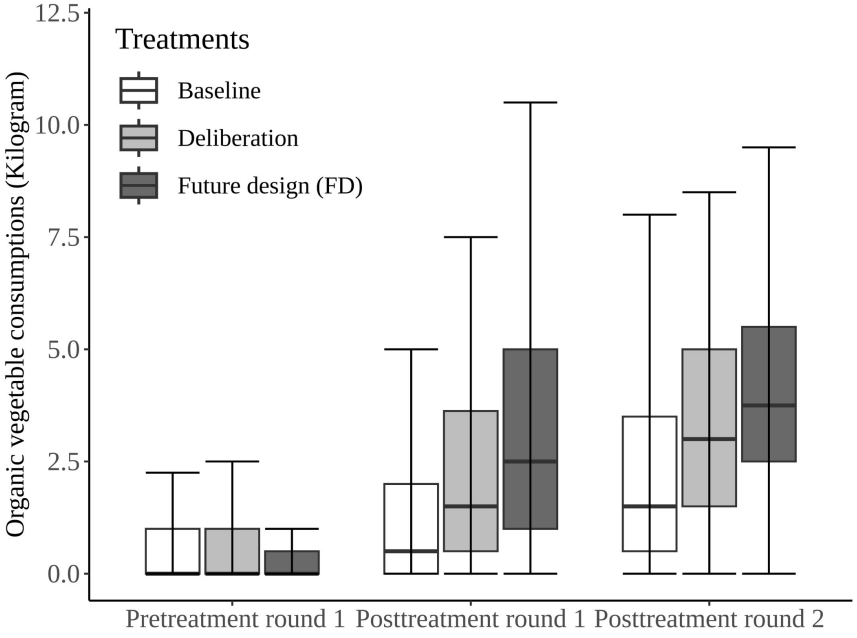
FD) at 1 % level.

Table 4 exhibits the difference-in-difference (DID) estimates, i.e., average treatment effects on the treated (ATT), based on equations (1) to (3), indicating the impact of the treatments. It is apparent that DID estimates of deliberation and FD on OVCs show consistently positive and statistically significant results at 1 % level in models 1-1 and 1-2, respectively (table 4). However, DID estimates of FD on NVCs are statistically significant at 1 to 5 % level with a negative sign in model 2-2. Particularly in posttreatment round 1 that households receive deliberation and FD, OVCs are estimated to increase by 1.12 and 1.92 kg, respectively and in posttreatment round 2, they are estimated to increase by 1.62 and 2.21 kg, respectively, as compared to baseline. The aggregate coefficients reveal that over three rounds, households in deliberation and FD weekly consume organic vegetable on average $ATT^{\text{OVCs}}_{\text{deli}}(2,3) = 1.37$ and $ATT^{\text{OVCs}}_{\text{FD}}(2,3) = 2.07$ kg more than baseline, respectively. Moreover, in posttreatment round 1 and posttreatment round 2, NVCs are estimated to decrease by 1.78 and 1.65 kg for FD households as compared to baseline, respectively. The aggregate coefficient shows that over three rounds, households in FD weekly consume nonorganic vegetable on average $ATT^{\text{NVCs}}_{\text{FD}}(2,3) = 1.72$ kg less than baseline. Overall, it can be interpreted that FD induces a lasting shift from nonorganic to organic vegetable consumptions as compared to baseline and it has a more economically significant impact, almost 2.0 times greater than deliberation. In addition, we also do the subsample analyses by considering deliberation as a base group and obtain positive (negative) impacts of FD on OVCs (NVCs) which demonstrate a great potential of FD compared to any other treatments.[3]

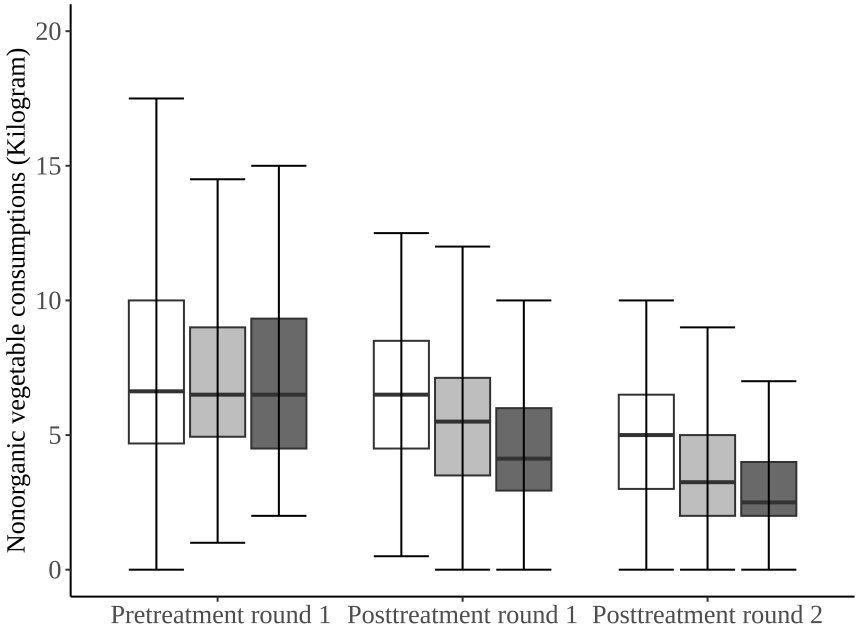
Table 5 represents the marginal effects of the independent variables in two-part models to check the robustness of our results and the main results remain the same.[4] We mainly center on reporting the marginal effects of treatment dummies, age, gender and household income, because they are

[3] In subsample analyses that include deliberation (base group) and FD treatments, DID estimates of FD on OVCs (NVCs) show positive (negative) and statistically significant results at 10 % level in posttreatment round 1 and at 11 to 12 % level in aggregate, respectively (see the appendix D for the results of subsample analysis). These results can be considered practically significant in view of the weekly organic and nonorganic vegetable consumptions of Bangladeshi households.

[4] Because of having less number of zero observations (approximately 5 %), we apply glm (gamma-log) by using equation (5) to identify the effect of independent variables on NVCs (Wooldridge, 2010, Smith et al., 2017).




(a) Households organic vegetable consumptions (OVCs) in three rounds




(b) Households nonorganic vegetable consumptions (NVCs) in three rounds

Figure 4: Boxplots of organic and nonorganic vegetable consumptions

Table 4: Average treatment effect on organic (OVCs) and nonorganic (NVCs) vegetable consumptions

| Difference-in-difference (DID) models | ATT[a] on OVCs[b] | | | Sample size |
|---|---|---|---|---|
| | Posttreatment round 1 Coefficient | Posttreatment round 2 Coefficient | Aggregate Coefficient | |
| *Treatments* | | | | |
| Deliberation treatment vs baseline treatment (model 1-1) | 1.12*** | 1.62*** | 1.37*** | 600 |
| Future design treatment vs baseline treatment (model 1-2) | 1.92*** | 2.21*** | 2.07*** | 600 |
| | ATT on NVCs[c] | | | |
| | Posttreatment round 1 Coefficient | Posttreatment round 2 Coefficient | Aggregate Coefficient | |
| *Treatments* | | | | |
| Deliberation treatment vs baseline treatment (model 2-1) | −0.69 | −1.18* | −0.93 | 600 |
| Future design treatment vs baseline treatment (model 2-2) | −1.78*** | −1.65** | −1.72*** | 600 |

***significant at the 1 percent level, **at the 5 percent level and *at the 10 percent level.

[a] ATT stands for average treatment effects on the treated

[b] OVCs stands for weekly organic vegetable consumptions in kg

[c] NVCs stands for weekly nonorganic vegetable consumptions in kg

Table 5: Marginal effects of the independent variables on household's organic and nonorganic vegetable consumptions

| | Posttreatment round 1 | | Posttreatment round 2 | | Panel | |
|---|---|---|---|---|---|---|
| | OVCs[a] | NVCs[b] | OVCs | NVCs | OVCs | NVCs |
| | ME[c](combined) | ME | ME (combined) | ME | ME (combined) | ME |
| | Model 1-1 (two part) | Model 1-2 (glm) | Model 2-1 (two part) | Model 2-2 (glm) | Model 3-1 (two part) | Model 3-2 (glm) |
| *Treatment dummies* | | | | | | |
| *(Base group = Baseline treatment)* | | | | | | |
| Deliberation treatment | 1.17*** | −1.08*** | 1.38*** | −1.24*** | 1.93*** | −2.05*** |
| Future design treatment | 1.74*** | −2.17*** | 1.86*** | −1.83*** | 2.41*** | −3.06*** |
| *Control factors* | | | | | | |
| Knowledge | 0.08 | −0.18 | −0.09 | 0.03 | 0.09* | −0.18* |
| Age | 0.03** | 0.019 | 0.04*** | −0.01 | 0.03*** | 0.007 |
| Gender (Base group = Male) | −0.41 | −0.59* | −0.31 | −0.78** | −0.26 | −0.63** |
| Household income | $-5.12 \times 10^{-06}$ | $1.80\times10^{-05}$* | $-9.57 \times 10^{-06}$ | $1.74\times10^{-05}$* | $-4.78 \times 10^{-06}$ | $3.1\times10^{-05}$*** |
| Education | 0.09 | 0.05 | 0.25** | −0.19* | 0.08 | −0.06 |
| Total family members under 18 | 0.22 | 0.29 | 0.37** | 0.03 | 0.28*** | 0.14 |
| Total earning member | 0.22 | 0.10 | 0.09 | 0.16 | 0.11 | 0.007 |
| Sample size | 300 | 300 | 300 | 300 | 900 | 900 |

***significant at the 1 percent level, **at the 5 percent level and *at the 10 percent level

[a] OVCs stands for weekly organic vegetable consumptions in kg

[b] NVCs stands for weekly nonorganic vegetable consumptions kg

[c] ME stands for a marginal effect to indicate a change in the weekly organic (or nonorganic) vegetable consumptions when one independent variable increases by one unit, holding other factors fixed

identified to remain significant at 1 to 10 % in posttreatment round 1, posttreatment round 2 and panel. In models 1-1, 2-1 and 3-1, the age is identified to be consistent and statistically significant with a positive sign on OVCs, meaning that an additional year increase of household head's age is associated with an increase in OVCs. In models 1-2, 2-2 and 3-2, regarding the gender dummy, females are interpreted to be consistently significant with a negative sign and household income is identified to be statistically significant (having a very small magnitude) with positive signs for NVCs. This means that women are generally more negative towards nonorganic vegetable consumptions than men. In posttreatment round 1 that households receive deliberation and FD, OVCs (NVCs) are estimated to increase (decrease) by 1.17 and 1.74 kg (1.08 and 2.17 kg), respectively and in posttreatment round 2, they are estimated to increase (decrease) by 1.38 and 1.86 kg (1.24 and 1.83 kg), respectively, as compared to baseline. In the panel regression, it is evident that deliberation and FD receiving households weekly consume 1.93 and 2.41 kg (2.05 and 3.06 kg) more (less) organic (nonorganic) vegetable than baseline, respectively. It can be concluded that FD results in a sustained transition from nonorganic to organic vegetable consumptions relative to baseline, and it has a nearly 1.5-times greater economic impact than deliberation. Furthermore, we conduct subsample analyses that take into account deliberation as a base group and FD treatments.[5] These analyses also reveal that FD has positive (negative) impacts on OVCs (NVCs) which highlights its significant potential compared to any other treatments.

Overall, it is evident from the summary statistics that the random assignments of the treatments through sampling processes are effective enough (table 2) and households vegetable consumptions (organic and nonorganic) get different as time goes from pretreatment round to posttreatment rounds (table 3). We quantify the difference and check its robustness across the treatments through DID and two-part models, respectively. As indicated in our conceptual framework, household OVCs and NVCs are impacted by FD over the time periods as compared to those in baseline and deliberation in practically and statistically significant manners (figure 3). In sum-

[5] In subsample analyses that include deliberation (base group) and FD treatments, the marginal effects of FD on OVCs (NVCs) show positive (negative) and statistically significant results at 5 % level in posttreatment round 1 and in panel, respectively (see the appendix D for the results of subsample analysis).

mary, the average treatment effects across different lengths of treatment exposure for OVCs are $ATT^{\text{OVCs}}_{\text{deli}}(2,2) = 1.12$, $ATT^{\text{OVCs}}_{\text{deli}}(2,3) = 1.37$, $ATT^{\text{OVCs}}_{\text{FD}}(2,2) = 1.92$ and $ATT^{\text{OVCs}}_{\text{FD}}(2,3) = 2.07$, while those for NVCs are $ATT^{\text{NVCs}}_{\text{FD}}(2,2) = -1.78$ and $ATT^{\text{NVCs}}_{\text{FD}} = -1.72$ (table 4). The estimated average effects indicate that over three rounds, households in FD weekly consume organic (nonorganic) vegetable on average 2.07 kg (1.72 kg) more (less) than baseline. FD results in a sustained transition from nonorganic to organic vegetable consumptions and the effect under FD is approximately twice as much as that under deliberation in magnitude. These are robust and consistent with the results obtained from two-part panel regressions. The estimation results associated with OVCs and NVCs provide answers to our research questions (how does the FD approach impact food consumption?) and support the alternative hypothesis (FD induces a lasting shift to SFC) by rejecting the null. Finally, our research establishes that FD demonstrates a great potential for inducing people to make a persistent change to sustainable food consumption (SFC).

Capitalism emerged as a socioeconomic system 300 - 400 years ago where private agents have ownership over properties based on their own interests, and transactions of commodities and services are made through demands and supplies in markets along the prices (Jahan and Mahmud, 2015, Brayshay, 2020). The goal is claimed to be benefiting a society as a whole by allowing decentralized market mechanisms for consumptions, productions and the exchanges (Harris and Delanty, 2023). The fundamental characteristic of such capitalism is a strong drive for private agents to make a continuous differentiation towards profits. In old agrarian societies, a geographical difference had generated profits, when people transported some commodities and resources form one place to the other (Brayshay, 2020). In industrial societies, a production-process difference has generated profits, enabling to make mass productions and consumptions with cheap costs all over the world (Iwai, 1992). In post-industrial societies, an informational difference is now expected to generate profits, when private agents can edit and convey the information associated with commodities and services as a story (or a narrative) to people by utilizing the advent of digital technologies and platforms (Gilliam and Flaherty, 2015, Iwai, 2015, Shiller, 2019, 2020, Li et al., 2019, Kemp et al., 2021, Júnior et al., 2023). It is also claimed that long-run behav-

iors get impacted, when people receive some information and find the meaning and significance as a story through their deliberative cognitive processes, such as psychological ownership (Evans, 2008, Frankl, 2008, Kahneman, 2011, Rosa et al., 2021). In this sense, a set of interventions introduced by FD is considered one effective approach that induces people to endogenously trigger their deliberative cognitive processes, edit and interpret information as their long-run life story. Therefore, it shall be possible to argue that households in our experiments have made a persistent change to SFC, voluntarily finding the meaning and significance by FD.

# 4 Conclusion

This paper has examined the effect of the future design (FD) approach on sustainable food consumption (SFC), investigating the question "how does the FD approach impact food consumption?" and the hypothesis "FD induces a lasting shift to SFC." To this end, we have implemented a 3-round social experiment with three treatments of "baseline," "deliberation" and "FD," for collecting data on organic vegetable consumptions (OVCs), nonorganic vegetable consumptions (NVCs) and sociodemographic factors of 300 households in Bangladesh over three months. The results show that FD induces people to have a sustained increase in organic and decrease in nonorganic vegetable consumption as compared to any other treatment, and the effect under FD is approximately twice as much as that under deliberation in magnitude and in each round. Overall, FD demonstrates a great potential for inducing people to make a persistent change to SFC. The novel aspects of this study are (i) to consider the perspective taking of future generations for analyzing households lasting shifts to SFC by conducting multiple rounds of social experiments and (ii) to empirically identify real choices and consumptions of households between organic and nonorganic vegetables instead of declared intentions.

We acknowledge certain limitations in our study and provide potential avenues for future research. First, this research focuses on organic and nonorganic vegetable consumptions by households to examine the sustained impact of FD on SFC, which is considered the best approximation

we can make in the context of Bangladesh. However, future studies should be able to collect and use household total food consumption and food waste data to identify the detailed results. Second, our study does not analyze the intricate mechanisms of how and why FD affects households motivations, decisions and behaviors on SFC. With an additional experimental design or further experiments using the neuropsychological approach and qualitative interviews, future studies should be able to characterize how and why FD households change their behaviors (Shahen et al., 2021). Third, in order to extend the applicability of our research findings, future studies should employ the FD approach to address several other sustainability problems. While we recognize that our research may have other limitations, we firmly believe that it represents an advancement in promoting a persistent change to SFC, and further studies on this topic will help solidify these findings.

# 5 Appendix

We provide (A) the experimental instructions for an overview of the programs, (B) a document for collecting the information of pretreatment knowledge and (C) the case-method materials on the history and current situation of organic and nonorganic foods to the Bangladeshi households in the field as materials of the appendices. We also prepare appendix (D), the tables of subsample analyses by considering deliberation (base group) and future design treatments, to support the robustness of our results.

# 6 Acknowledgments

We would like to thank the anonymous referees, Ryohei Hayashi, Yuta Yasui, Husniddin Sharofiddinov, Md. Tawhidul Islam, Pradip Hajong, Abdullah Al Zabir and Dr. Nazim Uddin for their helpful comments, advice and supports. The authors specially thank the Regional Agricultural Research Station, BARI, Jashore, Bangladesh Agricultural Development Corporation, Jashore and Department of Agricultural Extension (Jhenaidah and Jashore) under the Government of the People's Republic of Bangladesh for their support. We are also grateful to the financial support from the Japanese Society of the Promotion of the Science as the Grant-in-Aid for Scientific Research B (19H01485), Research Institute for Future Design and Kochi University of Technology.

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