

CAN SOCIAL MARKETING BE A TOOL TOWARDS IMPROVED NUTRITION?  
LESSONS FROM A FIELD EXPERIMENT IN INDIA

A Thesis

Presented to the Faculty of the Graduate School  
of Cornell University

In Partial Fulfillment of the Requirements for the Degree of  
Master of Science

by

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August 2018

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## ABSTRACT

Micronutrient deficiency, iron in particular, is a major health issue across India, affecting maternal and child health. Iron Folic Acid tablets are often distributed to pregnant women to address iron deficiency, however, recent data show a high prevalence of anemia within non-pregnant women too. Fortification powders have been found to improve child and maternal health in developing countries. The purpose of this paper, however, is to evaluate possibility of voluntary purchase of fortification powders by households when marketed by local women self-help groups at a price mutually agreed upon by the community. The paper tracks purchasing behavior of 5600 households across 15 villages in rural India for a period of close to 2 years and finds that the likelihood of a household making purchases increases by 55% because of its connectivity to local self help groups and other social networks, while other factors have no bearing at all.

## BIOGRAPHICAL SKETCH

Prankur Gupta holds a Bachelor's in Technology degree in Mechanical Engineering from IIT Delhi, Delhi, India and has experience working in the areas of social safety nets and food security in India.

Dedicated to all members of the *Sfurti* family.

તમે બધા માટે ઘણા બધા આભાર

## ACKNOWLEDGMENTS

I would like to thank Professor Prabhu Pingali and Professor Miguel Gomez for constant support and guidance throughout the two years to help me successfully complete this research work. A special thanks to Professor John Hoddinott for insightful conversations.

Lastly, a big thank you to all the wonderful people at the Tata Cornell Institute both in Ithaca, New York and Songarh, Gujarat and the cheerful '*Sfurti Bens*' for providing all the love and support.

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## CHAPTER 1

### INTRODUCTION

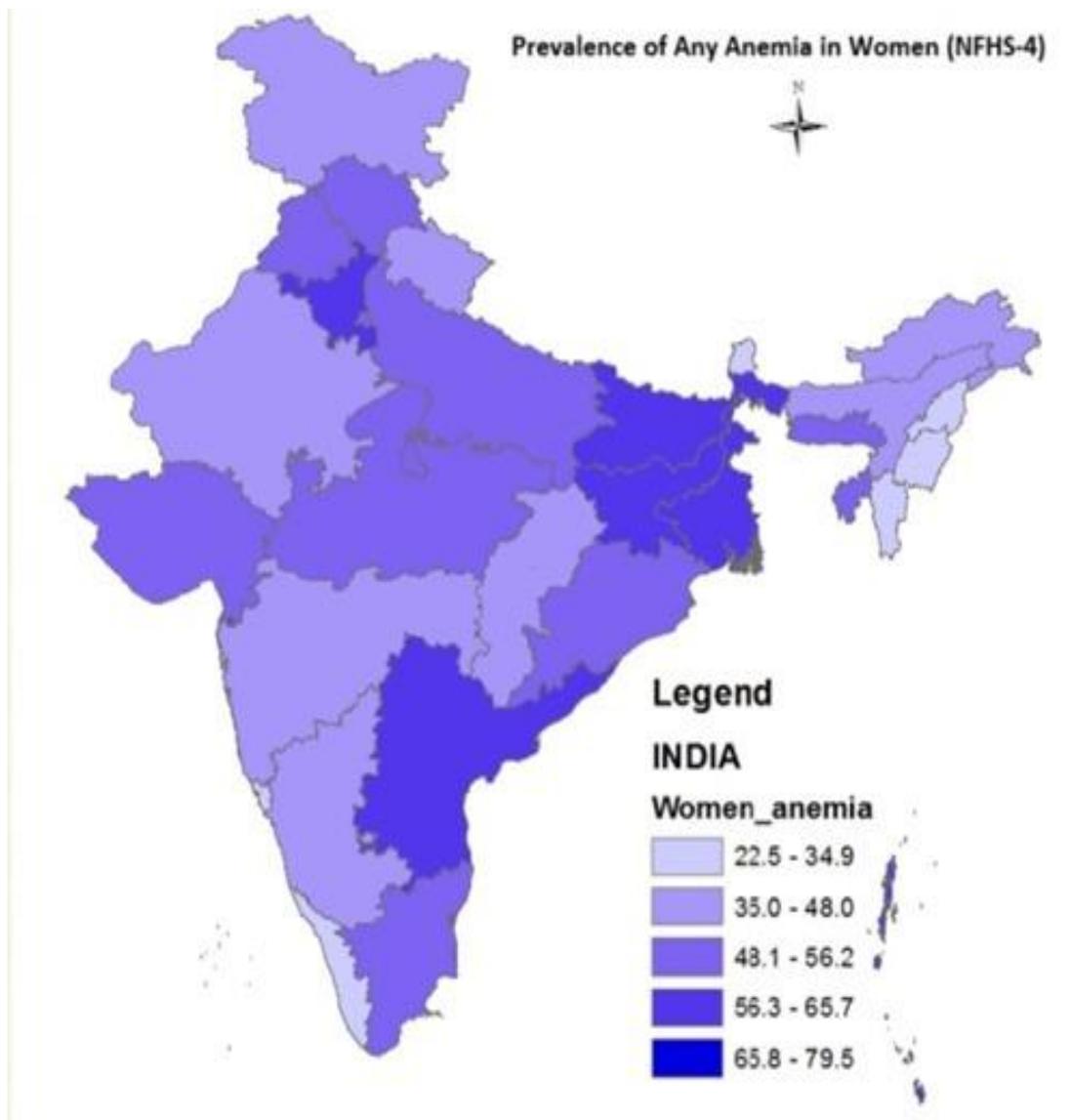
The United Nations in the year 2015, as a successor to the Millennium Development Goals, launched a total of seventeen international development goals, also known as “The 17 Sustainable Development Goals (SDG) or Global Goals. The second goal on this list is “to end hunger, achieve food security and improved nutrition and promote sustainable agriculture” (UN 2015). This is in continuance to the focus in the past century, especially after the World Wars, of achieving food security. Commendable advancements have been made in agricultural research resulting in ground breaking solutions such as the Green Revolution to tackle the problem of food security in the developing part of the world, especially Asia. Most nations as a result turned their agricultural fortunes from being frequently drought hit, food insecure, to self-sufficient food producers and some cases even exporters (Spielman and Pandya-Lorch 2009).

However, these revolutions mainly focused on calorie intake and popularized staple cultivation. While this was important to accomplish at that time, it led to a series of other problems as an unintended side-effect. The stress often, till date, is over calories and while this obsession isn't unnecessary it often underplays the importance of micronutrients – which are critical to bodily functions (Pingali 2012). The UN SDG recognizes this, hence, in addition to food security lists improved nutrition as a goal. While the situation in terms of food security has drastically improved throughout the past century, undernutrition as caused by micronutrient deficiency remains to be a big challenge (The World Bank 2011). Iron is one such critical micronutrient required for normal body functioning and stamina. Iron deficiency leads to lower level of stamina, fatigue and muscle pain, consequently decreasing productivity and hence, the standard of life

(Lopez et al. 2016). In addition, iron deficiency could lead to anemia, which is a global health problem. Though, global metrics on iron deficiency are not available, anemia is used as an indirect indicator which suggests that 40-50% preschool children and women in developing countries and 30-40% in developed countries are anemic (World Health Organization 2001). As is clear, it is a huge problem in the developing countries. Data from NFHS-4, a periodically conducted survey by the Government of India, finds more than 50% of non-pregnant women between the age of 15 and 49 years as anemic (See Figure-1).

The solution to the persistent problem of micronutrient deficiency must ideally come from natural shifts in the composition of diets, however, due to the dominance of certain food groups in agriculture, cereals for instance, is difficult to achieve in foreseeable future (Birtal et al. 2014). The bioavailability of certain micronutrients is often low in commonly available and culturally preferable food groups. Iron for instance can be best consumed through the consumption of red meats which could be expensive to access and may not be culturally acceptable to some people, in India. Vegetables on the other hand which people prefer to consume aren't so iron rich (Zimmermann and Hurrell 2007). These problems demand innovations of solutions which could bypass these factors and increase the access of the deprived population to important micronutrients.

Attempts at this have been made in the past and are ongoing mostly through different methods of fortification. Biofortification is another upcoming fortification method which combines micronutrients with mostly staple crops to increase access to micronutrients. This method is still being developed and is yet to see wide success (Johns and Eyzaguirre 2007). Industrial fortification, a method to combine micronutrients with suitable food groups, at an industrial level, mainly during manufacturing, are



**Figure 1: Prevalence of "Any Anemia" in non-pregnant women, aged 15-49, in India**

common. Iodized iron is a popular example which combined iodine with table salt and due to the expansive nature of this initiative it helped address iodine deficiency worldwide (Charlton and Skeaff 2011). However, beyond finding a suitable food group for the micronutrient to be combined with, a glaring problem with industrial fortification is it can only target consumables being bought off the formal economy. For instance, if rice or wheat flour were to be fortified it won't reach the millions of people who get the flour milled out of their home produce for household consumption. In developing

countries, where the marginalized are likely to suffer micronutrient deficiency, are also the ones who consume food through the informal economy, hence, they being left out through the formal fortification method is a big obstacle in increasing access to micronutrients. Therefore, we need a different method to combat this problem.

Home fortification is an approach which helps us increase access to micronutrients where other methods don't work. Under home fortification, micronutrients are packaged in the form of powder which can then be added to food at the household level to fortify (de Pee, Flores-Ayala, and Elena Jefferds 2013). 'Sprinkles', is one such program which is popular in Ethiopia where the powder is distributed for free by the government and it can be sprinkled and mixed with the kids' meal to fortify the meal for iron (Schauer and Zlotkin 2003). Such programs have been implemented with limited success in other countries as well. However, in such methods the take up becomes an issue. People often would neglect to add the fortificant powder to their meals, potentially due to lack of awareness about the importance of micronutrients (Suchdev et al. 2013).

The Tata Cornell Institute (hereafter TCI), a long-term research initiative based out of Cornell University, implemented a similar initiative in a few villages in Gujarat, a state in eastern India, however, with the difference that the ones promoting the initiative wasn't a government or a non-government organization but the local women self-help groups (with the assistance of TCI) and that the fortificant wasn't provided for free but had to be purchased, therefore, seeking a voluntary adaption of the households into the program. This study assesses the successes and limitations of the program and seeks to answer whether promoting home fortification through social marketing methods, such as through the involvement of women self-help groups, can be instrumental in helping increase access to micronutrients with considerable success and what are the

factors, demographic and behavioral, that influence the take up in such an initiative. The study addresses these question through a sales panel data of all 5600 households that were part of the initiative and its interlinkage with a detailed demographic and behavioral survey of 450 randomly selected households.

The following chapter provides a brief review of the different home fortification programs tested in developing countries across the world along with a review of the success fortification powders have had with respect to iron deficiency. Chapter 3 talks about the implementation of the program and its different phases in detail, the household survey conducted with the objective of informing the sales data with other demographic and behavioral information along with the empirical methodology used in the study. Chapter 4 discusses the data sources being used and trends observed in it. Finally, chapter 5 discusses the results, its potential implications, and the limitations of this study.

## CHAPTER 2

### LITERATURE REVIEW

Micronutrient powders, popularly known as MNPs have now been used for some time in developing countries specially to supplement infant nutrition. The efficacy of such powders has been widely studied and significant improvements in health has been found. Most such studies have been done using ‘*Sprinkles*’, owing to its popularity. A study (Zlotkin et al. 2003) finds that ‘*Sprinkles*’ alone can address the problem of anemia in infants. A study in Kenya (Lung’aho and Glahn 2009), finds that the powder increases not just adds iron to the food but increases the bio availability of iron in some complementary foods. A study in Ghana (Adu-afarwuah and Larrey n.d.), compared ‘*Sprinkles*’ with crushable tablets and fat-based nutri-butter another iron rich supplement. It found all three options to have had similar positive effects on health in the treatment groups. A follow up study (Adu-Afarwuah et al. 2007) found that the micronutrient powders also had lasting effects on child growth and motor development. A different study found that home fortification was as effective as iron drops and for a low income country it has a highly favorable cost benefit analysis as well. (Dewey, Yang, and Boy 2009).

In addition to having positive outcome on child health, studies have also evaluated its impact on health of pregnant women. A study (Suchdev, Peña-Rosas, and DeRegil 2015) identifies the problem in the irregularity of supplements for pre-natal care

and finds, in a limited manner, that the use of point-of-use micronutrient powders has no difference in comparison to tablets. Preferences of women were also similar. Another study (Choudhury et al. 2012) finds poor adherence to iron and folic acid supplements as a problem in controlling anemia in women during pregnancy and proposes micronutrient powders as a possible and much more effective alternate.

Other than Africa, China also has high incidence of iron deficiency. A study in China has shown fortification to be an important short term strategy until food diversification is met to address this issue (Troesch et al. 2009). Similar to '*Sprinkles*', a soy-based micronutrient powder called Ying yang bao (YYB) has been popular in China. A study (Huo et al. 2015) finds it to be effective in addressing anemia amongst infants in high risk regions of China.

Most studies validate the potential micronutrient powders hold with regards to health improvement. Not much research has been conducted to address its marketing strategy. One study (Sun et al. 2011) in China though, tested distribution of YYB through public-private partnerships and behavior change communication along with various other marketing methods. The study sold the product through various grocery stores and retailers. While it tested willingness to buy through surveys, the price wasn't determined by the community itself. It found about 60% of the caregivers buying the supplementary food product. The study also found significant reduction in the risk of anemia amongst those that bought the powder.

Hence, there is conclusive evidence in the literature about the tangible health benefits of such micronutrient powders. Therefore, this study addresses only the purchasing behavior of the household and was designed in a way to be able to answer the question, what could possibly influence the households to repeatedly purchase micronutrient powders and thereby improve their health. This would be the contribution of this study to the vast literature of micronutrient powders.

## CHAPTER 3

### PROGRAM AND METHODOLOGY

#### 3.1 About the Program

##### 3.1.1 Background

TCI in June 2016 launched its flour fortification campaign under the brand name *Sfurti* which in the local language, Gujarati, means energy or health. It is also an acronym for the name of the project, “**Sustainable Flour Fortification Initiative**”. TCI partnered with an organization, Sight and Life Foundation to develop *Sfurti*, a fortificant powder composed of iron, folic acid, vitamin B12 and vitamin A in appropriate quantities which when added to flour of a proportional quantity, can provide the consumers with a satisfactory level of access to the respective micronutrients. The powder was packaged in the form of a small sachet which didn't have any specific storage requirements with regards to temperature and hence could be easily transported. (See Figure 2).

The formula of the fortificant was developed by Sight and Life and the sachets contained a mere 1.25 grams of the powder which when added to 5 kg of flour suffices for the bodily needs of the respective micronutrients. In addition to being handy in terms of storage, special attention was paid so that the powder was tasteless, colorless and odorless. The colorless property is particularly important since iron fortificants in the

past have known to add a blackish color to the food making the food look ugly and hence, less likely to be consumed. Also, given the variety of grains which people consume, the powder was developed in a manner that it could be added to any type of flour and the results would stay the same.



**Figure 2: Sachet of the fortificant powder and its composition**

Since, the powder is in a small quantity and is mixed to a relatively large quantity of flour, the process to mix must ensure homogenous distribution and hence, is slightly complicated. It could be mixed both at home and at a miller. To mix at a miller, the powder was to be added to the grain before getting milled, however, given the small quantity of the powder chances of the powder being lost in the milling process was high. Therefore, it was recommended that the powder be added to the milled flour at home. To do so, 5 kg of flour must be first roughly equally split into three bins. Thereafter, the entire contents of the sachet (1.25 grams) must be added to one of the bins and be thoroughly mixed in the flour for about 30 seconds. This mixed flour should then be added

to either of the other two bins and again mixed in the same way and eventually be added to the third bin and mixed for another 30 seconds.

### **3.1.2 Program Implementation**

The program was implemented in 15 similar villages in Songarh block, Tapi district in eastern Gujarat near the Maharashtra border. All villages have a majority tribal population of agricultural labourers or farmers, subsistence and otherwise. TCI partnered with BAIF Development Research Foundation, a leading NGO with a strong base of local women self-help groups, to facilitate the distribution of the aforementioned fortificant powder (hereafter referred as Sfurti). In a somewhat pioneering approach, TCI recruited and trained 30 women from the BAIF run local women self-help groups. Since, the approach was to make people voluntary adopt in the program, instead of making it universally available for free, a price was fixed for Sfurti sachets. The price, Rs. 3 per sachet, was arrived at mutually by the residents of the target villages through focus group discussions organized by the women from the self-help groups. These women were later named Sfurit Ben (translates to Sfurti sisters). Hereafter, I will use Sfurti Ben to address these particular women who facilitated the delivery of Sfurti sachets. A few Sfurti Ben were recruited from each of the 15 target villages. Each Sfurti Ben was then assigned a few hamlets in her own village, and was trained to go door to door to all households in her assigned hamlets, to sell Sfurti. Additionally, their job was to help increase awareness about Sfurti, and iron in general within the households that she would visit.

Given the nature of delivery, through women within the village, the program was centralized in planning but decentralized to the villages in implementation. In

addition to Sfurti Ben, other local institutions such as dairy cooperatives (highly popular in this particular region of India), ASHA workers (government trained nurses who go door to door to provide basic checkups and render vaccinations), Anganwadi workers (child care providers), schools, churches (high proportion of the target population are Christians) etc. were roped in to increase awareness (See Figure 3 for a representation of the various institutions used). However, sales were made only door to door through Sfurti Ben. This nature of marketing through local institutions within the village centered around Sfurti Ben going door to door to make sales is what would be referred to as social marketing throughout this paper.

The program was officially launched in June 2016 in all the 15 target villages simultaneously. It is important to clarify at this moment that this program was of the nature of an intervention and not of a control experiment. Hence, there were no systemic differences between the 15 villages in terms of implementation strategy, neither were there any control group villages or households. The program was universally implemented in the 15 villages which similar marketing strategy to the extent possible.

The program had two phases of implementation. The first phase as explained, was launched in June 2016, and entailed Sfurti Ben going door to door to sell the Sfurti sachets. This phase after running for 10 months culminated in March 2017. The second phase was launched after a 5-month gap in September 2017 with a minor change. In the second phase, 5 villages were selected, where the sales were not made through the Sfurti Ben, but were made at the miller. It is worthwhile to mention here that households in all



**Figure 3: A representation of multiple marketing channels used to promote Sfurti**

these target villages, do not buy flour from the market. They take the grains, either purchased from the market or from their own farm produce, and get it milled at small miller shops located within the village. Therefore, an attempt was made in the second phase to test if people after having been exposed to the first phase, would now be willing to buy the Sfurti sachets by themselves through the miller. Sfurti Bens in these 5 villages were still involved in going door to door to create awareness but would not sell Sfurti sachets to any households. For the remaining 10 villages, the implementation was identical to the first phase.

### **3.2 Data Collection**

#### **3.2.1 Household Sales Tracking**

The purpose of this study is to track adoption of Sfurti by the target households. Hence, for this purpose the outcome variable of interest is whether households are

buying Sfurti sachets or not. Hence, the Sfurti Ben who go door to door to sell Sfurti were therefore also required to maintain a record of how many sachets were purchased by each of the households they visited. They would maintain a hard copy of the list of all households within the village and would enter the number of sachets purchased by a given household in a given month. If at all, a particular household did not make a purchase a zero would be entered against their record in the sales records maintained by the Sfurti Ben. These records would then at the end of the month would be entered by the TCI field staff in a centrally maintained digital Management Information System (MIS).

A doubt may precipitate about the authenticity and accuracy of this information. The intervention in a pursuit to ensure that the program was sustainable, is built around helping them make profits. As mentioned, the price of a sachet is Rs. 3, however, TCI procures these from Sight and Life at a price of Rs. 1.5. Currently, given the expense of the TCI field staff, a profit (or commission) of Rs. 0.5 is shared with each Sfurti Ben at the end of each month. This incentivization, other than acting as a reward mechanism, takes care of any under reporting of sales. A question may arise about the over reporting of sales due to incentivization. To address that, at the end of every month before entering the data in the MIS, a simple stock tally would be made. Each Sfurti Ben would be asked to show the number of sachets remaining with her as stock and would be tallied with the number of sachets given to her at the beginning of the month. Since, the commission is less than the price of a Sfurti sachet, this ensures accurate reporting of the total sales. Random visits to households were also conducted throughout the program to check that the households being reported as having bought a certain number of sachets in a given month, did do so. All these checks and balances ensured that we get a reasonable

accurate panel data on sales (hereafter referred as the sales data) for all the target households in the 15 villages (5579 households<sup>1</sup>)

### **3.2.2 Household Survey**

The purpose of this study entails trying to identify factors that influence purchasing behavior, and hence, additional information about the households would help to empirically investigate the relationship between household or individual level factors and the purchasing behaviors, or trends, being observed. A survey of a sample of these households was conducted in June-July 2017, after the first phase of the program had ended and the second phase was yet to begin.

The timing of the survey was chosen as such, to capture both the demographic factors of the households as well as the behavioral changes, if any, brought about as a result of the first phase. Perceptions towards Sfurti sachets, its usage, as well as any perceived differences to the flour were captured through the survey (See Appendix A for the complete survey questionnaire).

The sampling was done keeping in mind that most villages were similar but yet had unobserved differences, particularly because each village has different Sfurti Ben serving them. Given, that the program had a high likelihood of being influenced by the way the Sfurti Ben conducted herself during the household visits, it was imperative to have an adequate representation of all the 15 target villages. Ideally, we would have

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<sup>1</sup> The total number of households, 5579, reported here are as per local village level records and have been cleaned to remove households that may have migrated or ceased to exist due to deaths. Since, both, migration and deaths are a dynamic phenomenon, there is an approximation in keeping the total number of target households fixed for the purpose of this study. The fluctuations in these numbers is within an error margin of 2% and thus doesn't affect the results.

liked to conduct a random proportionate sampling based on the size of the village, however, there was a huge variation between the villages in terms of size. Therefore, in the case of a proportionate sampling, oversampling would have been required for the smaller villages to have an adequate sample to deduce any statistically meaningful results. This would have led to an increase in the total sample size. Availability (or rather unavailability) of trained enumerators in the region, along with the strict timeline to complete the survey within the stipulated time period, restricted the sample size. Hence, eventually, a random sample of a fixed size of 30 households was drawn from each of the villages. Thereby, resulting in a total of 450 households as the sample for empirical analysis.

The researcher himself conducted the survey. The questionnaire itself was not translated to the local language, Gujarati, but, the surveyor conducted the interviews in the local language to the extent possible<sup>2</sup>. After drawing the sample, often household members were not to be found at their residence, since it was paddy sowing season in the region. The temptation to randomly replace households because of unavailability of the sampled household, at the spot was resisted. This is critical to the nature of random sampling. A random replacement in theory may sound as not disturbing the randomness of the sample, however, the unavailability of household members was systemic. For instance, most household members would be unavailable because they were agricultural laborers, hence any attempt to resample such households would bias the sample towards households which have members who are not involved in agricultural laborer. Therefore, this risk of biasing the sample was averted by repeatedly visiting the sample

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<sup>2</sup> While the language used by the researcher was Gujarati the local language, often the diction changes from community to community. It is therefore, almost impossible to conduct interviews in the language spoken by the households. An active attempt, though, was made to converse with them in a language as close to their understanding as possible to restrict errors that may occur due to miscommunication because of the language gap.

households during different time of the day or in some cases even visiting the members of the household on their farms.

### **3.2.3 Sfurti Ben and Millers Survey**

As explained, the implementation of the program is critically tied to the on-ground implementors, or supply facilitators, the Sfurti Bens and the millers (in the second phase). In addition to the household survey, a brief survey of all the Sfurti Ben and the millers was conducted to get qualitative insights on how the households they interact with respond to the survey. A secondary objective was also to understand how they themselves as facilitators of the program saw the impact of the program on the target population. The surveys were conducted keeping in mind that the personal attributes of the Sfurti Ben or the scale and operational style of the millers may affect purchase of Sfurti sachets by the households (See Appendix B for the complete questionnaire). As with the household survey, these surveys were also not translated in the local language but the language of communication during the interview was the local language. Since, there were only 30 Sfurti Bens and 34 millers, no sample was drawn and all of them were interviewed.

### **3.3 Empirical Methodology**

The research questions that this study seeks to answer are of a multilevel nature. Foremost, it is important to understand any potential differences between households that have purchased Sfurti at least once versus those which have never purchased. Next, it would be interesting to see how the purchase behavior shaped over time and what factors influenced that trend. Finally, driving motivation from the name of the initiative,

an understanding of the sustainability of the initiative is important. It can be understood by making utilization of the structural gap between the two phases. As one might think, all of these are selection decisions. A household chooses to be part of the initiative (at least a single purchase), to make purchases over time (purchasing behavior being shaped throughout the initiative) and to eventually stick with the program (make recurring purchases across the two phases). Given, the nature of decision making of the households is of interest for this study, a discrete choice modeling approach must be used to determine the underlying empirical models. In fact, since these decisions are of a binary nature, it is ideal to use simple logistical regression models with different specifications to seek answers to the aforementioned questions.

### 3.3.1 Distinction between regular consumers, dropouts and non-consumers

A preliminary metric that is of interest is, given such an intensive door to door campaign, what separates people who have never purchased Sfurti sachets (non-consumers), who purchased it once or twice (dropouts), and, who purchased it at least thrice. This distinction could be understood as simple utility choice model for the household based on a variety of factors. To model this behavior, a multinomial logistical regression model is used, which is specified below:

$$\begin{aligned}
 \log \left( \frac{\Pr(Y_{iv} = y_{ivj})}{\Pr(Y_{iv} = y_{ivJ})} \right) \\
 = \alpha + \beta_{Demographic} D_{iv} + \beta_{Wealth} W_{iv} + \beta_{Groups} G_{iv} \\
 + \beta_{IronAwareness} IA_{iv} + \gamma_v + \varepsilon_{iv}
 \end{aligned}$$

where:

$Y_{iv}$  = Consumer category of the household (hh)  $i$  in village  $v$

$y_{ivj}$  = Consumer category of the household (hh)  $i$  in village  $v$ ;  $j$  assumes type of consumer – 1 for dropouts 2 for regular consumer

$y_{ivj}$  = Consumer category of the household (hh)  $i$  in village  $v$   $i$  is  $J$ ;  
 $J$  = non – consumer

$D_{iv}$  = Matrix with demographic factors of hh  $i$  in village  $v$

$W_{iv}$  = Matrix with wealth factors of hh  $i$  in village  $v$

$G_{iv}$  = Matrix with dummies for local group memberships of hh  $i$  in village  $v$

$IA_{iv}$  = If members of hh  $i$  in village  $v$  have heard about iron in general

$\gamma_v$  = Village dummy to capture village level fixed effects

All the variables in this specification are derived from the household survey conducted in June-July 2017. The variables are specifically chosen because of their perceived importance from learnings of the researcher during interacting with households while conducting the survey, along with economic theory.

The demographic variables include religion, caste and sub-caste of the household. All three in conjunction often decide the socio-economic position of the household in society. They also include variables capturing the education level of the household members as better education could be associated with better nutrition choices. Wealth as a factor commands a higher social status within a society, thereby affecting decisions taken by a particular household. Membership of local community groups is important, since, the program is marketed through these local groups. The reason why it is

important is also seen from the way social networks operate and how a new idea gets spread through these social networks. There would be detailed discussion about the variables being used in the specification in Chapters 4 and 5.

### 3.3.2 Modeling the purchasing behavior of households over time

Having modelled differences between households that made the purchase at least once versus those that didn't buy at all, the logical next step is to determine how consistent was the behavior of the households in terms of purchase. The program may have a positive effect starting out, given it is new and marketed by people they know, but households over time may stop purchasing it, due to lack of interest, dissatisfaction with the powder or other reasons. Additionally, longer exposure to the marketing efforts being made by the local groups could contribute to people beginning to purchase. Therefore, modelling for purchases in each month seeks to further disentangle the effects of the demographic and other factors as may have been observed in the model explained in section 3.3.1. To model at a monthly level, again a simple logistic regression model is specified as follows:

$$\begin{aligned} \log\left(\frac{y_{ivt}}{1 - y_{ivt}}\right) &= \alpha + \beta_{Demographic}D_{iv} + \beta_{Wealth}W_{iv} + \beta_{Groups}G_{iv} \\ &+ \beta_{ironAwareness}IA_{iv} + \beta_{PastPurchase}P_{ivt} + \theta_1 t + \theta_2 t^2 + \gamma_v + \varepsilon_{ivt} \end{aligned}$$

where:

$y_{ivt}$  = Assumes 1 if the hh  $i$  in village  $v$  made a purchase in time  $t$ , else 0

$P_{ivt}$  = No. of months preceding  $t$ , in which hh  $i$  in village  $v$  made a purchase

$t$  = Time(in months) passed from the launch of the campaign

$\partial_1$  = Captures the linear effect of increasing time

$\partial_2$  = Captures the rate of change in the effect of increasing time

A daunting problem with this specification is that each month's purchase by the same household is an independent observation. However, as is obvious, the behavior of a particular household over time is not independent. A household which has bought in the past could naturally be more likely to buy in the future. To address this issue, a variable 'past purchase' ( $P_{ivt}$ ) is included which cumulates the number of months in which the respective household made purchase prior to time (or month)  $t$ . As an example, if we were to look at  $P_{iv5}$ , if the household has made purchases in month 1, 3, 5, 6, 8, 10, then  $P_{iv5} = 2$ . For the same household  $P_{iv9} = 5$ . Therefore, the variable counts the number of months up to  $t$  (not included), in which the household made a purchase.

Since, we are also using  $t$  and its squared as a variable itself, it is important to clarify the distinction. While  $t$  is independent of the household and is only increases with months,  $P_{ivt}$  is a reflection of the past behavior of the household.  $P_{ivt}$  has the same direction of growth as  $t$  but, it won't necessarily correlate with  $t$ . A household may have made a purchase in month 1 only. In such a case,  $P_{ivt} = 1$  for all values of  $t$  other than 1, when it is 0. However,  $t$  would keep growing with each month. Therefore, both these variables capture different effects by construction and there isn't a reason to believe that one duplicates the other.

Three similar but slightly different models would be run using the same regression. One for observations from the first phase, second for observations from the second phase. This specification treats the second phase itself as a beginning and doesn't

account for the first phase at all. The third and final model for this specification clubs both the first and the second phases and ignores the time gap between the implementation of the two phases. This implies, that  $t$  would be continuous and wouldn't jump at the beginning of the second phase. This would further be discussed in Chapters 4 and 5.

### 3.3.3 Modelling persistent consumers

A critical question for this program is how sustainable such an initiative can be. In absence of any control groups, it is difficult to model sustainability in the way one would like. However, there is a structural gap in the two phases of the program. We can exploit this gap to check if consumers from the first phase stuck with the program and amongst those who did, what were their attributes. Thus, for this part of the study the modeling is restricted to the households which purchased Sfurti sachets at least once. It also gives the option of adding perceived attributed of Sfurti and other behavioral information, available only for households which have purchased Sfurti at some point. The model is similar to the one used in section 3.3.2, with the difference of sample and variables. The following logistical regression model is specified for this part.

$$\begin{aligned}
 \log\left(\frac{y_{ivt}}{1 - y_{ivt}}\right) &= \alpha + \beta_{Demographic}D_{iv} + \beta_{Wealth}W_{iv} + \beta_{Groups}G_{iv} \\
 &+ \beta_{IronAwareness}IA_{iv} + \beta_{PastPurchase}P_{ivt} + \beta_{SfurtiAttribute}S_{iv} \\
 &+ \partial_1 t + \partial_2 t^2 + \gamma_v + \varepsilon_{ivt}
 \end{aligned}$$

where:

$y_{ivt}$  = Assumes 1 if the hh  $i$  in village  $v$  made a purchase in time  $t$ , else 0

$P_{ivt}$  = No. of months preceding  $t$ , in which hh  $i$  in village  $v$  made a purchase  
(including in first phase)

$t$  = Time(in months) passed from the launch of the second phase

$S_{iv}$  = Attributes of *Sfurti* as perceived by the household  $i$  in village  $v$

Relaunch of a familiar campaign may have an effect which drives people to buy in the first month. Since, the focus is to check for sustainability it is desired that such an effect be checked and addressed. Therefore, two versions of this model were computed. One which is as specified, and another by removing the first month, or the month in which the second phase was launched. A comparison of these two would help us identify the existence of a potential outlier behavior, as mentioned.

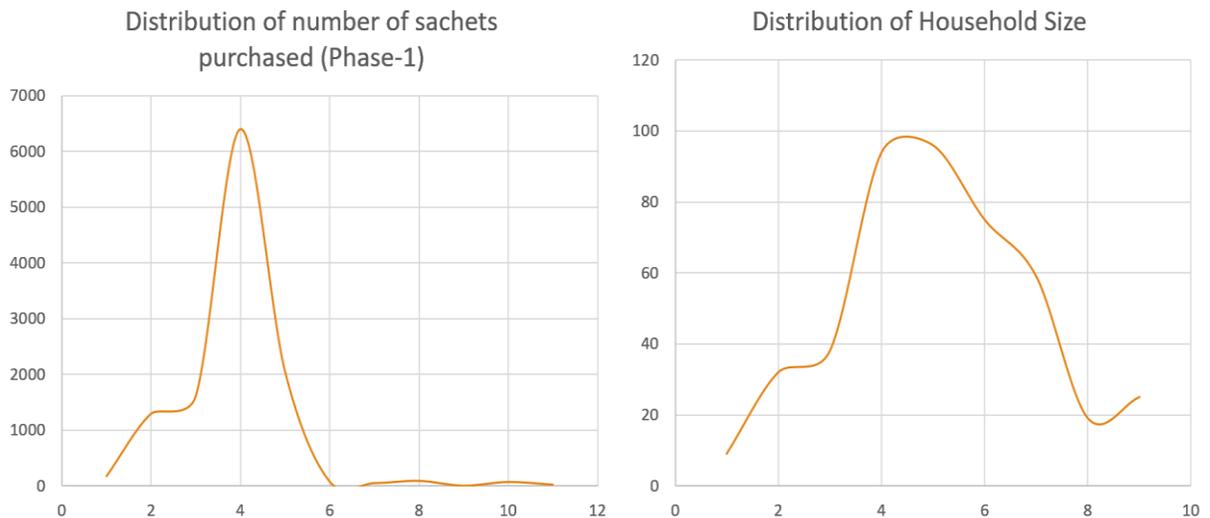
## CHAPTER 4

### DATA

#### 4.1 Purchasing trends

An analysis of the sales records maintained by the Sfurti Bens was done to get an initial understanding of the progress of the project. Additionally, this simple profiling of the data provides substantial information to interpret the results by revealing some of the potential purchasing behaviors of the target households. Data in this section pertains to all of the 5579 households that were part of the 15 target villages, unless specified otherwise.

There is information available on the number of Sfurti sachets each household purchased in a given month. Since, one sachet suffices for 5 kg of flour, different households must need different number of sachets each month, provided households size varies. However, comparing the frequency distribution of the number of sachets sold to a household in a month with the frequency distribution of household size (obtained from



**Figure 4: Comparison of distribution of per household sales per month, and household size**

the household survey) suggests that most of the times a total of 4 sachets were sold to the households (See figure 4).

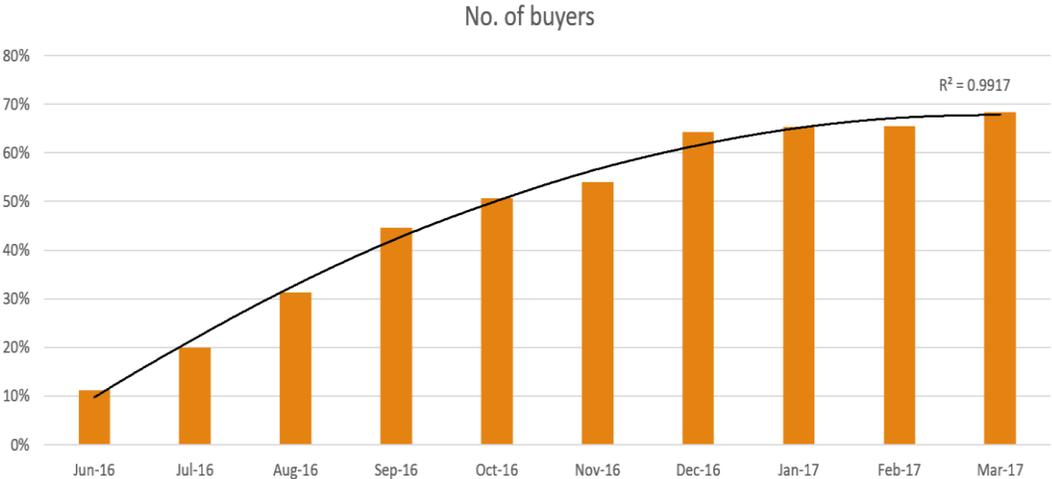
Clearly, the distribution of household size is spread out, however, in most instances the no. of sachets sold are 4. This was unintended; however, the way Sfurti Bens marketed the sachets, it seems, they fixed the quantity to 4 per family. It could be for multiple reasons. Mainly, it helps sell the sachets as instead of varying quantities, the Sfurti Ben sell these in bundles of 4, also fixing the price to be charged. Therefore, each time a Sfurti Ben would visit a household, if the household were to buy, she would simply give them 4 sachets (a standard number) instead of doing the math of the number of sachets the household would need. The consequence of this behavior, however, for this study is, throughout, whenever purchases are analyzed, nowhere are the number of sachets purchased, taken as the unit of analysis. The outcome being analysed always is whether a purchase was made in a given month.

#### **4.1.1 Trends in the first phase**

##### *Households touched by the program*

As a first level of analysis, to understand the progress of the program, it is important to understand the consumer base of the program. In terms of outreach, a measure of how successful the program is by computing the no. of households that were part of the initiative and their growth over time. Figure 5 shows a cumulative trend of the proportion of households amongst all the 15 target villages that purchased Sfurti sachets at least once over time.

It is observed that the growth of consumers happened gradually over time. While, in the month of the launch of the program, only about 10% of the target population tried Sfurti sachets, by about the 7<sup>th</sup> month of the program, the number has steadily increased to roughly 65%.



**Figure 5: Cumulative trend of consumers in the first phase**

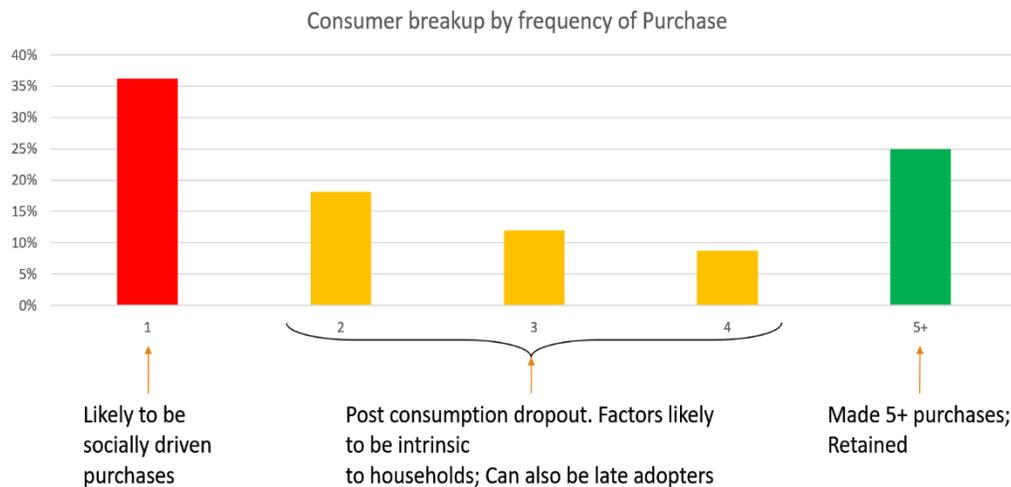
This behavior has an important reflection of the way in which the program grew over time. It may have been expected that the program sees majority of the households latching on to the program in the first few months, given it being a new idea. However, this steady increase points towards an organic growth, one that could potentially be a result of persistent marketing through the local groups. Spreading of awareness over time through these groups, as well as through the early adopters of the program to the remaining households may have led households to overcome the barrier of trying the sachets out.

The stabilization of the total proportion post December 2016 indicates the saturation of the program. In other words, beyond a point it wasn't possible for households to be convinced to at least try the Sfurti sachets. There is, therefore, a clear systemic

barrier for certain households which the program couldn't cross despite the efforts being made. The figure, therefore, also highlights the declining marginal impact of exposure to the program and the accompanied adoption by new households. The figure also then begs the question about the nature of consumption of these households, that is, did most of these households just try the sachets once or twice and then would they eventually drop off? The next section discusses this aspect of household consumption.

*Nature of consumption by the consumers in the first phase*

To understand the nature of consumption, it is important to investigate the frequency of purchase by the consumers identified in Figure 5. A distribution of these consumers by the frequency of their purchase is therefore drawn in Figure 4.



**Figure 6: Breakup of consumers by frequency of purchase in first phase**

Given, the nature of the campaign was social marketing, it is quite possible to argue that households may have ended up buying the sachets merely because someone they knew from their own village pitched it to them. To further elaborate, it is quite possible that the households wasn't interested in the sachets per se, but ended up buying anyway because someone they knew was selling it to them. This phenomenon is being

called an exclusively socially driven sale. However, it is possible that a household bought the sachet because of social pressure but ended up liking it for whatever reasons and stuck with the program. Households that bought the sachets only once throughout the first phase are termed as drop-off households. While Figure 5 established that the total coverage of the program in terms of single purchase was high (about 65%), most (35%) of the households ended up as drop-off households, a sign that while social marketing may have worked effectively to get people to try the Sfurti sachets, it wasn't as efficient with respect to retaining them.

It is also interesting to notice that though, a significant proportion of households dropped off, this likelihood of dropping-off decreases as the frequency of purchase went up. There were few households that have purchased 2, 3 or 4 times. About 25% of the households which bought the sachets at least once, ended up buying it 5 or more times, a sign of retention within the program. Figure 6 indicates that though it may be difficult to get households to not drop-off (single purchase only), once they make a repeat purchase (second purchase) the likelihood of the household buying more no, of times increases. It must also be kept in mind that figure 6 doesn't control for late adopters, that is, a household which may have purchased for the first time in December 2016 or January 2017, clearly didn't have enough months (the first phase ended in March 2017) to become a retained household (purchase frequency greater than equal to 5).

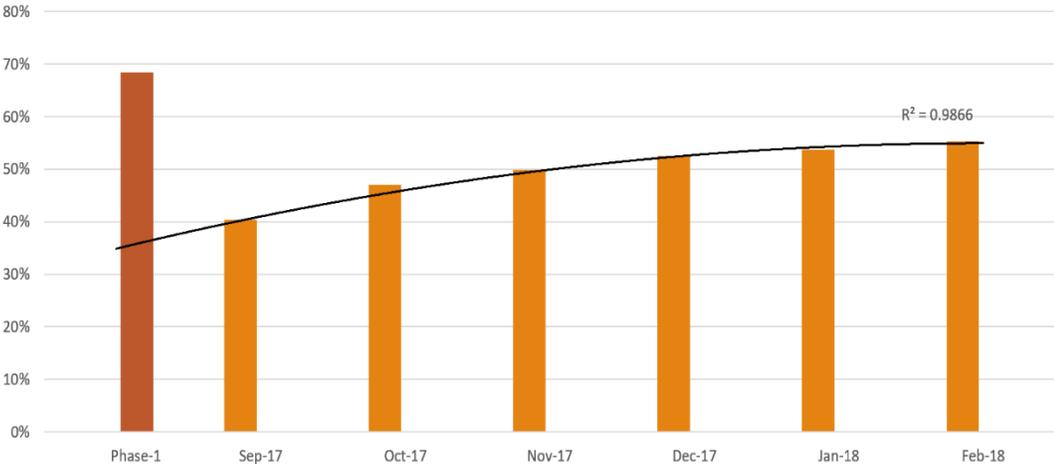
#### **4.1.2 Trends in the second phase**

Like the first phase it would be interesting to see how both, trends on number of new consumers as well as distribution of frequency of purchase looked like in the second phase. It may be useful to recall that the second phase started after a 5-month gap

from the end of the first phase, in September 2017. Additionally, during the second phase, in five villages sales were made through the local millers and not through Sfurti Bens. Ideally, we would have liked to track the behavior of all the households across both the phases, however, due to an update of households lists between the phases, the household level sales information between the two phases isn't linked. Therefore, while we can track the over time behavior of a household within a phase, it is not possible to do so across the phases.

*Households covered in the second phase*

Unlike the first phase, the second phase doesn't introduce the target households to a completely new product, therefore, it is interesting to see as to how households behaved in the second phase. Intuitively it would be expected that given the first phase saw a saturation in terms of coverage, there would be no addition of new households. Unfortunately, given that households cannot be tracked across phases, this information cannot be verified. However, it would still be expected that the second phase doesn't show high variation, as the consumer base must have been fixed. Figure 7 corroborates this. The month on month growth within the second phase is marginal, and it starts from



**Figure 7: Cumulative trend of consumers in the second phase**

about 40% in the first month of the second phase and increases only up to about 55% by the end of 6 months.

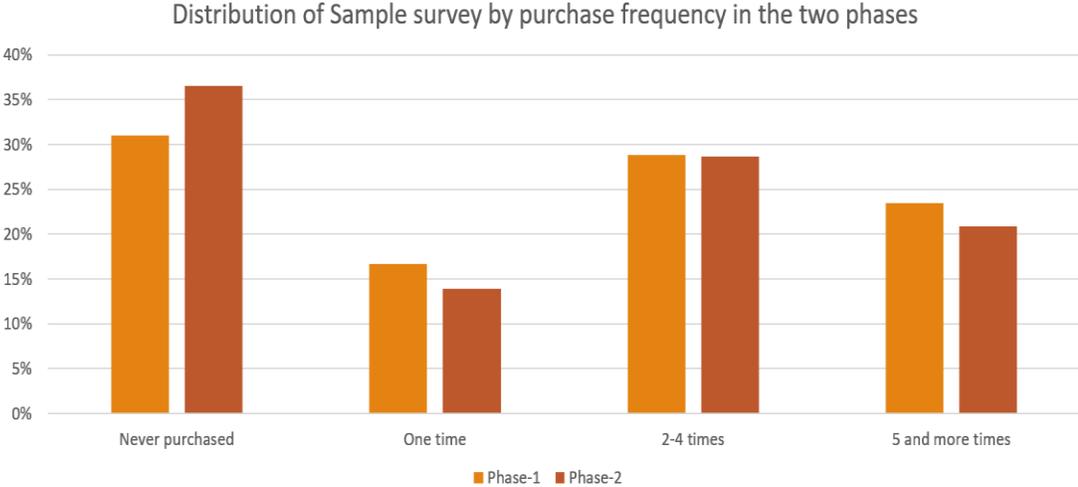
In comparison to the saturation levels of the first phase, it is expected that the starting levels for the second phase be low. The first phase had a total of 65% coverage, however, about a third of these made a purchase only once, and it would be safe to assume that those household dropped off and were highly unlikely to make a purchase again. Therefore, the effective households that the second phase could cater to, assuming that saturation indeed set in, would be two-thirds of the coverage of the first phase, hence about 40-45% of the total households. As Figure 7 illustrates that is almost exactly the proportion of households which bought Sfurti sachets in the first month of the second phase. However, this conclusion is indicative and limited given the absence of further corroborating evidence.

#### **4.2 Profile of surveyed households**

A profile of the surveyed households is drawn from the responses to the survey instrument (See Appendix A for the complete instrument). A total of 450 households were surveyed, a randomized sample of 30 households within each village. The intention of the random sample was to get adequate representation not just demographically but also in terms of purchasing behavior.

Figure 8 shows the frequency distribution of the purchasing behavior of the sample households. The requirement was enough number of households in each sub category of purchasing behavior, namely, households that never made a purchase, households that made a purchase just once, households that made repeat purchases (2-4

times), and, finally households that made enough purchases to be considered as retained or regular consumers (5 or more purchases). Given, the empirical analysis is done on both phases, this requirement should hold true for both the phases.



**Figure 8: Distribution of sample households by frequency of purchase**

It is evident that the sample had a fair distribution across these three categories. It is slightly under represented in single purchases but still significant to not undermine the drop-off group. More importantly, the group that never made a purchase is proportionately represented, hence allowing for the distinction between purchasers and non-purchasers to be made clearly.

It should be mentioned here that though data for 450 samples were collected as per the sampling methodology, due to unfortunate technical issues, data on 4 observations was lost, thereby, the data available for analysis is of 446 households, instead of 450. Also, the data for consumption of these households was tracked and matched with the sales data of all the 5579 households. There were instances, very few, where a household in the sales data shows purchases, however, in the interview they refused to have ever purchased Sfurti. These households were treated as non-purchasers. Since, the

survey was conducted before the second phase began, this check was available only for the first phase, however, recognizing that mismatching could be an error, for the second phase, the TCI field staff manually checked and verified the identity of the 446 sample households and their sales information. Given this verification, the sales trend of the sample households is tracked across both phases.

### *Iron awareness*

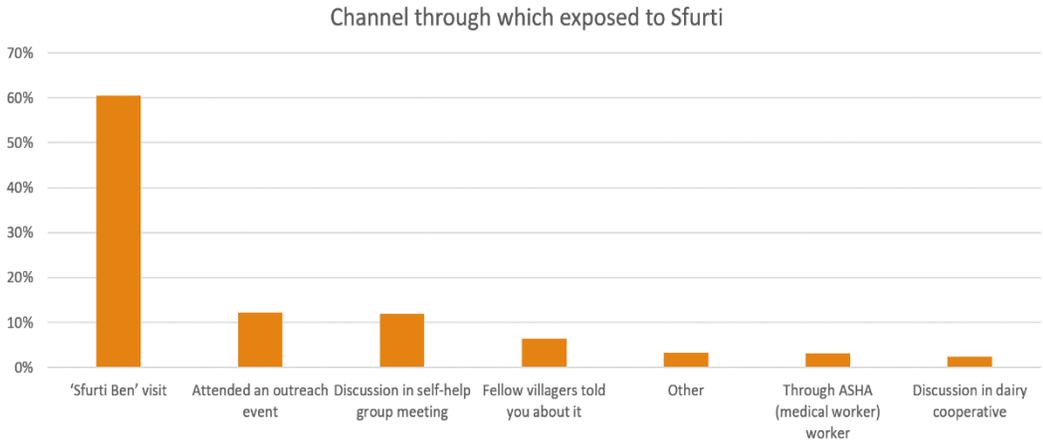
Awareness about iron of these households is an important question tied intrinsically to the Sfurti sachets. One would expect, if households were aware about iron as a micronutrient they would be better informed to make a decision on whether or not they would want to buy Sfurti, which is primarily an iron fortificant. However, the survey found only about 21% of the sample households had heard about iron as a fortificant. It is important to recall here that the survey was conducted after the first phase had culminated. Therefore, it is surprising that households that were purchasing Sfurti sachets did not know about iron as a micronutrient. It also highlights how the pitches on ground may have actually worked. Though, the Sfurti Bens were trained to talk about iron, its importance, how most people in the region are iron deficient and why an iron fortificant is important for their health, this message apparently did not get communicated that clearly.

Amongst the households that have heard about iron, only 14% reported that someone in their household was iron deficient. For context, the NFHS-4 data shows that about 55.1% non-pregnant women in the age 18-49 are anemic, a condition most often caused by iron deficiency. Further, only about 5% of the households reported receiving any iron supplement. The Government of India have been running a program which distributes iron folic acid tablets to pregnant women and iron syrup to infants for free.

Despite such efforts, such low levels of iron awareness and self-reported deficiency indicates a systemic problem about the lack of communication with regards to the information on micronutrients.

*Exposure to Sfurti*

The program was designed to be implemented through social marketing involving various groups, but primarily, through door to door visits by the Sfurti Bens. This aspect is highlighted in Figure 9. The households were asked about the first channel through which they had come to know of the Sfurti sachets. The question specifically asked them to name a single source, through which they first hear about the program being run in their village. As would be expected, a majority 60% of the households said it was through the Sfurti Bens, highlighting the importance the door to door visits of Sfurti Bens to increase awareness.

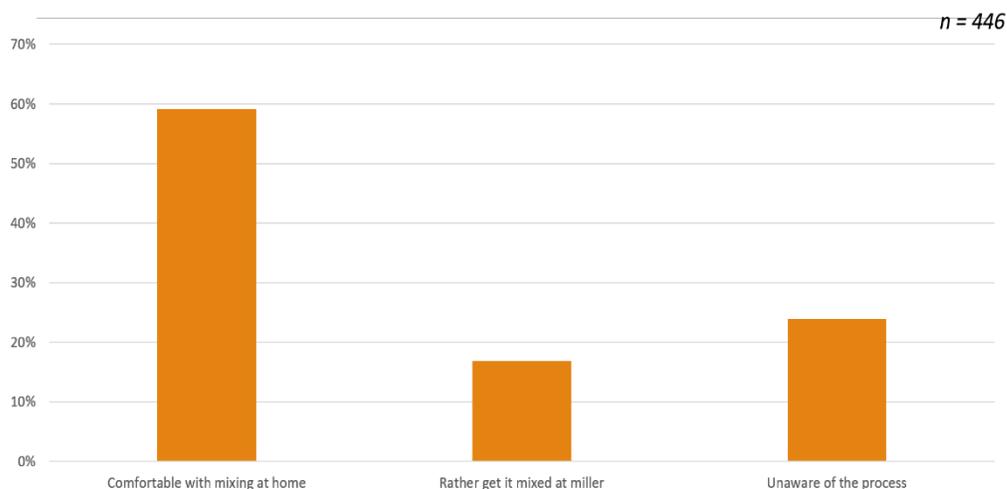


**Figure 9: Channel through which household was exposed to Sfurti**

*Mixing process*

It may be recalled that the process to mix Sfurti in the flour may have been complicated. This, could then deter people from buying the sachets, since it may mean too

much additional work and hassle, which may seem unnecessary (given the low awareness about iron in the first place). The households were asked what they felt about the mixing process, if they even knew what the process was, were they comfortable with mixing it at home or would they rather get it mixed at the miller. About 60% of the households found it comfortable to mix at home, while about 25% of the households were not aware of the mixing process at all (See figure 10). The households unaware of the process were non-purchasers.



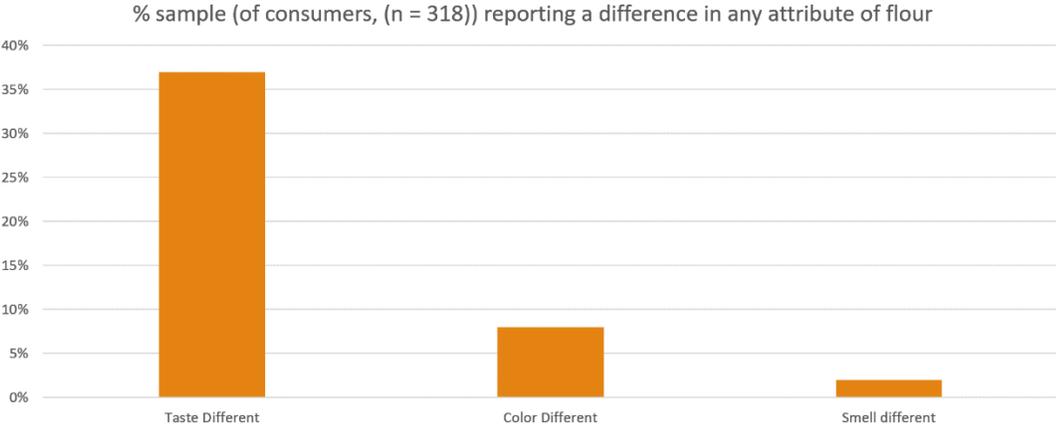
**Figure 10: Comfort with mixing process**

The second phase of the program involved sales through the millers. One motivation behind that was to make it easier for the households to mix the powder to the flour and hence promote purchases. Though, only 17% of the households said they would rather get the flour mixed at the miller, from the survey experience itself (not documented objectively), it was felt that most households that were comfortable with the mixing process were not doing it right. Therefore, chances that the powder wasn't being mixed properly, and hence, not utilized in the manner it is supposed to, are high.

Mixing the powder while the grains are being milled eliminates this problem and ensures that it is mixed properly.

*Attribute perceptions*

The powder is manufactured with the objective of it to be tasteless, colorless, and odorless. However, it was found that the powder does add a slight tinge of yellow to the flour, noticeable only when observed very sharply. If added in excess quantities (thrice or more of what was to be added) the flour would turn an ugly black. However, in terms of taste or smell there are no changes. As a test, households that had consumed the powder at least once were asked about what they felt about all these attributes (See Figure 11).



**Figure 11: Perceptions towards physical attributes of Sfurti**

Only a very small fraction of the sample (less than 10%) found any difference with color or smell of the flour once Sfurti was added. However, interestingly about 35% of the households reported a difference in the taste of the flour. All of the respondents said they found the taste better than before. A possible explanation could be that since iron increases appetite people observed an increase in their appetite over time, and, mistook it for an improved test of the flour. However, there is no data on

consumption of flour over time which could substantiate this explanation, and, therefore for all likelihood this could just be a wild guess. Other more plausible explanations are a simple placebo effect or taste being conflated with a general liking of Sfurti sachets.

## CHAPTER 5

### RESULTS AND DISCUSSION

#### 5.1 Consumers, drop-outs and non-consumers

Table 1 lists selected results of interest from the respective multinomial regression. The regression was controlled for village fixed effects and the sub-caste (social group) of the households. As was specified, demographics, wealth, membership of local groups, awareness about iron were the household factors that were used in the regression.

**Table 1: Selected marginal effects when regressing purchasing categories on household variables with no purchase as base in Phase-1**

Variable	Drop-offs	Regular
Christian	0.05 (0.05)	0.02 (0.06)
Cult. Land	0 (0.01)	0 (0.01)
Sugarcane cultivator	0.09 (0.07)	-0.1 (0.1)
Dairy	-0.02 (0.01)	0.03 (0.02)
Children < 5	0.04 (0.05)	0.14** (0.07)
Dairy coop member	-0.02 (0.06)	0.19** (0.07)
BAIF SHG member	0.08 (0.07)	0.22** (0.1)
Other group member	0 (0.05)	0.1 (0.07)
Highest Ad. Male Edu.	0.01 (0.01)	-0.01 (0.01)
Highest Ad. Female Edu.	0 (0.01)	0 (0.01)
Iron awareness	0.01 (0.05)	0.06 (0.07)

\*\*\*p<0.01 \*\*p<0.05 \*p<0.10; Controlled for village fixed effects and sub-caste fixed effects;

Before discussing each of the factors individually, it is important to highlight that none of the factors are statistically significant in differentiating the dropout consumer group (1-2 purchases) from the non-consumers group. Effectively, implying that in terms of behavior there isn't any determinable difference between the two groups. It is also intuitively true. As noted earlier, the dropout consumer group mostly bought one or two times under some social coercion and not out of an actual will to buy. The decision to buy, as a courtesy to the Sfurti Ben, with respect to the factors considered in the regression would be random. The results reflect that too.

### *Demographics*

Demographically, the variables of interest were highest education of adult and female members (less than 60 years of age), if household has children less than 5 years of age and religion<sup>3</sup> of the household. Education of household members isn't a factor that is statistically significant at all to which category of consumers the household belongs. However, theoretically it makes sense to control for education. A household with educated members can affect their decision both positively and negatively. Education may imply higher sensitivity towards health, therefore, could influence the decision positively. Higher education in a rural setting, also commands an elevated level of respect within the society. During the interviews, households with educated members seemed to have an opinion that they have a better understanding, because of their education, of health issues than the Sfurti Bens and hence, wouldn't need advice from her on what supplements they should be taking.

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<sup>3</sup> Religion is a personal choice and not a collective decision of the household. However, religion refers to as how the household identifies themselves and practicing different faiths within the same household is not a common practice in the region.

Religion is expected to be an important factor because of the outreach programs conducted through the churches in the region. However, religion is also insignificant in determining the consumer category of the household. Children under the age of 5 years on the other hand holds significance increases the likelihood of a household belonging to the regular purchase category by 14%. If a household has children under the age of 5 years, it has three consequences relevant to the program. First, the mother of the child has been recently a recipient of iron folic acid tablets and is accustomed to the principle of supplements. She may not be aware of what she is taking but she could relate it to the tablets that she was consuming. Second, households with smaller children are in touch with ASHA and Anganwadi workers, both of whom helped spread the word about the program and are respected in the villages because of the healthcare work that they do. Third, mothers with children less than 5 years of age, tend to stay home more often, increasing their availability for when the Sfurti Ben would visit the house. It also gives them more time to understand and adopt to the program as compared to women in other households who in addition to household chores, have agricultural responsibility as well. Therefore, having a child less than 5 years of age in the household is also an anecdotal indicator of how social marketing in a rural setting works rather than intrinsically being a demographically important variable.

### *Wealth*

Direct income of the households wasn't available and therefore, indicative variables were used for wealth. Since, most of the households were farmers, an indication of how wealthy a household could be is through the total land under cultivation owned by the household. This, however, doesn't qualify as enough, since in the region there are mainly two types of cultivators, paddy and sugarcane. The sugarcane cultivators make much more profit per acreage of land than paddy cultivators, hence a dummy

variable indicating whether a household cultivates sugarcane is also used. Finally, the dairy industry is very popular in the region. Therefore, total no. of cows and buffaloes owned by the household is also an indicator of relative wealth.

The results show that none of these variables are significant. The sachets, as mentioned cost only Rs.3 and the price was arrived at by the focus groups in the villages themselves. Hence, affordability shouldn't be a substantial issue. The reason wealth was included as a factor was again based on field experience. Wealthier households have a higher social standing similar to how individuals with higher education do. Therefore, approachability and the power to convince could have been issue and hence the outcome is tested for these factors.

#### *Group membership*

These group of variables are of the utmost interest given the design of the program. The program, as mentioned, is implemented through the BAIF self-help groups. Consequently, it is seen that the variable affecting the outcome most significantly is whether a member of the household is a member of the BAIF self-help groups. Since, Sfurti Ben is a part of these groups, it is natural that she has an ongoing relationship with other members of the group as well. This is clearly reflected in the results. Being a member of these self-help groups increases the likelihood of the household being a regular consumer by the highest margin amongst all factors (22%) .

The other groups that have a positive significant effect is membership of dairy cooperatives. Dairy cooperatives were also engaged with to help spread awareness about the program. Additionally, these are large networks of people, thereby it is likely that people became consumers through word of mouth within these cooperatives.

Households that were members of other local groups not engaged with, to promote the program do not have an effect. This could be both, because these networks were not actively engaged with by the program, and because of the scale of these groups. It is less likely to find a consumer within a group that is smaller as compared to a larger group, as of dairy cooperatives, thereby, limiting the possibility of changing purchasing behavior through word of mouth.

### *Iron awareness*

As was discussed in Chapter 4, iron awareness in the region is quite low. Households which might have used iron folic acid tablets were also not aware about iron as a micronutrient. Therefore, it is not surprising that iron awareness is an insignificant factor, as there would be households that are purchasers but not aware about iron and those who may be aware about iron but are unwilling to purchase.

## **5.2 Purchasing behavior over time**

The results in this section showed in Table 2 are modelling purchasing behavior of a household in a given month. The three version of the model tried are, first phase observations only (Phase -1), second phase observations only (Phase-2) and by combining both phases 1 and 2 (combined).

### *Demographics*

Same variables as in the section 5.1 are used, however not all of them are shown in the results. Similar to table, none of the demographic factors influence decisions of a household to make a purchase in a statistically significant manner other than having a child less than 5 years of age in the household. All the factors which potentially make it a significant factor in the households buying decision are of a repeating nature. The

engagement is continuing and hence the reasons persist throughout, making it a positively significant factor for purchases over time., increasing the likelihood of making a purchase by 4% irrespective of the phase being considered.

**Table 2: Selected coefficients when regressing monthly purchase decision on household variables**

Variable	Phase – 1	Phase – 2	Combined
Christian	0 (0.01)	0.01 (0.02)	0 (0.01)
Cult. Land	0 (0)	0 (0)	0 (0)
Sugarcane cultivator	0 (0.02)	0 (0.03)	0 (0.02)
Dairy	0.01* (0)	0.01 (0.01)	0.01** (0)
Children < 5	0.04*** (0.02)	0.04* (0.02)	0.04*** (0.01)
Dairy coop member	0.03* (0.02)	0.04* (0.02)	0.04** (0.01)
BAIF SHG member	0.05** (0.02)	0.11*** (0.03)	0.07*** (0.02)
Other group member	0.03* (0.02)	0.02 (0.02)	0.02* (0.01)
Iron awareness	0.01 (0.02)	0.05** (0.02)	0.03* (0.01)
Time from launch (in months)	0.02 (0.01)	-0.11*** (0.02)	0 (0)
Time from launch (in months) sq.	0 (0)	0.01*** (0)	0 (0)
Purchased last month	0.26*** (0.02)	0.36*** (0.02)	0.33*** (0.01)
Purchased two months before	0.17*** (0.02)	0.21*** (0.02)	0.19*** (0.01)

\*\*\*p<0.01 \*\*p<0.05 \*p<0.10; Controlled for village fixed effects and sub-caste fixed effects;

### *Group membership*

It is interesting, that the impact of being a BAIF self-group, while still significant across all three specifications, has gone down in magnitude. This should also be seen in

conjunction with the fact that this specification accounts for past behavior and hence, it is likely that factors which are responsible for converting people into consumers would then have a lower magnitude of significance when it comes to purchases over time.

While being a member of the dairy cooperatives increases likelihood by about 4% across phases, being a member of the BAIF self-help groups increases likelihood by 5% in the first phase, whereas by 11% in the second phase. The 7% in the combined could simply be considered as an average of the two phases. The increase in magnitude by almost double is intuitive owing to the restart of the campaign. Given, there was a gap of 5 months between the two phases, households that were connected to the BAIF groups had been in contact with the program while the others lost that connection because there were no household visits or talk of *Sfurti* in this period. This also has consequences to understand the importance of frequent households in aiding purchase. We would discuss this further later.

#### *Time from launch*

This specification includes time (as in months passed) and its squared term as a proxy for exposure to the program. Ideally, our variable of interest must have been how often does a household engage with the program, but as can be imagined, given the scale of the program and its intensive marketing style, it is realistically impossible to have data on that information. As a proxy, therefore, time has been used. Since, the program's marketing is intensive, the assumption here is that with each passing month, the households get exposed to the program linearly.

An insignificant marginal effect of these coefficients highlights how the exposure hardly had any impact on households purchase making decision. The impact that it may have had, also gets absorbed in the past purchasing behavior variables. This is to

say, that exposure per se in isolation to the past purchasing behavior did not have any impact on purchasing decisions. A prolonged campaign therefore, isn't something that would convince a household to make a purchase if the households have not been making purchases already.

#### *Past purchase behavior*

It effectively captures the likelihood of a household to make a purchase based on if the household made a purchase in the month before and the month before that. It effectively measures the persistence of a household in making purchases. As can be seen it has a huge positive impact across the three specifications. This emboldens the view that once a household has made a purchase it is likely to keep making purchases. The purchasing behavior isn't random and that, though, there might be drop-offs, but at an overall level, purchases made in the past have a positive impact. Once, households keep making purchases, this likelihood keeps increasing. Hence, repeat purchasing is likely with the households.

### **5.3 Purchasing behavior of first phase purchasers in the second phase**

The results in this section, shown in Table 3, are to compare the behavior of households that made even a single purchase (drop-off or regular) with the over all sample. The first column in the table is based only on the households that had made at least a single purchase. The second column is a reproduction of the second column from Table 2 for comparative purposes.

### *Demography*

When talking of only the households that were consumers in the first phase, whether the households has a child less than 5-year old or not, is no longer significant. The implication is that while the variable is significant when considering non-purchasers as well as purchasers, both for a simple comparison as well as monthly purchases, when considering just first phase consumers' purchasing behavior in the second phase, there is no distinction.

By comparison with the second column, it can be observed that all the factors which were present in both specifications have similar magnitude and significance even when the sample is restricted to just phase-1 consumers. The first four factors introduced only in this specification, therefore, explain the outcome further and help understand, at least partially, what made consumers from phase-1 stick and what made them drop off.

### *Sfurti attributes*

This specification introduces variables of interest to consumers and check if that made a difference to their purchase decision in the second phase. Households finding the mixing process easy or observing an improvement in their health are insignificant to the purchase decisions. However, a perceived improvement in taste as an indicator is positively influenced the decisions of households to make a purchase in the second phase. It could be argued that if improvement is an influencer then the health indicator should also have been significant. However, there is a distinction between the two. As explained, in section 4, taste improvements are just a perceived effect, since the powder by design is tasteless.

The response might very well be an indicator of the fact that households felt good about the product in a generic manner, implying a positive experience, not

necessarily measurable in tangible terms, but an overall good or happy feeling. Health on the other hand, is a more tangible factor and given the physically strenuous nature of most of the people, also, difficult to observe marginally.

**Table 3: Regression results for monthly purchase decisions in phase-2**

Variable	Phase – 1 consumers	Everyone in sample
Health has improved	0.02 (0.03)	--
Food taste better	0.07** (0.03)	--
Find mixing easy	-0.03 (0.03)	--
SB visits once a month	0.05 (0.03)	--
SB visits once a week	0.07 (0.05)	--
SB visits multiple times a week	0.21** (0.08)	--
Children < 5	0.01 (0.03)	0.04* (0.02)
Dairy coop member	0.01 (0.03)	0.04* (0.02)
BAIF SHG member	0.11*** (0.04)	0.11*** (0.03)
Other group member	0.02 (0.03)	0.02 (0.02)
Iron awareness	0.04 (0.03)	0.05** (0.02)
Time from launch (in months)	-0.10*** (0.02)	-0.11*** (0.02)
Time from launch (in months) sq.	0.01*** (0)	0.01*** (0)
Purchased last month	0.36*** (0.02)	0.36*** (0.02)
Purchased two months before	0.2*** (0.02)	0.21*** (0.02)

\*\*\*p<0.01 \*\*p<0.05 \*p<0.10; Controlled for village fixed effects, sub-caste fixed effects, highest male and female education;

A new factor introduced here is after phase-1, what did the households think was the frequency of visits by the Sfurti Ben. The positive significance of this factor reiterates the reliance on Sfurti Bens for the people to continue making purchases. This was

also touched upon by conjecture when assessing the difference of the impact of being a BAIF member between the two phases. The assumption here is that the frequency of visits by the Sfurti Bens as in the first phase, continued in a similar manner in the second phase. Therefore, households that were visited more frequently in the first phase, were also visited more frequently in the second phase and consequentially these household have a higher likelihood of purchasing Sfurti sachets in the second phase.

## CHAPTER 6

### CONCLUSION

Various ways have been tried and tested to address micronutrient deficiency in different parts of the world. A somewhat unique strategy that was tried in this field experiment, or rather, intervention have multiple learnings for various stakeholder groups. Unlike traditional free distribution by local governments to the households, or a willingness to pay experiment, the use of local women self help groups and other village level communities to market the powder, while, letting the self-help groups, themselves, through focus group discussions decide the price of the powder sachets made this intervention very different. Another valuable deviation from standard home fortification programs was the utility of the powder for the entire household, and not just infants or pregnant women. Mixing the powder in the flour used for daily consumption, not only made it available to all members of the household, as a collective health initiative, but also decreased the effort of using the fortification powder, when compared to programs which requires sprinkling powder over each cooked meal.

These changes were made with the problems arisen in the past with fortification programs. As a result, towards the end of the program, about 40% of the target households were making purchases every month. As highlighted, the main factors driving purchases were the social networks within the villages. The association with the local women self-help groups, local dairy cooperatives and assistance of ASHA and *Anganwadi* workers, substantially increase likelihood of purchase by a household. This should be viewed in conjunction with the fact that none of the demographic factors such as wealth or highest adult education in the household influenced purchasing decisions.

Both these outcomes very clearly suggest that it is only the proximity of a household to a social network and the exposure of that social network to the fortification program that increases the likelihood of purchase. The most significant factor always came out to be being a member of the local women self-help group followed by dairy cooperative followed by whether the household had a child under 5 years of age. As explained all of these factors increase exposure of the household to the program, most by the self-help groups, since they implemented the program in the villages, then the dairy cooperatives who periodically helped spread the message through their meetings and eventually ASHA and *Anganwadi* workers who visit households with a child less than 5 years of age and hence, may have canvassed for the program informally.

Having explained the importance of social networks in making such a program a success, another important result is of the door to door visits. While the result that households that were visited frequently have an increased likelihood of making a purchase by 21%, is intuitive, it should not be over estimated as a sole cause or contributor to purchases. As the results show, the most important factor in repeat purchasing is whether or not a household made a purchase in the past month. Hence, the persistence of a household to stick to the program once they have made a purchase is high, and this is controlling for the frequency of visits to the household. This is an important outcome for the sustainability of a program like this.

It directly implies that once a household starts making purchases, the likelihood of the household making a repeat purchase shoots up. Hence, there seems to be a threshold of sorts which once crossed, the households are likely to stick with the program and would continue consuming the fortification powder. Additionally, making a household cross that threshold could be accomplished simply by understanding the dynamics of

social networks within the village and exploiting them to help spread awareness about the fortification powder and making sure that access to the powder is also fairly convenient. Women self-help groups clearly seem to pave the way in both these directions.

These women self-help groups not only provide easy access for the households but could also be strong agents of any social messaging that is to be done in the villages. Additionally, it also expands the role of these self-help groups from being money lenders to being entrepreneurs. The entrepreneurial spirit that was observed in this program was a big reason why they could continue to go door-to-door overtime spreading awareness and selling the powder. Their success as highlighted through this particular program isn't necessarily restricted to fortification powder but can be used in any sort of intervention which aims to increase voluntary adaption.

India in the past decade or so has seen the rise of women self-help groups and with women stepping out of their conventional household roles and performing other tasks, such programs offer them an additional opportunity to not just be participative in improving health of the people in villages but also be entrepreneurial and run such operations like a small enterprise. Programs using such social marketing methods, particularly the women self-help groups, may therefore, help establish a path towards improved health through sustainable interventions.

## APPENDIX A

### Survey instrument used for the household survey

#### **Part – A : SfurtiBen Identification**

1. Village Name: \_\_\_\_\_
2. Hamlet Name: \_\_\_\_\_
3. SfurtiBen ID: \_\_\_\_\_
4. Date: \_\_\_\_\_

#### **Part – B : Consent**

We would like to interview you and some members of your household about your education, demographics, and positions of governance if any.

The study is conducted by the 'Tata Cornell Institute' We are interviewing other Sfurti Bens in this and other villages in Songadh district to participate in this same interview.

The interview is voluntary. During the interview, we would also like to ask you questions about the awareness and sales work you conduct for Sfurti.

If you choose not to reply any of the questions in this questionnaire, you are free to do so.

If you decide to answer some or all the questions, we will use the information you give us only for the purpose of research. In any of the published findings of these interviews, none of your personal information would be shared.

1. Do you agree to be interviewed?

- a) Yes
- b) No

2. Interview Start Time: \_\_\_\_\_

**Part – C: Household Information and assets**

1. How many members are there in the household?

\_\_\_\_\_

2. How many members are above the age of 5?

\_\_\_\_\_

3. No. of female children in the household under the age of 5, dependent on you?

\_\_\_\_\_

4. No. of male children in the household under the age of 5?

\_\_\_\_\_

5. Ask about all household members (above age 5)

*ID 1 should be SfurtiBen herself*

Person Code (1)	Name (2)	Rel. to Sfurti Ben (3)	Sex (4)	Age (years) (5)	Education (years) (6)	Non-agricultural occupation <sup>4</sup> (7)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

<sup>4</sup> 1- Panchayat; 2- Dairy; 3 - ASHA/Medical worker; 4 - School; 5 - Other government; 6 – Private sector job

7 - Other (Specify); 9 - None

6. Is the occupation filled above your primary employment?
  - a. Yes
  - b. No
  
7. What activities do you perform in the household other than the non-agricultural occupation?
  - a. Agricultural activities
  - b. Tending to cattle
  - c. Food preparation
  - d. Child care
  
8. What religion do you follow?
  - a. Hindu
  - b. Muslim
  - c. Christian
  - d. Sikh
  - e. Other (Specify)
  
9. What caste do you belong to?
  - a. ST
  - b. SC
  - c. OBC
  - d. General
  
10. What is your sub-caste?
  - a. Gamit
  - b. Choudhary
  - c. Kotwadia
  - d. Bhil
  - e. Other (specify)
  
11. Which amongst the following livelihood activities, does this household best identifies itself with?
  - a. Owns and operates land
  - b. Owns, operates, and rents out land
  - c. Operates land but does not own any
  - d. Agricultural labourers
  - e. Non-farm business
  - f. Salaried/waged
  - g. Casual labour

h. Other (specify)

12. How much total land do you own?  
\_\_\_\_\_ acres

13. How much of this land is irrigated?  
\_\_\_\_\_ acres

14. Answer about the ownership of the following household assets

	Asset	No. held
1	Electricity (Yes = 1, No=0)	
2	Piped Water (Yes=1, No=0)	
3	Toilet (Yes=1, No=0)	
4	Mobile Phone	
5	Motorized two-wheeler	
6	Motorized four-wheeler	
7	Television	
8	Refrigerator	
9	Tractor	

15. Answer about the ownership of the following livestock

	Asset	No. held
1	Calves	
2	Cow	
3	Bull	
4	Buffalo	
5	Goat	
6	Chicken	

### **Part – E: Exposure to Sfurti**

1. How did you come to know about Sfurti?
  - a. Attended an outreach event
  - b. Fellow villagers told you about it
  - c. Saw poster in the village or at someone's house
  - d. Discussion in dairy cooperative
  - e. Discussion in self-help group meeting
  - f. Through ASHA (medical worker) worker
  - g. 'Sfurti Ben' visit
  - h. Other(Specify)

2. Has a '*Sfurti Ben*' visited your house for promotion of 'Sfurti'?
  - a. Yes
  - b. No

**If no skip to Part F**

3. What is the frequency of '*Sfurti Ben*' visiting your house for promotion of 'Sfurti'?
  - a. More than once a week
  - b. Once a week
  - c. Once in two weeks
  - d. Once a month
  - e. Once in two or more months
  
4. What is the average duration of a '*Sfurti Ben*' visit for promotion of 'Sfurti'?
  - a. 5-10 minutes
  - b. 10-20 minutes
  - c. 20-30 minutes
  - d. 30-60 minutes
  - e. More than 60 minutes
  
5. Were you friends/associated with 'Sfurti Ben' before the introduction to 'Sfurti'?
  - a. Yes
  - b. No

**Part – F: Perception towards Sfurti, its attributes and supply chain**

1. What do you think about the packaging appeal of Sfurti?
  - a. Find it good
  - b. Find it bad
  - c. Indifferent
  - d. Never seen a Sfurti sachet
  
2. Do you think the price of Sfurti is reasonable?
  - a. Yes
  - b. No
  
3. Are you comfortable with the process of mixing Sfurti?
  - a. Yes
  - b. No – it is too complicated
  - c. No – too many bins required
  - d. No – too much effort goes into it
  - e. Not aware of the process
  
4. Would you rather get it mixed during milling of the flour?
  - a. Yes
  - b. No (specify reason)
  - c. Indifferent
  
5. Have you ever consumed Sfurti?
  - a. Yes
  - b. No

**If no skip to question 23**

6. Do you find the Sfurti sachets easy to open?
    - a. Yes
    - b. No – too tightly packed, sometimes powder is spilled while opening
    - c. No – hard to open
    - d. No – any other reason (specify)
  
  7. Have you observed any difference in the taste of ‘rotis’ made from Sfurti mixed flour?
    - a. Yes
    - b. No
    - c. Can’t say
- If yes, then proceed else ask question 9

8. Do you find the taste of the 'rotis' better after mixing Sfurti?
  - a. Yes
  - b. No
  - c. Indifferent
9. Have you observed any difference in the color of 'rotis' made from Sfurti mixed flour?
  - a. Yes
  - b. No
  - c. Can't sayIf yes, then proceed else ask question 11
10. Do you like the color of the 'rotis' better after mixing Sfurti?
  - a. Yes
  - b. No
  - c. Indifferent
11. Have you observed any difference in the smell of flour made from Sfurti mixed flour?
  - a. Yes
  - b. No
  - c. Can't sayIf yes, then proceed else ask question 13
12. Do you like the smell of the flour after mixing Sfurti?
  - a. Yes
  - b. No
  - c. Indifferent
13. Have you observed any difference in the hardness/softness of flour after mixing Sfurti?
  - a. Yes
  - b. No
  - c. Can't sayIf yes, then proceed else ask question 15
14. Do you find the flour better after mixing Sfurti?
  - a. Yes
  - b. No
  - c. Indifferent
15. Has anyone in the household (including yourself) complained about the food after mixing Sfurti?
  - a. Yes – about the taste

- b. Yes – about the color
- c. Yes – about the smell
- d. Yes – about the hardness/softness
- e. No

16. If yes, would you tell us who? (Enter person id, 0 if none or won't share)

\_\_\_\_\_

17. Do you find any difference in health after consuming Sfurti?

- a. Yes – it has become better
- b. Yes – it has become worse
- c. No difference

If no difference, then skip to question 19

18. Which of the following do you feel has happened?

- a. Increase in appetite
- b. Reduction in joint pains
- c. Reduction in fatigue
- d. Can sleep well at night
- e. Less frequent headaches
- f. Reduction in hair fall
- g. Whitening of skin
- h. Skin texture has improved
- i. Any other (specify)

19. Have you continuously been using Sfurti?

- a. Yes
- b. No – we stopped
- c. No – we stopped in between and then resumed

If yes then skip to question 21

20. Why did you stop using it?

- a. Too expensive
- b. Complaints within the household regarding taste
- c. Complaints within the household regarding color
- d. Complaints within the household regarding smell
- e. Complaints within the household regarding hardness/softness of rotis
- f. Hard to obtain – Sfurti ben doesn't visit

21. Do you contact Sfurti Ben to get your supply?
- a. Yes – only sometimes
  - b. Yes – every time
  - c. No – she visits when we approach end of stock
  - d. No – we wait for Sfurti Ben to deliver

22. Would you like Sfurti to be sold elsewhere too?
- a. Yes – at retail shops
  - b. Yes – at millers
  - c. No – Sfurti Ben is fine
  - d. Indifferent

Ask only if the household has never consumed Sfurti

23. Why have you never consumed Sfurti?
- a. It would harm health
  - b. It would alter the food made
  - c. Don't feel the need to
  - d. It is too costly
  - e. Don't trust '*Sfurti Ben*'

## APPENDIX B

### Survey instrument used for the women self-help groups

#### **Part – A : SfurtiBen Identification**

1. Village Name: \_\_\_\_\_
2. Hamlet Name: \_\_\_\_\_
3. SfurtiBen ID: \_\_\_\_\_
4. Date: \_\_\_\_\_

#### **Part – B : Consent**

We would like to interview you and some members of your household about your education, demographics, and positions of governance if any.

The study is conducted by the 'Tata Cornell Institute' We are interviewing other Sfurti Bens in this and other villages in Songadh district to participate in this same interview. The interview is voluntary. During the interview, we would also like to ask you questions about the awareness and sales work you conduct for Sfurti.

If you choose not to reply any of the questions in this questionnaire, you are free to do so.

If you decide to answer some or all the questions, we will use the information you give us only for the purpose of research. In any of the published findings of these interviews, none of your personal information would be shared.

1. Do you agree to be interviewed?

- a) Yes
- b) No

**Part – C: Household Information and assets**

1. How many members are there in the household?  
\_\_\_\_\_
2. How many members are above the age of 5?  
\_\_\_\_\_
3. No. of female children in the household under the age of 5?  
\_\_\_\_\_
4. No. of male children in the household under the age of 5?  
\_\_\_\_\_
5. *Ask about all household members (above age 5)  
ID 1 should be SfurtiBen herself*

Person Code (1)	Name (2)	Rel. to Sfurti Ben (3)	Sex (4)	Age (years) (5)	Education (years) (6)	Non-agricultural occupation <sup>5</sup> (7)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

6. Is the occupation filled above your primary employment?
  - a. Yes
  - b. No

<sup>5</sup> 1- Panchayat; 2- Dairy; 3 - ASHA/Medical worker; 4 - School; 5 - Other government; 6 – Private sector job

7 - Other (Specify); 9 - None

7. What activities do you perform in the household other than the non-agricultural occupation?
  - a. Agricultural activities
  - b. Tending to cattle
  - c. Food preparation
  - d. Child care
  
8. What religion do you follow?
  - a. Hindu
  - b. Muslim
  - c. Christian
  - d. Sikh
  - e. Other (Specify)
  
9. What caste do you belong to?
  - a. ST
  - b. SC
  - c. OBC
  - d. General
  
10. What is your sub-caste?
  - a. Gamit
  - b. Choudhary
  - c. Kotwadia
  - d. Bhil
  - e. Other (specify)
  
11. Which amongst the following livelihood activities, does this household best identifies itself with?
  - a. Owns and operates land
  - b. Owns, operates, and rents out land
  - c. Operates land but does not own any
  - d. Agricultural labourers
  - e. Non-farm business
  - f. Salaried/waged
  - g. Casual labour
  - h. Other (specify)

12. How much total land do you own?  
\_\_\_\_\_ acres

13. How much of this land is irrigated?  
\_\_\_\_\_ acres

14. Answer about the ownership of the following household assets

	Asset	No. held
1	Electricity (Yes = 1, No=0)	
2	Piped Water (Yes=1, No=0)	
3	Toilet (Yes=1, No=0)	
4	Mobile Phone	
5	Motorized two-wheeler	
6	Motorized four-wheeler	
7	Television	
8	Refrigerator	
9	Tractor	

15. Answer about the ownership of the following livestock

	Asset	No. held
1	Calves	
2	Cow	
3	Bull	
4	Buffalo	
5	Goat	
6	Chicken	

**Part – D: Sfurti outreach**

1. How many Hamlets do you serve? \_\_\_\_\_

2. Name them  
\_\_\_\_\_

3. No. of households covered? \_\_\_\_\_

4. Approximately how many minutes do you converse with a household in a single visit? \_\_\_\_\_

5. How often do you visit a household that has previously bought Sfurti?  
\_\_\_\_\_

6. How often do you visit a household that has never bought Sfurti?  
\_\_\_\_\_
7. Does someone in your household accompany you or assist you in sales or awareness of Sfurti?
- Yes
  - No
8. If yes, list person ID from before  
\_\_\_\_\_
9. Approximately, how many hours do you spend a month in household visits?  
\_\_\_\_\_
10. Which activity takes bulk of your time?
- Household visits
  - Data Entry
  - Accounting
  - Sfurti meetings
  - Other \_\_\_\_\_
11. What reasons do people not buying usually give?
- It would harm health
  - It would alter the food made
  - Don't feel the need to
  - It is too costly
  - Someone in the family objects to it
  - Don't trust '*Sfurti Ben*'
12. Do households approach you to buy Sfurti?
- Yes, most of them (75% or above)
  - Yes, quite a few (50% or above)
  - Yes, some of them (25% or above)
  - Yes, but very few (fewer than 25%)
  - Hardly (Almost 0%)
13. If the village now has miller channel, do you think the previous system of you selling door to door was better?
- Yes
  - No
  - N/A

14. Do you feel your workload has reduced significantly after the miller system was introduced?

- a. Yes
- b. No
- c. N/A

15. If the village still has SfurtiBen selling door to door, do you think in your village, like some other villages, sales should be made through the miller?

- a. Yes
- b. No
- c. N/A

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