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Movies, Margins, and Marketing
Encouraging the Adoption of Iron-Fortified Salt

Abhijit Banerjee, Sharon Barnhardt, and Esther Duflo

9.1 Introduction

Anemia is estimated to affect 1.6 billion people worldwide (de Benoist et al. 2008). Iron deficiency is one of the leading causes of anemia, along with other nutritional deficiencies, illness and disease (diarrhea and malaria), and infections (parasites) (Viteri 1998). Anemia is associated with slower physical and cognitive development (Lozoff 2007), with potentially long-lasting effects (Lozoff et al. 2006). For working-age adults, productivity may be lowered by anemia, as feeling weak is the most common symptom of the disorder (Haas and Brownlie 2001). Severe anemia during pregnancy can lead to low birth weight and child mortality (Stoltzfus 2001). High rates

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of anemia are observed broadly among older adults, among whom lower hemoglobin levels are associated with cognitive decline (Peters et al. 2008) and lower physical performance (Penninx et al. 2004).

Fortified foods are a potential solution for widespread iron-deficiency anemia (IDA).[1] Model-based estimates suggest that, compared to iron supplementation, iron fortification is less expensive and would be more cost effective at a large scale for reducing maternal and neonatal mortality (Baltussen, Knai, and Sharan 2004). For iron fortification to be effective, the fortified food must be something households routinely consume. Grains like wheat were seen as promising in north India, but only for the relatively richer households who buy flour. For poorer households who consume their own grains, fortification at small mills requires behavioral changes by households, which are unsustainable (Banerjee, Duflo, and Glennerster 2011).

Salt seems to be an ideal product to fortify: it is ubiquitous, cheap, and generally purchased from stores. Consumers have brand loyalty and prefer white, branded salt over the grayish traditional rock salt. Adding iron to branded salts thus seems to be a promising way to increase iron intake and reduce IDA if marketing campaigns can convince consumers to make the switch. Despite its promise, double-fortified salt (DFS) was not commercially available until recently, due to technical difficulties in ensuring the stability of both the iron and the iodine. In the middle of the first decade of the twenty-first century, India's National Institute of Nutrition (NIN, Hyderabad) developed DFS fortified with iron and iodine. Double-fortified salt is estimated to provide about 30 percent of the recommended daily allowance (RDA) of iron (National Institute of Nutrition [India] 2005) when consuming 10g salt per day regularly (fortified at 1mg iron/g salt) (Ranganathan and Sesikeran 2008). The NIN scientists first demonstrated the long-term safety of DFS in animal studies (Nair, Sesikeran, et al. 1998). They also established the stability and bioavailability of iron in DFS and the acceptability and effectiveness of DFS in school children and small-scale trials with tribal populations (Nair, Brahmam, et al. 1998; Brahmam et al. 2000; Sivakumar et al. 2001).

In the last five years, NIN and the Indian government have sought to encourage wider adoption of DFS. Since 2011, the NIN formulation of DFS can be manufactured by private companies through a license agreement requiring a certain percentage of production to be donated to charities such as school meal programs. In 2012, India's Department of Women and Child Welfare directed states to use DFS in the national midday meal

1. Bhutta, Salam, and Das (2013, 10) describe the full list of nutritional interventions aimed at women and children as "education, dietary modification, food provision, agricultural interventions, supplementation and fortification . . . alone and in combination, provision of financial incentives . . . home gardening and community-based nutrition education and mobilization programs."

scheme (school lunches) and the Integrated Child Development Scheme (Mudur 2013). Several manufacturers produce and market DFS, including Tata Chemicals Limited. Tata is one of the leading manufacturers of salt in India, and we used their DFS, branded as "Tata Salt Plus" for our study. The maximum retail price of Tata Salt Plus is twenty rupees (₹20) per kg, making it a relatively low-cost iron source, but around twice the price of regular iodized salt.[2]

Surprisingly, the nationwide scale-up of DFS in school meals and the approval for retail sales happened despite the lack of large-scale efficacy trials of DFS: we only have a few efficacy studies, all among women and children in carefully monitored environments (Mudur 2013).

This chapter is part of a larger project to fill this gap and assess the potential impact of a nationwide subsidy on double-fortified salt. There are three overarching questions to answer: (a) what would be the demand for DFS, even if it were subsidized, and at what price would demand be sustained over time? (b) could that demand be increased through marketing approaches? and (c) what is the population-wide impact of DFS?

We examined the first question in a previous paper (Banerjee, Barnhardt, and Duflo 2014) with a small-scale, individual-level, randomized pricing experiment to determine the demand curve for DFS. We found that demand falls sharply at a price of ₹10 per kilogram, the price of the cheapest alternative branded salt. Just under a third of the households seem willing to try it just below that price. To answer question (c) we set up two experiments. First, a free distribution experiment that will help us determine the causal impact of DFS consumption and, more broadly, whether demand multiplied by impact would be sufficient to make a difference in population health, cognitive and physical capacities, and productivity. Second, we designed a large-scale impact evaluation where all shopkeepers in 200 villages (randomly chosen out of 400) were given the opportunity to stock Tata Salt Plus at a special research MRP of ₹9, and we measured health and productivity outcomes at baseline and approximately three years after the introduction of the product.

This chapter focuses on question (b). We analyze a set of experiments conducted in the 200 villages where Tata Salt Plus was made available in order to understand whether different forms of social marketing can boost demand for double-fortified salt. Within these villages, we conducted the following experiments: First, we commissioned a high-production value twenty-six-minute edutainment movie and screened it during an intermission midway through a free showing of a very popular film. Modeled on a sitcom and starring prominent actors from local language cinema, the movie was widely seen and was entertaining as well as informative. This is in keeping with the effort of companies like MTV to convey health messages

2. Tata Salt, which is the highest-quality iodized salt available, normally sells for ₹15 per kg.

through entertaining TV shows, but contrasts with the more dour style of the traditional public health documentary. Second, we sought to incentivize shopkeepers by randomly providing either one or all of them in a given village with higher margins to sell the product (Ashraf, Bandiera, and Jack 2012). In a lighter touch experiment, we also hand delivered flyers in some villages to sample households: the idea was to make sure that households in the sample knew of the existence of the product. Finally, we distributed DFS to some households at no charge in order to measure the impact on actual consumption and downstream biological and economic impacts of having the salt at home for free. In this chapter, we use the results of free distribution on take-up as a benchmark for the effect of the other interventions.

9.2 Context and Data

9.2.1 Anemia in Bihar

Bihar is a large and poor state in north India, with nearly one-third of its 103 million residents living under the poverty line as of 2012 (Planning Commission 2013). According to the National Family Health Survey, 67 percent of adult women, 34 percent of adult men, and 78 percent of children under the age of three years suffered from some form of anemia in 2005–2006 (International Institute for Population Sciences [IIPS] and Macro International 2008). Wendt et al. (2015) found that only 37 percent of pregnant women in Bihar received the recommended iron supplement in 2007–2008 and only 24 percent of them consumed the supplement for ninety days. We worked across all fourteen administrative blocks of Bhojpur District (which has a population of 2.7 million). In the State Health Society's December 2015 ranking of districts in terms of medical service provision, Bhojpur came in at number twenty-six out of thirty-eight (State Health Society Bihar 2015). For the study, we randomly selected twenty-eight or twenty-nine villages in each block to get a total of 400 villages. Our "main" experiment is the marketing of double-fortified salt to shopkeepers in randomly assigned treatment villages compared to the remaining main control villages where DFS is not offered. We randomly assigned 50 percent of the villages in each block to the sales treatment and 50 percent to be control, ending up with 200 of each for the main experiment.

Our data come from detailed household surveys at baseline and endline. The timing of endline data collection was approximately two years after DFS was introduced.[3] Purchase data come from a household salt-purchase module, answered by the household head (male or female) who had the most knowledge about household purchases and assets. The baseline also includes modules on household composition, consumption and expenditure, use of

3. See appendix for a time line of all activities.

health services, time use, cognition, and physical health. Baseline data is described in some detail in Banerjee, Barnhardt, and Duflo (2014).

9.2.2 Baseline Data and Attrition

Table 9.1 shows some baseline descriptive statistics of the sample[4] and balance checks across treatment conditions. The households in the sample are poor but not exceptionally so by Indian standards. In the control group, 14.8 percent of individuals were anemic at baseline. The average household size is eight persons. Eighteen percent of the households have elderly members, an important target group for this study. Overall, the randomization seems to have produced very balanced experimental groups. The households that receive the free DFS intervention are somewhat less likely to have older members and an educated head.

Table 9.2 shows that 8 percent of households were lost to attrition in the 200 treatment villages, and there are no differences across samples. This chapter will focus on household-level variable "purchase," and here the attrition level is fairly low; therefore, we opted not to correct for attrition with bounds or other methods. At the individual level attrition is higher—in total, 20 percent of individuals surveyed at baseline were lost to follow-up. Table 9.3 shows that attritors were more likely to be men, less likely to be children, and less likely to be anemic. Most characteristics of the attritors are balanced across groups, with one exception: attritors tend to be poorer in the "basic" experiment villages (those receiving the 50 percent discount alone) and in the store-incentives villages but not in the movie or flyer experiment villages (column [7]).

9.3 Experiments and Assignments

In each main treatment village, a team of vendors approached every shop in the village, including both private *kirana* (grocery) stores and public distribution system (PDS or "fair price") shops. The team pitched the product, took orders, delivered salt to the shops, and accepted payment from the shopkeepers. Shops were then instructed to sell DFS at the special research price of ₹9 per kg, discounted from the retail price of ₹20 per kg. The price was prominently displayed on the packet.[5] The first time the village was visited for stocking, a marketing team from Tata Chemicals launched the product. To highlight the importance of a diet sufficiently rich in iron, team members played games that required endurance with children in the village, gave away T-shirts and hats to the winners, and explained the key benefits of consuming DFS. After approaching all shops in all 200 villages this way, a

4. Banerjee, Barnhardt, and Duflo (2014) has a much more detailed description of the baseline sample.

5. At this price level, Banerjee, Barnhardt, and Duflo (2014) established an initial take-up of approximately 30 percent in Behea Block of Bhojpur District.

Table 9.1 **Balance checks, baseline characteristics**

	Female (1)	Age (2)	Elderly (3)	Anemic (4)	Severely anemic (5)	HB concentration (6)	Consump. per capita in the past thirty days (in thous. of INR) (7)	HH head completed class 5 or above (8)	Number of HH Members (9)	HH includes only immediate family members (10)
Movie experiment	0.005	–0.425	–0.004	0.006	–0.001	–0.102**	0.021	0.048**	–0.186	0.010
	[0.006]	[0.335]	[0.006]	[0.007]	[0.002]	[0.050]	[0.077]	[0.023]	[0.298]	[0.016]
Flyer promotion experiment	–0.003	–0.595	–0.010	0.000	–0.001	0.068	–0.040	–0.033	0.377	–0.013
	[0.007]	[0.422]	[0.007]	[0.008]	[0.002]	[0.057]	[0.088]	[0.026]	[0.310]	[0.019]
Store incentive: All kiranas	0.004	0.328	0.004	–0.020**	–0.001	0.050	–0.066	–0.027	–0.229	0.011
	[0.008]	[0.418]	[0.007]	[0.009]	[0.002]	[0.063]	[0.099]	[0.028]	[0.363]	[0.019]
Store incentive: 1 kirana	0.003	0.093	0.004	0.001	0.002	–0.038	–0.090	0.017	–0.174	0.036*
	[0.008]	[0.423]	[0.008]	[0.009]	[0.002]	[0.063]	[0.097]	[0.029]	[0.408]	[0.020]
Free DFS households	–0.011	–1.439***	–0.024**	0.007	0.004*	–0.107	0.145	–0.078**	–0.120	0.017
	[0.009]	[0.542]	[0.010]	[0.011]	[0.002]	[0.065]	[0.131]	[0.040]	[0.558]	[0.026]
Basic treatment mean within treatment group	0.513	26.205	0.166	0.128	0.009	12.302	2.236	0.563	8.726	0.224
Main control group mean	0.515	26.522	0.182	0.148	0.008	12.196	2.074	0.574	8.429	0.231
Observations	19,998	19,998	19,998	17,342	17,342	17,342	19,852	18,677	19,997	19,976

Note: The sample excludes the control group for the main treatment. Regression includes block-level fixed effects. Regressors not reported include a dummy for free DFS villages and a dummy for non-store-incentive households within the main treatment villages. Standard errors are clustered at the village level for individual characteristics and at the household level for household characteristics. Intermediate family members include household head, wife/husband of household, and children of household head. The variable for consumption is measured in rupees. Standard errors in brackets.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 9.2 Individual-level and household-level attrition by experiment type

	Respondent lost to attrition since BL (1)	HH lost to attrition since BL (2)
Movie experiment	–0.009	0.004
	[0.012]	[0.010]
Flyer promotion experiment	0.013	–0.007
	[0.013]	[0.012]
Store incentive: All kiranas	0.020	0.013
	[0.013]	[0.013]
Store incentive: 1 kirana	0.023	0.005
	[0.015]	[0.014]
Free DFS households	–0.032**	–0.015
	[0.016]	[0.011]
Basic treatment mean within treatment group	0.206	0.081
Main control group mean	0.193	0.064
Observations	20,315	3,002

Note: The sample excludes the control group for the main treatment. Regression includes block-level fixed effects. Regressors not reported include a dummy for free DFS villages and a dummy for non-store-incentive households within the main treatment villages. Standard errors are clustered at the village level for individual characteristics and at the household level for household characteristics. Standard errors in brackets.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

new round of stocking began. In all, we completed twelve rounds of stocking between August 2012 and May 2015. Tata stocked 446,732 kilograms of DFS, 160,958 in the PDS shops and 285,774 in private *kiranas*.

Within each village, we randomly selected fifteen households from the District Rural Development Authority household listing to form the measurement sample. All of the experiments reported in this chapter took place within the 200 main experiment villages and measured the impact on the nearly 3,000 measurement households living in them.[6]

Our earlier work in the district (Banerjee, Barnhardt, and Duflo 2014) suggested shopkeepers may have an important influence on which salt consumers choose. Our field team observed several shoppers ask for a package of salt and shopkeepers give a package without asking which brand or type the consumer wanted. This is confirmed in the reasons given to buy salt in the data we collected for this study: in the main experiment group with

6. In sixty-two randomly selected main treatment villages, we randomly assigned seven households to receive free DFS from May 2013 until the end-line survey back checking was completed. This was to measure the impact on health (not take-up, which is the focus of this chapter). We therefore control for both free DFS village and free DFS household in all of our regressions.

Table 9.3 Characteristics of those lost to attrition since baseline

	Female (1)	Age (2)	Elderly (3)	Anemic (4)	Severely anemic (5)	HB concentration (6)	Consump. per capita in the past thirty days (in thous. of INR) (7)	HH head completed class 5 or above (8)	Number of HH members (9)	HH includes only immediate family members (10)
Resp. lost to attrition since BL	–0.037***	0.928**	–0.005	–0.037***	0.005**	0.022	–0.054	–0.007	–0.330	–0.010
	[0.009]	[0.456]	[0.008]	[0.008]	[0.002]	[0.050]	[0.052]	[0.016]	[0.211]	[0.012]
Characteristics of those lost to attrition by experiment type										
Movie experiment * respondent lost to attrition since BL	0.035*	2.457**	0.033**	–0.043***	0.010*	–0.071	0.234**	0.042	–0.735*	0.027
	[0.020]	[0.949]	[0.016]	[0.016]	[0.005]	[0.102]	[0.116]	[0.034]	[0.439]	[0.027]
Flyer promotion experiment * respondent lost to attrition since BL	–0.014	–2.172*	–0.044**	0.021	0.003	0.057	0.317***	0.034	0.550	–0.032
	[0.022]	[1.115]	[0.018]	[0.016]	[0.006]	[0.109]	[0.106]	[0.039]	[0.436]	[0.031]
Store incentive: All Kiranas * respondent lost to attrition since BL	0.060***	–0.608	–0.006	–0.028	0.007	–0.091	–0.090	–0.004	0.346	0.001
	[0.021]	[1.133]	[0.020]	[0.020]	[0.006]	[0.118]	[0.135]	[0.040]	[0.510]	[0.030]
Store incentive: 1 Kirana * respondent lost to attrition since BL	–0.008	0.301	–0.002	–0.040*	0.011**	0.002	–0.003	–0.024	0.694	–0.024
	[0.023]	[1.131]	[0.019]	[0.022]	[0.006]	[0.127]	[0.134]	[0.041]	[0.523]	[0.030]
Free DFS households * respondent lost to attrition since BL	–0.027	1.813	0.022	–0.001	–0.002	–0.130	–0.072	–0.013	–0.855*	0.020
	[0.032]	[1.659]	[0.030]	[0.030]	[0.007]	[0.177]	[0.169]	[0.054]	[0.505]	[0.040]
Resp. lost to attrition since BL	–0.039	1.509	0.020	–0.012	–0.006	0.017	–0.267**	–0.054	–0.783	0.015
	[0.024]	[1.225]	[0.020]	[0.021]	[0.005]	[0.135]	[0.127]	[0.048]	[0.588]	[0.037]
Basic treatment mean within treatment group	0.513	26.205	0.166	0.128	0.009	12.302	2.236	0.563	8.726	0.224
Main control group mean	0.515	26.522	0.182	0.148	0.008	12.196	2.074	0.574	8.429	0.231
Observations	19,993	19,993	19,993	17,338	17,338	17,338	19,847	18,674	19,992	19,971

Note: The sample excludes the control group for the main treatment. Regression includes block-level fixed effects. Regressors not reported include dummies for all the treatment groups (without the interactions), as well as a dummy for free DFS villages and a dummy for non-store-incentive households within the main treatment villages. Also not reported is the interaction between currently or previously use DFS and non-store-incentive HHs, as well as the interaction between currently or previously use DFS and free DFS villages. Standard errors are clustered at the village level for individual characteristics and at the household level for household characteristics. The variable for consumption is measured in rupees. Standard errors in brackets.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

no other intervention, 41 percent of households who bought DFS did so because it was what the shopkeeper gave them, and 8 percent because it was what he recommended. The shopkeeper's incentive to choose DFS over other brands or to exert more effort marketing DFS may be important in the adoption of DFS. On the other hand, previous research (Ashraf, Bandiera, and Jack 2012) raises the possibility that for a low-demand product that represents only a small part of the retail business, financial incentives may have no impact. In that study, financial incentives for selling female condoms were given to hairdressers. The setting here is different, however, because the product is less exotic and may be easier to convince households to try. In particular, households do regularly buy salt and the shopkeeper just needs to get them to buy this particular type. In contrast, in Ashraf, Bandiera, and Jack (2012), the average control group hairdressers only sold seven packs of two condoms over the course of a year.

Since the impact of retailer incentives is an empirical question, we conducted an experiment to determine the impact of increasing the private shopkeeper's margin on household adoption. This experiment happened during the fifth round of stocking (August–December 2013) in the 189 main treatment villages that had at least two *kiranas*. Shopkeepers selected for the treatment group got an additional discount of ₹3 per kg on the wholesale price of DFS, without any requirement to decrease the price charged to the final consumer. It was then the shopkeeper's choice to reduce the price, increase marketing, or do something else. We randomized these villages into three equal groups, those in which one shop gets the discount, all shops get the discount, and no shop gets the discount (control). This design was chosen to enable the study of how shopkeeper behavior (including price charged to customer and other marketing habits) depends on competition. Kumar, Rajiv, and Jeuland (2001) suggest that the pass-through may be limited when consumers lack information, and only a few retailers are offered the promotion. In the sixty-three villages where only one shop was given the discount, we randomly selected it from all shops in the village.

Notwithstanding the influence of shopkeepers, households are the eventual decision makers. An important challenge for the launch of a new product is making sure households know about it. Tata's launch in the villages addressed this need systematically across all sales villages. However, many of the villagers probably missed the launch event, and others may not have been persuaded by it: as discussed in Banerjee, Barnhardt, and Duflo (2014), our pilot experiment showed that various versions of the "standard" marketing package performed by Tata did not seem to increase the adoption rate. To address this issue, we commissioned the production of a twenty-six-minute movie about the health benefits of adequate iron consumption and the availability of iron in DFS. The film was meant to be entertaining, modeled on sitcoms and starring Bhojpuri actors (Bhojpuri is the local dialect of Hindi and has its own cinema industry). It tells the story of Bhim and his pregnant

wife. Bhim is physically small and not very strong and wants to ensure that his son (he assumes he will have a son) will grow to be a strong man. A village nurse convinces his wife of the importance of taking iron for anemia as a way of making sure that the child is healthy and strong, and after initial misgivings Bhim is convinced as well.

Earlier research has shown that edutainment movies can be effective, but there are few randomized trials on the subject. Using a difference-in-difference strategy based on the gradual introduction of cable television, Jensen and Oster (2009) and La Ferrara, Chong, and Duryea (2012) show sizable effects of television on behavior. In India, the introduction of cable television is associated with improvements in women's status, including increases in reported autonomy and female school enrollment, and decreases in the acceptability of beating. In the case of Brazil, exposure to *Rede Globo* soaps featuring very small families was found to decrease fertility by an amount equivalent to the mother having two extra years of education.

Some studies focus, like us, on soap operas explicitly produced with education in mind. Rogers et al. (1999) and Rogers and Vaughan (2000) found that the radio soap opera *Twende Na Wakati* in Tanzania had strong behavioral effects on family planning. Exposure was nonrandom, however, and the survey just compared exposed to unexposed households. Using mixed methods and before-after designs, Usdin et al. (2005) and Solórzano et al. (2008) find encouraging effects on risky sexual behavior and gender-based violence indicators of two popular campaigns, *Soul City* in South Africa and *Puntos de Encuentro* in Nicaragua. Paluck and Green (2009) and Gunhild and Zia (2013), both randomized evaluations of soap operas, find positive impacts on conflict resolution and intergroup tolerance in Rwanda and on financial literacy outcomes in South Africa, respectively. Finally, Kearney and Levine (2014) estimate that the MTV reality series *16 and Pregnant* led to a 5.7 percent reduction in teen births across the United States, which is about one-third of the overall decline in the period they studied.

To maximize viewership, we showed the movie as an intermission between two halves of the classic film *Nadiya Ke Par*. We showed the film and our movie twice in each movie treatment village between October and December 2013. One screening was outdoors in the evening and intended for the entire village. The second showing was intended for women and kids, and we scheduled it the next day inside a school, day care, medical office, or somewhere else women would feel comfortable. To estimate movie viewership, we sent observers to twenty-five randomly selected villages to count the number of men and women present. We estimate that a total of slightly over 50,000 people saw the movie in total (about three-quarters of those in the general screening sessions, and one-quarter in the sessions for women and children), which we estimate was about 15 percent of everyone in the village (including children). We conservatively estimate (based on some auxiliary assumptions) that this means at least one adult male saw the movie in

20 percent of households and at least one adult female saw it in 9.3 percent of households.

We conducted the movie experiment in both main treatment and main control villages so that we could separately study the impact of the film's DFS promotion on adoption of the product where it was available in stores and the impact of the anemia-prevention information in villages where DFS was *not* sold. The movie experiment was stratified by block, village status in the main experiment, as well as by the free DFS experiment we simultaneously conducted. In total, we randomly assigned sixty-four out of the 200 main treatment villages to receive the movie screenings. This chapter focuses on the take-up of the fortified salt, so we focus on the part of the movie experiment that happened in the main treatment villages (since the salt was not available in the control villages).

To serve as a benchmark for those interventions, we also conducted a much lighter touch information experiment. We designed a flyer that simply informed a household about DFS and where it could be bought locally. We then delivered the flyer directly to our sample households in October and November 2013. The advantage of direct marketing is that the flyer has a greater chance of reaching those women who do not go outside the home very much, but who may have different preferences for investing in health or over brands of salt. Another reason for distributing the flyer was that, in the original marketing experiment, the reduction in prices was announced through vouchers distributed at home. The flyers would allow us to say something about the part of the impact of the vouchers that came from raised product awareness, rather than the price cut. The flyer experiment was stratified by the retail incentive, movie, and free DFS experimental status. In all, we assigned 150 villages (in the main treatment group) to receive flyers. All fifteen measured (sample) households were supposed to get the flyers.

Finally, in sixty-two villages, seven of the fifteen study households were provided with free double-fortified salt. The prime objective was to serve as a large-scale trial of the impact of double-fortified salt on health outcomes in a field setting, but this also provides a useful benchmark for the impact of the marketing experiment. The willingness to use the salt when received for free should be an upper bound for any potential impact of a marketing intervention.

9.4 Results

We estimate the impact of the marketing treatments using the main treatment sample of 200 villages. Given the multiple randomizations occurring across the same set of villages, we estimate all results in a single specification as follows:

$$(1) \qquad \begin{aligned} \mathrm{USE}_{hv} = {} & \alpha + \beta_1 * \mathrm{Movie}_v + \beta_2 * \mathrm{Flyer}_v + \beta_3 * \mathrm{AllStores}_v \\ & + \beta_4 * \mathrm{OneStore}_v + \beta_5 \mathrm{Free}_h + X\gamma + e_{hv} \end{aligned}$$

where X represents the controls: village randomized into free DFS treatment group, village not in retail incentive experiment (has < 2 *kiranas*), and fixed effects at the block level. Thus, each treatment coefficient can be interpreted as the impact of this particular modification compared to a situation where this modification is not present. We work with several versions of the USE variable: currently use, ever used, current and past use, number of times purchased (or received) DFS in the last year.

Results are presented in table 9.4. Without any additional intervention, just under 10 percent of households are currently using DFS (about two to three years after introduction of the product in their villages), and 20 percent have ever tried it. When DFS is distributed for free 54.6 percent of households do use it (9.8 percent + 44.8 percent), which probably represents an upper bound of what any kind of marketing could achieve. The difference between DFS and other preventive health products such as bed nets (see Dupas 2009) is that, even at zero price, not everybody is willing to use the product. While essentially all households accepted delivery of the salt, about half of them did something else with it. Anecdotal evidence suggests that they either gave it away, resold it, or fed it to cows.

Against this backdrop, the movie experiment has a large impact: it increases current take-up at end line, which took place between seven and sixteen months after the movie was shown, by 5.5 percentage points (57 percent) and "ever used" by 11.5 percentage points (22 percent). This is a much longer-term impact of a single exposure than what is typically evaluated. In most studies, the impact is measured while the movie is still being shown. We calculate that someone has seen the movie in 20 percent of households on average, so the impact per viewer is large. Of course, it could be that viewers share the information with others, so there is no implied instrumental variable estimate here. But it suggests that the movie was effective in convincing people to adopt double-fortified salt, and to stick with it over several rounds of purchases. The effect appears to be similar for households who receive free DFS and those who do not (the interaction of DFS and Movie is noisy, positive for current use, and negative for past use), and for those who are in the shopkeeper experiment and those who are not. It suggests that the movie shifted up the demand for DFS, regardless of the price point: it basically changed the "willingness to accept" the product rather than the willingness to pay.

In contrast with the results of Ashraf, Bandiera, and Jack (2012), increasing the retailer margin also leads to an increase in sustained adoption of double-fortified salt: the point estimate for "currently using DFS" is 5.5 percentage points, almost exactly identical to the impact of the movie. Interestingly, this is only true when all the retailers were offered the incentives. The point estimate impact of the one-shop treatment is either zero or negative.

Contrary to the movie—which led both to an increase in one-time purchases (trying out the product) and persistence—the store incentive has a

Table 9.4 Take-up results

	Currently using DFS (1)	Currently or previously used DFS (2)	Currently and previously used DFS (3)	Times in past year HH purchased DFS (4)	Currently using DFS (5)	Currently or previously used DFS (6)	Currently using DFS (7)	Currently or previously used DFS (8)
Movie experiment	0.056**	0.115***	0.085***	1.026*	0.052**	0.121***	0.042	0.127***
	[0.023]	[0.030]	[0.025]	[0.544]	[0.025]	[0.035]	[0.027]	[0.041]
Flyer promotion experiment	–0.002	–0.018	0.021	–0.284	–0.002	–0.019	–0.002	–0.018
	[0.023]	[0.034]	[0.026]	[0.546]	[0.024]	[0.034]	[0.024]	[0.034]
Store incentive: All kiranas	0.055*	0.023	0.035	0.235	0.055*	0.022	0.043	0.028
	[0.029]	[0.036]	[0.029]	[0.606]	[0.029]	[0.036]	[0.032]	[0.040]
Store incentive: 1 kirana	0.000	–0.044	–0.028	–0.954	0.000	–0.044	–0.002	–0.043
	[0.028]	[0.036]	[0.032]	[0.631]	[0.027]	[0.036]	[0.028]	[0.037]
Free DFS household	0.448***	0.517***	0.347***	2.862***	0.441***	0.529***	0.442***	0.528***
	[0.038]	[0.044]	[0.038]	[0.515]	[0.048]	[0.051]	[0.048]	[0.051]
Movie experiment * free DFS HH					0.020	–0.033	0.018	–0.032
					[0.066]	[0.066]	[0.066]	[0.066]
Movie experiment * store incentive: All kiranas							0.035	–0.016
							[0.052]	[0.065]
Basic treatment mean within treatment group	0.098	0.207	0.061	3.195	0.098	0.207	0.098	0.207
Observations	3,193	2,088	2,088	2,236	3,193	2,088	3,193	2,088

Note: The sample excludes the control group for the main treatment. Regression includes block-level fixed effects. Regressors not reported include a dummy for free DFS villages and a dummy for non-store-incentive households within the main treatment villages. Standard errors are clustered at the village level. Standard errors in brackets.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

larger marginal impact on the fraction of households who persist with using the salt: the point estimate is smaller and insignificant for "ever purchased."

These results contrast with those for the flyer distribution, which only notified households at home of where in their villages fortified salt was being sold. That treatment had absolutely no impact on purchases. This suggests that the movie treatment affected purchase because it truly changed the way households thought about the salt, as opposed to merely reminding them of its availability.

Our next set of results on who currently uses DFS is presented in table 9.5. In that table, we run the following specification:

$$\begin{aligned} CHAR_{hv} = \alpha &+ \beta_1 * Movie_v * USE_{hv} + \beta_2 * Flyer_v * USE_{hv} \\ &+ \beta_3 * AllStores_v * USE_{hv} + \beta_4 * OneStore_v * USE_{hv} \\ &+ \beta_5 Free_h * USE_{hv} + \beta_6 USE_{hv} + X\gamma + e_{hv}, \end{aligned}$$

where $CHAR_{hv}$ is a particular household characteristic, measured at baseline (e.g., number of household members), and the vector of control variable including main effects for each treatment group. Few characteristics of households who take up DFS are systematically different, compared to nonusers. The only differences are that they have slightly more female members and the head is more likely to be educated. It does not seem to be the case that households with greater incidence of anemia are more likely to switch to DFS. The different treatments do not alter the composition of buyers in any important way either, with one exception: the "all store incentives" experiment seems to lead poorer households to purchase DFS than in the conditions without treatment. We need to take this finding with some caution, given the number of characteristics in the table, but it seems to be the one robust result. Based on the social marketing literature, one hypothesis we had was that the film could have been particularly effective on the type of families depicted in the movie, in this case a small nuclear family expecting their first child. We find no evidence for that.

The next two tables shed light on the mechanisms behind the effects, and suggest that although the movie and the store incentives had comparable impacts on purchase, the underlying reasons were very different. The movie informed households and led them to demand more double-fortified salt; the store incentives led shopkeepers to try to force households to buy it.

In table 9.6 we provide more evidence from a survey that we conducted with our study households in each village on average forty-five days after the store incentive experiments started—which was many months before the end-line survey showing the results above. This earlier survey focused on salt adoption and purchase and was conducted in all the villages that were part of the store incentive experiments. In table 9.7, we show data that comes from a survey conducted with shopkeepers.

Column (1) of table 9.6 mostly confirms the findings of table 9.4, with one exception: it seems to suggest that even the flyer led to some adoption

Table 9.5 Household characteristics of current DFS users

	Total number of females in HH (1)	Average age of HH members (2)	Total number of elderly HH members (3)	Total number of anemic HH members (4)	Average HB conc. of HH members (5)	Consump. per capita in the past thirty days (in thous. of INR) (6)	HH head completed class 5 or above (7)	Female HH head completed class 5 or above (8)	Total number of HH members (9)	HH includes only immediate family members (10)
Movie experiment * currently use DFS	0.371	–0.787	0.072	–0.050	0.115	–0.315	–0.005	0.077	0.624	–0.035
	[0.347]	[1.006]	[0.104]	[0.157]	[0.096]	[0.199]	[0.052]	[0.047]	[0.598]	[0.042]
Flyer promotion experiment * currently use DFS	–0.578	0.954	–0.039	–0.047	0.079	–0.010	0.013	–0.006	–0.953	0.010
	[0.372]	[0.967]	[0.103]	[0.137]	[0.104]	[0.205]	[0.052]	[0.047]	[0.630]	[0.046]
Store incentive: All kiranas * currently use DFS	–0.532	–0.439	–0.154	–0.207	0.103	–0.206	–0.076	–0.050	–0.696	0.045
	[0.453]	[1.108]	[0.114]	[0.209]	[0.112]	[0.270]	[0.064]	[0.057]	[0.797]	[0.051]
Store incentive: 1 kirana * currently use DFS	–0.856*	1.071	–0.147	–0.227	0.111	–0.244	–0.045	–0.044	–1.052	0.030
	[0.437]	[1.272]	[0.136]	[0.223]	[0.123]	[0.278]	[0.065]	[0.058]	[0.770]	[0.061]
Free DFS household * currently use DFS	–0.232	0.869	0.008	0.365	–0.149	0.445	0.010	0.030	–0.187	0.001
	[0.487]	[1.678]	[0.153]	[0.227]	[0.168]	[0.318]	[0.076]	[0.073]	[0.891]	[0.077]
Currently using DFS	0.821*	–0.050	0.116	0.128	–0.041	0.253	0.134*	0.070	0.973	–0.037
	[0.465]	[1.378]	[0.144]	[0.222]	[0.139]	[0.280]	[0.075]	[0.062]	[0.832]	[0.063]
Basic treatment mean within treatment group	3.662	28.142	1.221	0.794	12.277	2.491	0.555	0.133	7.176	0.324
Main control group mean	3.667	28.673	1.263	0.923	12.228	2.266	0.545	0.216	7.104	0.314
Observations	3,193	3,193	3,193	3,152	3,152	3,174	2,990	2,841	3,193	3,192

Note: The sample excludes the control group for the main treatment. Regression includes block-level fixed effects. Regressors not reported include dummies for all the treatment groups (without the interactions), as well as a dummy for free DFS villages and a dummy for non-store incentive households within the main treatment villages. Also not reported is the interaction between currently or previously use DFS and non-store-incentive HHs, as well as the interaction between currently or previously use DFS and free DFS village. The variable female head of household is defined as either the wife of the head of the household or the head of the household. If there were multiple female heads for the household, then the highest education level out of all the female household heads was used. Standard errors are clustered at the village level. Standard errors in brackets. The variable for consumption is measured in rupees.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 9.6 **HH take-up results from store incentive experiment**

	Currently use DFS (1)	Selected DFS because contains iron or because it reduces anemia (2)	Selected DFS because contains iodine (3)	Selected DFS because of taste (4)	Selected DFS because of clean, white appearance (5)	Selected DFS because always buy the same thing (6)	Selected DFS because no other salt available (7)	Store owner gave or recommend DFS to respondent (8)	Amount paid for 1 packet of DFS (9)
Movie experiment	0.049**	0.086**	0.011	0.019	0.001	–0.074***	0.042	–0.093	–0.398**
	[0.024]	[0.039]	[0.033]	[0.043]	[0.036]	[0.028]	[0.057]	[0.061]	[0.182]
Flyer promotion experiment	0.039*	–0.045	–0.012	–0.003	–0.081	0.055*	0.068	–0.113	0.478***
	[0.023]	[0.044]	[0.046]	[0.055]	[0.051]	[0.032]	[0.069]	[0.070]	[0.182]
Store incentive: All kiranas	0.078***	–0.000	–0.085**	–0.013	0.040	–0.038	0.137**	–0.087	0.163
	[0.030]	[0.039]	[0.040]	[0.045]	[0.045]	[0.033]	[0.057]	[0.070]	[0.199]
Store incentive: 1 kirana	–0.031	0.057	0.023	0.022	–0.028	–0.011	0.117	–0.147*	0.078
	[0.022]	[0.055]	[0.055]	[0.060]	[0.060]	[0.043]	[0.072]	[0.076]	[0.160]
Basic treatment mean within treatment group	0.099	0.000	0.033	0.083	0.116	0.033	0.157	0.463	8.135
Observations	4,862	636	636	636	636	636	636	636	608

Note: The sample excludes the control group for the main treatment, free DFS households, and all households within the main treatment that were not part of the store incentive experiment. Columns (2)–(10) include only houses that were currently using DFS. Regression includes block-level fixed effects. A dummy for free DFS village was included in the regressions, but the coefficient is not reported. The amount paid for one packet of DFS is measured in rupees. Standard errors in brackets.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

of DFS (3.9 percentage points). This is perhaps because the survey was conducted shortly after the flyer distribution (fifty days on average, between one and eighty days depending on the village), and households were persuaded to buy DFS once, but then stopped.

The next few columns look at stated reasons for buying DFS. Interestingly, *no one* in the control group reports buying DFS because it prevents anemia. In contrast, in the movie group, 8.6 percent of the DFS buyers say that they buy it because it reduces anemia and the fraction of buyers who buy DFS because this is what they have always done, goes down. Thus, the movie succeeded in conveying its message.

Another sign that the movie changed households' information is that they report paying less for the DFS in the movie villages. There was a scene in the film where the price of ₹9 for the double-fortified salt was clearly shown. Looking at the distribution of reported prices (results not shown) we find that they are more likely to report paying ₹9 (the official price) and less likely to report ₹10. This is not confirmed by what the shopkeepers report in table 9.7, but it is plausible that generally people do not know exactly how much they pay for salt. Those who saw the movie know the price better.

On the other hand, in the incentive for "all *kiranas*" treatment, households who bought DFS are much more likely to report that this was the only salt available. This suggests that, rather than lowering the price (which does not change, see column [6] in table 9.6) or selling the virtues of DFS (households are no more likely to buy it because it reduces anemia, but they are less likely to buy it because it contains iodine), the primary marketing strategy of the shopkeeper was to push it on people by claiming he did not have anything else, even if he did. Note that this was not done by simply treating DFS as the default: the fraction of purchasers who buy DFS because it was what the shopkeeper handed them or what he recommended actually goes down in the store incentive treatments. Instead, the main margin of influence seems to be not giving customers a choice.

In table 9.7 (columns [8] and [9]) we see that although shopkeepers who received the incentives were more likely to carry and display DFS, and carried more of it, most of them also carry other iodized salt, as well as in some cases unbranded rock salt, and that these proportions are not affected by receiving the incentives.

The behavior of the other shopkeepers in villages where only one shopkeeper got the incentive is interesting. While the incentivized shop behaves exactly like the shops in villages where all shops got the incentive, shops that are not getting the incentive are more likely to carry other types of branded salt relative to the control group (where no one got incentives). This may be to attract consumers with variety. Recall that about half of the households that are given DFS for free still do not want to use it. If the incentivized shopkeeper is more likely to claim that DFS is all he has, some consumers who are really averse to it probably decide to go to another shop to buy a substitute. Shops that carry the alternative will thus increase their sales.

Table 9.7 **Store take-up results from store incentive experiment**

	Ever sold DFS (1)	DFS currently in stock (2)	Number of 1 kg DFS packets in stock (3)	Amount at which store sells 1 kg of DFS (4)	Amount paid for 1 kg of DFS (5)	Profit from 1 kg of DFS (6)	DFS displayed in store (7)	Sell other iodized salt (not including DFS) (8)	Sell unbranded rock salt (9)
Movie experiment	–0.009	–0.060*	1.456	0.039	0.175*	–0.141	–0.035	–0.024	0.011
	[0.031]	[0.033]	[3.207]	[0.050]	[0.099]	[0.107]	[0.031]	[0.022]	[0.034]
Flyer promotion experiment	–0.031	–0.003	3.192	0.002	0.125	–0.119	–0.006	0.019	0.008
	[0.033]	[0.039]	[2.984]	[0.041]	[0.117]	[0.119]	[0.039]	[0.024]	[0.034]
Store incentive: All kiranas	0.074**	0.190***	10.452***	–0.106**	–1.228***	1.129***	0.143***	0.001	–0.011
	[0.033]	[0.040]	[3.259]	[0.051]	[0.123]	[0.126]	[0.041]	[0.028]	[0.044]
Store incentive: 1 kirana	–0.022	–0.011	–0.662	–0.048	0.071	–0.101	–0.018	0.043*	–0.065*
	[0.032]	[0.037]	[2.524]	[0.043]	[0.069]	[0.081]	[0.042]	[0.024]	[0.039]
Store incentive: 1 kirana * store chosen for incentive	0.050	0.143**	4.296	–0.099	–1.219***	1.176***	0.217**	–0.047	0.093
	[0.070]	[0.073]	[3.639]	[0.080]	[0.341]	[0.357]	[0.096]	[0.053]	[0.078]
Basic treatment mean within treatment group	0.710	0.314	5.896	9.197	7.641	1.548	0.211	0.860	0.186
Observations	1,532	1,316	1,447	1,074	593	590	1,084	1,316	1,316

Note: The sample excludes the control group for the main treatment, free DFS households, and all households within the main treatment that were not part of the store incentive experiment. Regression includes block-level fixed effects. A dummy for free DFS villages was included in the regressions, but the coefficient is not reported. The amounts for columns (4)–(6) are measured in rupees. Standard errors in brackets.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

There may then be two reasons why the overall take-up of the salt does not change relative to the control group. First, the shopkeeper with incentives may stop trying to impose double-fortified salt, as a result of this kind of competitive pressure. Second, there may be a composition effect, with purchases of DFS going up in the store that gets the incentive and down in the stores that do not (over and above the sorting of the clients). The former explanation is not consistent with the data, since the probability of DFS purchasers saying that they got it because it was the only one available goes up even when only one store receives the incentive. Therefore, the latter explanation is likely: shopkeepers that did not receive the incentive may have helped spread rumors that the salt was not good for people's health in order to depress demand. Anecdotal reports suggest that this was indeed the case.

9.5 Conclusion

The promise of double-fortified salt to reduce anemia and increase productivity rests on two premises: that households will be willing to buy it and use it, even at a reduced price—or potentially for free—and that it is effective enough, at the levels of fortification that are stable and safe, to make a real difference.[7]

This chapter addresses the first question. Double-fortified salt is a new product, with some characteristics that would positively influence adoption (it is clean and white, sold in a fancy packet with a trusted brand name) and some handicaps (people are generally reluctant to try new foods, there were some instances of food blackening early on). Moreover, many people did not understand the links between salt and anemia or between anemia and well-being. Clearly, the basic marketing campaign conducted by the manufacturer at launch was completely ineffective at conveying why this salt should be purchased: two years after the introduction of the product, absent any additional information campaign, *no one* who buys DFS knows that it helps reduce anemia, or reports buying it because it is good for the health of household members.

Even when the salt is provided for free, only about half of households actually use it for cooking. When they have to buy it just below half price, with no other intervention, about 20 percent of households give it a try, but only 10 percent still use it after about three years.

Against this backdrop, this chapter shows the power of a strong communication campaign, in the form of an entertaining movie that was seen by about 20 percent of the households in the village, in changing households' perception about the product. Consumption of doubled-fortified salt increased by 5.5 percentage points, an increase of 50 percent over the mean

7. In settings like schools where children have no choice about what they eat, only the second question is pertinent.

for households who have to buy the salt, and more than 10 percent over the mean usage among those who get it for free. Eight percent of households who buy DFS at endline do report that they bought this salt because it helps fight anemia (although that leaves 92 percent who do so for other reasons), and they pay a lower price on average (as advertised in the movie).

The chapter also highlights how powerful shopkeepers are in influencing what households do. A small increase in (all) retailer margins resulted in an increase in take-up at least as large as that caused by the movie screening. There is some ambiguity on how this was achieved. The retailers claim that they dropped the final price of the salt (very little). Village households do not report such a decline and instead claim that they bought the salt because it was the only one available. More generally, over half of the buyers of DFS report that they just bought what the shopkeeper gave them. On the other hand, when only one shopkeeper was given an incentive, the others seem to have reacted by being more likely to sell other types of salt. There was no increase in the overall take-up of DFS. Future research should investigate the impact of providing discounts to consumers versus providing them to shopkeepers, and, more generally, examine their potential as agents of change.

Appendix

9A.1 Time line of activities

Start	End	Activity
May 2011	March 2012	Baseline survey
October 2011	November 2011	Pricing experiment
August 2012	May 2015	Main experiment: DFS sales
February 2013	October 2013	Monitoring survey
May 2013	May 2015	Free DFS experiment
August 2013	December 2013	Retailer incentive experiment
October 2013	February 2014	Store & household take-up surveys
October 2013	December 2013	Movie experiment
October 2013	November 2013	Flyer experiment
July 2014	February 2015	End line survey

Note: The pricing experiment was conducted in Behea block with separate villages.

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