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ABSTRACT

Informational Shocks and Street-Food Safety: A Field Study in Urban India*

The street food market is a major source of food in developing countries, but is often characterized by unsafe food conditions. We investigate whether improvements in food safety can be achieved by providing information to vendors in the form of a training. Among randomly assigned groups of street-food vendors in Kolkata, India, we find large improvements in knowledge and awareness, but little change in their observed behavior. We provide two main explanations for these findings. First, information acquisition by itself does not make it significantly easier for vendors to provide customers with safer food options. Second, although consumers in this market have a positive willingness to pay for food that is perceived as more hygienic, they struggle to distinguish between safe and contaminated food. We conclude that information to vendors is not the key constraint in this context, and that policies mitigating supply-side constraints as well as improving food safety awareness among consumers are likely to have more impact.

JEL Classification: O12, O17

Keywords: food safety, public health, street-food, hawkers, trainings, RCT, informal sector

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1 Introduction

The Food and Agricultural Organization (FAO) and the World Health Organization (WHO) regularly report that the consumption of unsafe street food affects the health status of millions of people all over the world ([WHO, 1996](#); [FAO/WHO, 2003](#); [WHO, 2006](#)). Since street food accounts for a significant proportion of the daily food consumption of 2.5 billion consumers ([FAO, 2007](#)), establishing a more reliable and safe food supply chain remains one of the major public health concerns of many governments ([Bhowmik, 2012](#)). Among the several factors that contribute to this status quo, street vending is an occupation that requires little start-up capital, and therefore draws a large section of the urban poor who lack awareness and adequate training in safe food handling methods ([NCEUS, 2007](#); [World Bank, 2013](#)). As a result, one of the key messages for governments and relevant stakeholders by the FAO and WHO is that food handlers' knowledge and awareness about food safety and hygiene is a necessary pillar for setting up national strategies to control food-related hazards, particularly in urban areas ([WHO, 2006](#); [FAO, 2009a,b](#)). Food safety training and certificates are common in developed countries, but less so in many developing countries. Moreover, among the range of interventions, they are possibly the cheapest, but evidence on whether and why they might work is still limited.

In this paper, we aim to fill this gap by designing a training aimed at improving vendors' awareness and reducing street-food safety hazards. The simple hypothesis underlying such an intervention is that information acquisition could enable vendors to offer to consumers a wider array of desirable products and services by removing the knowledge barrier. We verify that this is appropriate in our context by demonstrating both that vendors have low awareness and high perceived costs of providing hy

Our project was undertaken from March 2015 to July 2016, with the logistic support of Innoaid, a Denmark-based non-governmental organization (NGO).¹ We collected a sample of street-food vendors, spread out in different areas of the city, and grouped them into 74 blocks of roughly 10 vendors each.² We randomized vendors across three conditions: control, training and training with promotional material, allowing them to advertise to customers their participation in the program. The training consisted of 3 workshops and 3 follow-ups, organized over 10 consecutive weeks, and had two main objectives: first, to enhance vendors' awareness of health risks related to food vending, and second, to develop their capacity to make the necessary improvements in food safety practices.

At the beginning and at the end of the study, we collected data on vendors' socio-economic characteristics, business practices, as well as their awareness about food safety and hygiene. Additionally, we monitored vendors' actual behavior between the baseline and the endline surveys for a total of 6 data points on each vendor (once every 8 weeks). The direct monitoring of vendors' daily behavior at their kiosks allows us to have a more comprehensive and accurate evaluation of their practices without relying exclusively on self-reported information. Moreover, at each point of the data collection and training, the take-up rate was always above 70%. This also makes our study novel in terms of the degree of accuracy of the data collected on vendors.

Our design allows us to identify the effect of the program in a simple first-difference framework, comparing outcomes for vendors in treatment and control groups.³ The parameter we identify is the effect of increased awareness on vendors' behavior such that it is not confounded by the fear of punishment. This is because (i) the eligibility for the training was randomly allocated, (ii) the participation was voluntary, and (iii) there was no mandated penalty for non-compliance to food-safety practices. This would not be the case, for instance, if one were evaluating a government-designed food hygiene monitoring program. In this case

potential scope of self-regulation by the vendors.⁵ This is informative to a policy-maker, because it would make the case for the efficacy of such an intervention due to its low cost of implementation. Indeed, fines and sanctions may provide stronger incentives for vendors to comply with higher food-safety practices, but it would likely be a much more expensive intervention, especially in a weak and complex institutional environment.⁶

The first set of results is twofold. We find a substantial effect of the training on vendors' awareness, knowledge of food safety hazards, and self-reported safety behaviors. Overall, treated vendors' awareness improves by 7.1 percentage points relative to the control group. We also see a significant improvement in terms of self-reported actions that vendors claim to have engaged in, by about 10.8 percentage points.⁷ However, we fail to discern a significant impact of the training on actual food safety behavior as measured by the external monitors.

Given the complexity of the sector, there are several reasons that might explain why behavioral improvements in food safety are difficult to undertake. First, vendors may lack the necessary incentives to produce safer foods because, even if they changed their behavior, they know the improved quality would be difficult to observe in practice, and hence they would not be rewarded by the consumers. This would be the case if, for example, food safety improvements were not visible to customers, as in the case of some food storage and preservation processes. Since one treatment arm is given free tools to advertise participation in the program, we are able to test directly whether food safety improvements are prevented because vendors fear that they might go unnoticed by consumers. We do not find a significantly different impact for this group of vendors compared to the basic treatment.⁸

Second, the information acquired from the training might not actually have made it easier for the vendors to provide consumers with a wider array of hygienic products and services. This could be the case because, besides lacking awareness about food safety, vendors continue to be constrained by the lack of several other costly

disposal, electricity, etc. We validate this hypothesis by collecting direct information on individual perceived cost or difficulty of engaging in safer practices (pre and post intervention). Vendors have a high perceived cost at the baseline, and though the training modestly decreases it, the reduction is not significant. We elicit further information from vendors about the primary problems faced by them, which corroborates the idea that infrastructural, institutional or monetary problems are highly prevalent.⁹

Third, consumers in this sector may not have a sufficiently high demand for hygienic food. We investigate this hypothesis in a follow-up study, conducted between June and August 2019, on 1,480 customers of street food. This study allows us to speak to the factors that determine their consumption choices and to directly elicit their willingness to pay for alternative food options. We find that consumers' stated preferences indicate that they do in fact value safer food and have a positive willingness to pay for it. However, almost 70% of the sample reports that they find it impossible or extremely difficult to detect whether food is contaminated. Moreover, consumers also take into consideration several other attributes, such as taste, price, and location of street food, while making their purchase decisions. For instance, as many as 63% of consumers regard something other than hygiene as the key determinant of their decision. Additionally, compared to their preferences for safer food, they are less willing to pay when vendors simply display a signal of external endorsement (unaccompanied by an actual improvement in their practices). Not surprisingly, our data on vendors shows that they do not exhibit increases in their revenue and profits, given the lack of actual enhancements in their food safety standards. The identical picture that emerges from our vendor and consumer samples lend further credence to our results.

All in all, our findings imply that a training is not sufficient to foster substantial changes in food-safety, suggesting that, information alone to vendors, is not the key constraint in this sector. What is perhaps required is a more active role played by the local authorities, both in terms of providing easier access to infrastructure as well as imposing regulations to mandate safer practices. While our data validates that there is demand for safer

not being able to capitalize on higher profits and prices that consumers would be willing to pay in exchange for a perceived improvement in food hygiene.

Lastly, our study also has a strong temporal relevance in this context, because the Indian government is currently undertaking a process of formalization of street vendors. Indeed, the Parliament of India enacted to regulate street vendors in public areas and passed a National Act for Urban Street Vendors (“Protection of Livelihood and Regulation of Street Vending”) in March 2014. The aim of the Act is to regulate the unorganized street vending sector, providing specific zones to the street vendors, a proper license to run their business and recommendations concerning health and hygienic standards (NPUSV, 2009). The implementation of this policy has been so far limited to few urban areas, and, as of 2019, Kolkata is not among them yet. Therefore, much of the business still remains informal throughout India.¹⁰ Our results can inform policy-makers in India as well as similar countries in South-East Asia, who are attempting to undertake a similar formalization of a hitherto unregulated sector, a key component of which is bolstering the quality of the good produced.

The remainder of this paper is organized as follows. In Section 2, we review the relevant literature and highlight our contributions. In Section 3, we describe in detail the context of our study and the design of the experiment. In Section 4, we present our data. We describe our empirical strategy and report our main results in Section 5. We then detail the findings from our choice experiments and consumer survey in Section 6, and conclude in Section 7.

2 Literature Review and Contribution

The paper contributes to a flourishing literature investigating the role of trainings offered to micro-entrepreneurs in developing countries. While they mostly focus on improving business practices to foster profitability and employment,<

prevent HIV (Dupas, 2011; Duflo et al., 2015), and to access to family planning sessions (Ashraf et al., 2014). In a recent review of this literature, Dupas and Miguel (2017) state that “Information is necessary but often not sufficient to generate take-up” (page 41): similar conclusions can be drawn from our experiment. The only previous study that we are aware of that deals with retailers is Banerjee et al. (2015), in which they provide information and financial incentives (higher markups) to retailers selling a specific type of salt aimed at reducing anemia. Differently from this latter paper, we do not rely on direct financial incentives because they are difficult to implement in our context. Additionally, while much of this literature follows only the entrepreneurs comprising the supply side of the market, we combine it with direct evidence from the consumers that they cater to, thereby making our study more comprehensive.

Our study also contributes to broadening our understanding of whether trainings aimed at improving food safety among street vendors might change their behaviors. Although they are often recommended by the FAO and the WHO (FAO/WHO, 2003; WHO, 2006; FAO, 2009b, 2013), we lack conclusive evidence on their effectiveness. For example, Soon et al. (2012) run a meta-analysis on several food-safety trainings evaluations, and find a positive effect of the training on both food safety knowledge and self-reported practices. Along the same line, Medeiros et al. (2011) reach a similar conclusion in a review of different food safety training methods. However, both these reviews have several limitations. First, they include also food handlers from very different contexts, such as restaurants or canteens employees, who may face different constraints as compared to street vendors. Second, food safety practices are evaluated through self-reporting only.¹² A third limitation is the small sample size of such studies, which in the case of Soon et al. (2012) is on average 47. Finally, more recent studies report null findings, in which self

workshops; iv) our intervention allows measuring how lasting the informational shock provided by the training is; and (v) our consumer survey allows us to comment directly on the demand aspect of this market.

3 Background, Motivation and Intervention

3.1 Street-food, health hazards and professional trainings

Street vending is the activity of selling goods and services in the streets without having a permanent built-up structure (Wongtada, 2014). This is an important and growing source of employment in developing countries, especially for the urban poor, as it does not require specialized skills or a large start-up capital (FAO, 2013). Street vending is mostly conducted in the informal sector, as local authorities are often unable (and/or unwilling) to regulate this sector (Bhowmik, 2012). On their side, vendors are often criticized for providing low quality goods, creating congestion and safety risks (Bromley, 2000). This precarious position and highly uncertain environment make them ideal victims for harassment such as evictions, confiscation of merchandise, petty offenses and demands for extortion (Bhowmik, 2012). Among street vendors, food sellers represent the most visible group as they provide affordable and nutritional food to millions of urban consumers every day, especially to low- and middle- income consumers with limited time and means for shopping and cooking (FAO, 2007).

However, street vendors are also considered a threat for public health, as street-food is a main determinant of food-borne diseases. According to the last WHO bulletin, the overall burden of such diseases is substantial: “an estimated 600 million –

of business due to their ignorance of food safety hazards. This hypothesis finds support in some of the reports by the WHO. For instance, WHO (2006) states: “[...] in (street-food) markets, loss of business will result from unclean and poorly managed facilities and unhygienic food handling practices. All these losses are more regrettable because they are preventable with basic investments in training and infrastructure” (p. 6). The vendors in our sample themselves seemed to be aligned, *ex ante*, with the idea that our program could boost their business. Our baseline data showed that the majority of them (53%) expected that a professional training related to hygiene practices would increase their profits.

We further establish why, *ex ante*, such a training intervention was appropriate in our context by bringing empirical evidence to bear on both the supply and demand sides of our market. First, in the absence of such a program, acquiring knowledge about food safety is costly and unlikely for several reasons: (i) street vendors have low levels of education (e.g., 29% of vendors in our sample have no formal education at all, and only 11% completed secondary school), which limits their capability for independent knowledge acquisition on food safety; (ii) they operate in an informal sector, and hence they rarely deal with official institutional bodies which could in principle provide guidance and support on food safety matters; and (iii) there are no self-help groups in this market which might help in spreading such information (e.g., only 1.8% of vendors in our sample were part of any such group or association). Moreover, at the baseline, we directly collected data on vendors’ perceived cost or difficulty of engaging in desirable practices. A large share of vendors reported a high perceived cost of providing clean drinking water (60%), maintaining clean surroundings at the stall (48%), keeping hands clean (41%), having a clean cooking area (42%), and providing disposable utensils and cutlery (68%). Such costs could stem from both a lack of relevant knowledge or awareness, as well as inadequate infrastructural and other external support. Our informational intervention was designed to alleviate the former, providing them with the capability to make necessary improvements by removing the

4 Data

4.1 Independent Variables and Balancing

One of the novelties of our study is the degree of accuracy of the data collected about street-vendors' information and practices. Table 3 provides socio-economic and demographic information of the vendors in each of the treatment arm. The last column of the table reports the p-value for the means of the two treatment groups and the control group being equal. As one can see, treatment and control blocks are statistically similar in terms of most baseline characteristics. In Panel (A) we can see that around 86% of vendors in our sample are male, which is not surprising given the heavily skewed gender ratio in this sector. Vendors' average age is about 41 years old and they have a remarkably long experience in this sector (19 years). Moreover, 72% of them have some education and approximately 70% of the vendors are associated with a union.

In Panel (B) we can see that roughly 72% of vendors in our sample sell food that is cooked at the stall. The most represented category are vendors selling light snacks²⁸ (55%), followed by vendors selling meals (20%), heavy snacks (14%), drinks (10%), fruits and vegetables (7%) and sweets (6%). Vendors profit on average 334 Rupees a day, which is well above the poverty threshold line (35 Rupees in 2015). Whereas Panel (C) shows that vendors are concerned with a wide set of problems, such as lack of basic infrastructures (electricity, clean water and toilets), extortion and capital constraints. In Section 5.2, we discuss to what extent this set of obstacles might affect vendors' behaviors.

We also collected

Table 3: Pre-Intervention: Summary statistics and balancing

	Training (T1)	Training w/Signal (T2)	Control (C)	Full sample	P-value difference		
					T1 = C	T2 = C	T1 = T2
Panel (A): Socioeconomic and demographic information							
Male	0.85	0.87	0.87	0.86	0.72	0.96	0.77
Age	40.32	41.41	41.01	40.94	0.60	0.75	0.45
Years of vending	19.21	19.20	19.97	19.47	0.60	0.64	0.99
Some education	0.7						

Table 4: Post-Intervention: Summary of main outcome variables

	Training (T1)	Training w/Signal (T2)	Control (C)	Full sample
Panel (A): Food safety awareness				
Food hygiene	0.70	0.67	0.58	0.65
Personal hygiene	0.80	0.77	0.75	0.77
Contamination	0.73	0.72	0.69	0.71
Utensiles	0.84	0.86	0.77	0.82
Panel (B): Claimed Behavior				
Discussions	0.24	0.21	0.05	0.17
Get information	0.16	0.16	0.07	0.13
Improvements	0.47	0		

The first category is *Facilities*, and it is applicable to all vendors. We assigned vendors scores based on (i) whether they used an apron and a proper dustbin, (ii) whether there was safe drinking water, (iii) whether the vendor was using a clean cloth to wipe his hands, and (iv) whether there was food debris or waste on the floor of the stall or in the cooking area. We then calculated the percentage of the total score that the vendor received and obtained the final “Facilities index”. For instance, a vendor exhibiting perfect behavior on all dimensions would get a score of 1, corresponding to 100%, on this index. The index for the second category, *Handling*, is similarly constructed and based on scores assigned for (i) whether the ingredients are covered and separated from the cooked food, (ii) whether the cooked food is covered, and (iii) whether tongs, spatulas or other implements are used to cook and to serve (as opposed to touching the food with bare hands). This index is relevant only for vendors who are actually cooking food at the stall, and not for vendors who only sell pre-cooked or pre-packaged snacks, cut fruits, beverages etc. The corresponding index for the third category, *Customer*, is calculated based on scores for (i) whether there are food debris on the tables, chairs or benches, (ii) whether the vendor uses disposable plates, cups and cutlery, and (iii) whether the non-disposable utensils (usually made of steel) are washed with soap. This last index is applicable only for those vendors who have accommodations for customers to actually sit and eat at the stall. Finally, the index *Total* is the average of the 3 indices and it is representative of the general (audited) observed vendors’ behavior or hygiene practices of the street-food vending sector in Kolkata. The Online Appendix includes further details on how each of these indices was constructed.

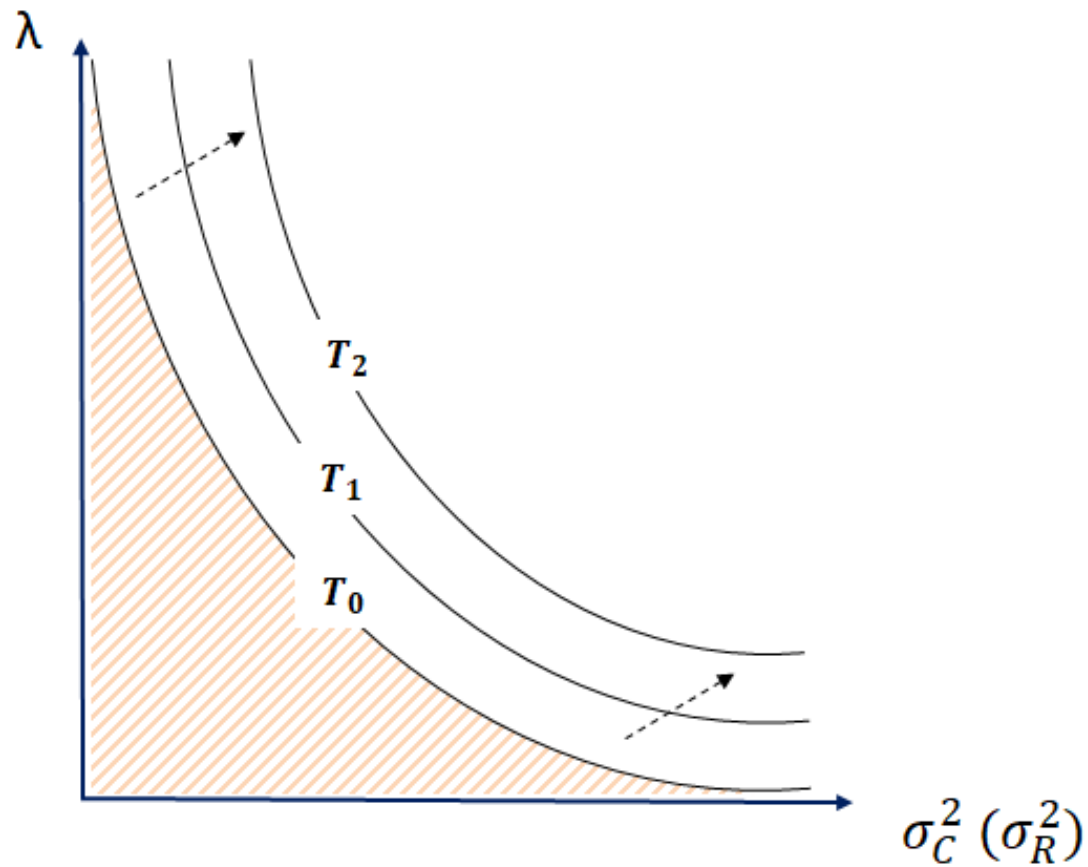
As shown in Panel (C) of Table 4, vendors displayed an average score of 52% for the facilities index, around 81% for the food handling index, around 62% for the customer service index, and 63% for the total index. Differently from the other two

this is likely due to the training not significantly reducing vendors' perceived difficulty of providing more hygienic services to customers. We also show that, though consumers exhibit a positive marginal willingness to pay for higher perceived hygiene, they struggle to detect whether street food is contaminated.

Our results highlight that information alone to the vendors is not sufficient to alter hygienic practices in this sector. This is a useful, evidence-based, policy conclusion for those organizations and institutions whose job is to provide guidance to governments on setting up long-term strategies to control food safety. For instance, the ongoing formalization processes in India are uniquely focusing on licensing and delimiting vending areas. Conversely, we point out that future research, as well as policymakers, should focus on mitigating especially the supply-side constraints, as well as improving food safety awareness among consumers, in order to achieve improvements in the street-food vending sector. Lack of basic facilities, such as clean water, waste disposal and electricity, are all factors that hinder self-improvement in food safety, and should be at the core of investigation in future studies. Governments interested in formalizing this sector should seriously take into account the supply side constraints when drafting street-food vending regulations and when designing vending areas.

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Figure A1: Share of vendors producing H



hypotheses are brought to data in this paper. It is worth pointing out that our primary purpose is not going to separately estimate the parameters μ_R , μ_c , σ_R^2 , σ_C^2 , or λ , of our model. The primary aim is to test whether, and to what extent, simple interventions acting on what we labeled “soft” costs (like awareness of food quality

