Quality Upgrading in the Street Food Market: Is Better Equipment and Training Sufficient?

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September 22, 2024

Abstract

We study quality upgrading in goods sold in the informal sector using two experiments, focusing on the provision of safer street food. Firstly, we show that consumers are willing to pay large premiums for meals from perceived cleaner kiosks. Secondly, we evaluate the impact of providing highly visible sanitation equipment and food-safety training to vendors. We observe high compliance with the equipment, but limited additional effort to improve food safety. Equipment usage also declines over time, despite treatment group vendors earning significantly more. We document that local contextual factors can inhibit effective upgrading: pervasive theft and constraining market norms likely make quality upgrading prohibitively expensive.

JEL Codes: I12, J40, O12, O17

Keywords: Quality upgrading, Food Safety, Street Food, Sanitation, Informal Enterprise, RCT, India.

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This project was funded by the United Nations Food and Agricultural Organization (FAO). We are extremely grateful to Cornelia Boesch, Markus Lipp, and Diletta Topazio who have supported us throughout the implementation. We also thank the program teams of Rajabazar Education and Awareness Development (READS), particularly the Secretary, Sarfaraz Ali, the Project Manager, Sudipta Moitra, the Field Supervisor, Samaresh Mukherjee, and the entire field team, for their collaboration during the project's implementation and data collection. We are also indebted to InnoAid for their invaluable support in conducting this research project, in particular to Marie Louise Pollman-Larsen, Matias Pollmann-Larsen and Carmine Alaia. We also thank Maria Battistin and Louis Steyn for outstanding research assistance. The experiment has been registered with the AEA RCT registry (AEARCTR-0008797). IRB approval was obtained from the University of Bologna. Furthermore, we wish to express our gratitude to the seminar participants at BI Norwegian Business School, St Andrews University, University of Amsterdam, University of Bologna, University of Gothenburg, Université libre de Bruxelles, University of Lisbon, and conference participants at the CDES Sustainable Development Conference 2023 for their valuable comments. We have no relevant or material financial interests related to the research described in this paper. All errors are our own.

1 Introduction

A major challenge in developing countries is consumer uncertainty about product quality. Asymmetric information between firms and consumers creates "markets for lemons". Recent studies document this phenomenon in various sectors, including fertilizers (Bold et al., 2017; Michelson et al., 2021), pharmaceuticals (Bennett and Yin, 2019; Björkman Nyqvist et al., 2021), street food (Daniele et al., 2021), agricultural products (Hoffmann and Jones, 2021; Bold et al., 2022; Park et al., 2023; Hsu and Wambugu, 2024), artificial insemination of livestock (Hasanain et al., 2023), and public transit (Lane et al., 2023). Costly signals, such as quality grading or certification systems, are a potential solution to improve welfare for both sides of the market. These systems can empower consumers to make better choices (Levin, 2001) or incentivize firms to offer higher quality products (Bai, 2024). However, the effectiveness of costly signals as a general, sustainable solution depends critically on whether the private benefits of quality upgrades outweigh the associated costs. This may not be the case for informal "survivalist" firms, which constitute a significant portion of economic activity in developing countries (Ulyssea, 2020).[1] Low productivity and the inherent uncertainty of their businesses, characterized by a lack of legal permits to operate and the risk of evictions, suggests either stringent constraints or limited potential returns on quality upgrading.

This paper investigates the challenges hindering quality upgrades in the informal sector,[2] focusing on informal street food markets. Street vending, the activity of selling goods and services in the streets without having a permanent built-up structure, is a large and growing sector across the developing world (Wongtada, 2014). Vendors comprise a substantial portion of urban informal employment, ranging from 2% to 24% in African, Asian, and Latin American cities (ILO, 2018). Among street vendors, food sellers represent the most visible group as they provide affordable food to 2.5 billion consumers every day, including up to 50% of daily energy and protein intake for those earning low- and middle-incomes (FAO, 2007). However, they also pose a significant threat to public health due to the risk of contaminated food, a primary cause of foodborne diseases (World Bank, 2019; WHO, 2022).[3] Street food exemplifies a *credence* good, because the risk of contamination remains unknown to consumers until after consumption; even then, it may not be fully observable.[4] With limited to no government regulation or oversight of street food, consumers in most settings can only evaluate the risk of contamination based on the appearance of the kiosk and the general hygienic practices of the vendor at the time of purchase. This would suggest vendors must use visible enhanced equipment and strictly adhere to food safety practices during food preparation to win customers, as these measures would serve as the primary signals of reduced contamination risk.

[1] Traditionally, the literature categorizes informal firms into three groups (La Porta and Shleifer, 2014): De Soto, parasite, and survivalist firms. De Soto firms are constrained by high entry costs into the formal sector. Parasite firms remain informal to benefit from the cost savings of avoiding formal regulations. Survivalist firms, the largest group according to Brazilian data (Ulyssea, 2018), lack the financial viability to operate in the formal sector, as their low productivity and earnings do not justify the associated costs.

[2] The informal economy plays a significant role in developing countries. For example, in India, the focus of our study, 18.5% of economic activities occur outside the formal sector (Medina and Schneider, 2019). Given this significant share, it follows that a substantial portion of everyday goods are purchased by consumers within the informal sector.

[3] The overall burden of such diseases is substantial, with an estimated 600 million people falling ill, 420,000 deaths, and a loss of 33 million disability-adjusted life years (DALY) lost each year due to contaminated food (WHO, 2022). Low-income countries in Southern Asia and sub-Saharan Africa bear a disproportionately high burden, accounting for 53% of all foodborne illness and for 75% of related deaths. While these aggregate figures do not pinpoint street food as the sole contributing factor, extensive research in microbiology has documented the presence of harmful pathogens in street food itself, along with unsafe food handling practices among vendors in developing countries (e.g., Muinde and Kuria, 2005; Chukuezi, 2010; Muyanja et al., 2011; Samapundo et al., 2015; Abrahale et al., 2019; Andrade et al., 2023).

[4] A credence good is characterized by asymmetric information between buyers and sellers, whereby the seller has more information about the quality of a good than the buyer and the buyer may be unable to judge the quality of the good even after purchase (Dulleck and Kerschbamer, 2006; Dulleck et al., 2011).

We conduct two experiments with consumers of street food and vendors in three areas of Kolkata, India. Our assessment starts by gathering baseline information on kiosk facilities, food safety inputs, and practices employed by all street food vendors in Dalhousie, Hazra, and Sector V. The data confirms several key points that align with previous assessments of this sector (e.g., Daniele et al., 2021). Firstly, many kiosks lack essential sanitary infrastructure for safe food preparation, especially toilets and potable water. Moreover, they are typically located close to busy roads or pedestrian zones, posing significant challenges to maintaining food safety standards. A critical input for kiosk operations is water, and 75% of vendors in our sample rely on public taps for their water source. Samples collected from these taps show high levels of contamination with pathogens, with 45% of samples containing Escherichia coli and 55% of samples exceeding recommended bacterial counts. Since none of the vendors chlorinate their water, this raises serious health concerns. Secondly, there is low compliance rates among vendors for essential hygiene practices. For example, only 40% of vendors observed washing their hands with soap before handling food and only 20% fully covering raw ingredients. This suggests a potential knowledge gap or lack of awareness regarding safe food handling among vendors. Thirdly, vendors seem to want to upgrade their kiosks, with 75% vendors report that they would spend an unexpected financial windfall primarily on equipment maintenance and repair.

The first step in understanding why vendors do not invest in quality-upgrading equipment or exert more effort in food safety practices is to ascertain whether consumers would be willing to pay more for food produced from a more hygienic kiosk. In our first experiment, we survey 2,684 regular street-food consumers who frequent vendors targeted for our supply-side intervention. Firstly, we find that consumers often struggle to detect contaminated food, with only 41% reporting it as easy to identify. Secondly, consumer food safety knowledge is limited, with an average of just 1.8 food contaminants identified. On the other hand, 74% of respondents deem vendors' hygiene crucial when choosing a meal, and over half report that they would switch vendors after falling ill. Using a discrete choice experiment, we document that consumers are willing to pay up to three times more for a meal from a perceived cleaner-looking kiosk and up to twice more for one from a vendor with perceived good hygiene. This experiment confirms that visual signaling is important as consumers would be willing to pay a premium for perceived higher quality, indicating a potential market incentive for quality upgrading.

However, even though enhanced visible equipment has the potential to attract more consumers, vendors may face constraints that trap them in a low-quality equilibrium. That is, despite consumer demand, vendors may not be willing or able to produce food of higher hygienic quality either because equipment upgrading is too costly and simply not profitable, or because they lack the necessary know-how to improve their food safety practices and quality standards. To test these hypotheses, we collect a sample of 274 vendors and implement a field experiment with two treatment arms. Both treatment groups receive a set of equipment consisting of two parts. The first is a set of "large" visible items such as a water storage drum, a stainless steel drinking water container, a hand-washing basin with a fitted water tank, and an 80-liter waste bin. These items were delivered at the start of the experimental period and are not only highly visible to consumers but also require minimal effort to use. The second is a set of "small" items necessary for safe food practices, such as soap and chlorine tablets for treating the water used in kiosk operations. These items are delivered weekly throughout the three-month intervention; they are less noticeable than the larger items and require some effort for use. Vendors in the second treatment group additionally receive short 15-minute weekly training sessions at their

kiosks, which are aimed at improving food safety practices. To track any changes in outcomes, we collect baseline data, two endline data, and weekly monitoring data, both during the treatment period and for 4 months following the end of the treatment period.

Our main experiment yields several findings. Firstly, treated vendors regularly use around 60% of the large items provided to them (three out of four), and they are more likely to be observed using the small items than the control group. However, the use of both large and small items falls over time. Similarly, compliance with chlorine tablet use is nearly universal throughout the treatment period, but usage returns to pre-treatment levels, close to zero, after the treatment ends. To summarize, vendors regularly use sanitation-related items that are provided freely, but will not go out to purchase or replace the same items themselves, even after experience with using the products. Secondly, we see small spillover effects to other aspects of kiosk operations, with treatment group vendors slightly more likely to have a cleaner and more hygienic kiosk environment and engage in better food handling practices. These effects, albeit small, persist at the same level in the treatment period and the 4-month post-treatment period. Thirdly, we find no significant difference between the two treatment arms. Training has limited additional effects on equipment usage or on the broader kiosk environment and practices. This may be due to vendors not finding the training valuable, and though initial vendor engagement in the training is very high (around 90%), it drops to near 5% mid-way through the program. Fourth, we find modest, significant changes in business outcomes for the average vendor, and vendors who fully utilize the large equipment experience an 11% increase in profits and 12% more customers. This suggests, in line with our findings regarding consumer demand for safer food, better practices have potential financial benefits. We do not find any treatment effects on menu prices, and vendors seem reluctant to increase prices relative to other vendors.

The findings from the two experiments suggest that while a costly, visible signal of quality upgrades is valued by consumers and can boost vendor profits, it is not enough to motivate vendors to consistently maintain higher quality standards. To better understand our main findings and why vendors hesitate to sustain food safety despite the potential benefits, we consider several possibilities. A primary obstacle appears to be the local environment in which vendors operate. While vendors may desire to upgrade their kiosk equipment, the risk of theft is a major concern, shared by nearly all (93%) vendors. During the experiment itself, almost 10% of vendors experienced theft of the provided large items. Furthermore, none of the vendors in our study hold a licence to operate, and bribe payments and evictions are common. These constant threats create uncertainty about the payback period, ultimately discouraging vendors from making the initial investment. Furthermore, the difficulty for consumers to notice and value smaller items, such as chlorine tablets, may further explain the overall reduction in adopting safer food practices.

Social pressures within the vendor community act as another barrier. Our study documents strong social norms regarding price and product competition and a shared social space among vendors. For example, around 70% of vendors agree that price and menu item coordination is common practice and 85% agree that vendors who deviate on prices or menu offerings are not seen well by other vendors. This likely creates a situation where, although they recognize the value of differentiation, vendors' entrepreneurial activity is constrained by the rules of the informal market in which they operate. Even if a vendor seeks to stand out, they may be restricted by peer pressure and prevailing social norms.

Finally, the discrepancy between vendors' self-reported food safety practices and what is actually observed adds another layer of complexity. While 95% of vendors agreed with statements indicating that they practiced safe food handling, our independent random audits revealed a different reality, with 85% of vendors observed with unsanitary conditions in and around their kiosks. This gap suggests that social desirability bias, reporting bias, where vendors misunderstand the survey terminology, or simple memory recall issues could be factors. In the latter case, vendors may believe their practices and kiosks are more hygienic than objectively observations indicate.

Our primary contribution is to the recent empirical literature on quality upgrading in markets facing information problems in emerging countries. We expand on work by Lane et al. (2023) and Bai (2024) by creating a signal of quality for consumers through the provision on sanitation-related equipment. Consistent with Bai (2024), we demonstrate that investing in visible quality upgrading yields positive economic returns through increased consumer demand. However, we also find that quality is not maintained, and decreases significantly after the treatment period has ended. Local contextual factors prevalent in informal markets, such as limited protections from theft, indicate that quality upgrading is unlikely to spontaneously emerge in a market populated by "survivalist" informal firms and any upgrades, such as in our intervention, may quickly depreciate. In this sense, we contribute to the literature documenting market inefficiencies driven by lack of property rights and imperfect law enforcement (Field, 2007; Goldstein and Udry, 2008; Besley et al., 2015; Besley and Mueller, 2018; Dyer, 2023). To our knowledge, we are the first to document an additional constraining factor of strict social norms among informal sellers that limit their market operations and restrict their potential to take full advantage of quality upgrades.

We also build upon existing research regarding the role of subsidies and information in health-related behaviors. Regarding subsidies, we find that providing free or highly subsidized health-related products does increase take-up, in line with studies such as Kremer and Miguel (2007); Cohen and Dupas (2010) and Dupas et al. (2016). However, we also observe a low willingness-to-pay for these products, evident from the substantial drop-off in usage following the treatment period. The decline in chlorine usage aligns with findings by Ashraf et al. (2010), Kremer et al. (2011), Blum et al. (2014), and Ritter et al. (2017). The pattern also resonates with broader research showing that large subsidies may boost short-term take-up but changes do not persist over longer horizons (Hanna et al., 2016; Fischer et al., 2019; Shukla et al., 2022). Turning to the role of information, while some studies have found a positive effect (e.g., Rhee et al., 2005; Ashraf et al., 2010; Devoto et al., 2012; Luoto et al., 2014), we found no significant impact of training on equipment usage. Our findings align more closely with research demonstrating that information about health products or behaviors does not necessarily translate into behavioral change (e.g., Kremer and Miguel, 2007; Dupas, 2009; Nyhan et al., 2014; Duflo et al., 2019; Ho et al., 2023).

Finally, we contribute to the extensive literature on food safety, particularly by documenting poor food safety practices and inadequate equipment among street food vendors in low- and middle-income countries. Prior work by Vollaard et al. (2004), Choudhury et al. (2011), Cortese et al. (2016) and Samapundo et al. (2016) has shed light on these challenges. Additionally, we build upon the findings of Daniele et al. (2021), who find that providing information to vendors on safe food practices increases knowledge and awareness but has limited impact on observed behavior.

2 Context

The WHO estimates that over 200 diseases are caused by eating food contaminated with bacteria, viruses, parasites or chemical substances such as heavy metals (WHO, 2022).[5] This contamination can occur at many stages along the food chain; for example, through unsanitary surfaces used in production, or polluted water (FAO, 2023). Lack of adequate sanitary infrastructure and inputs, as well as insufficient knowledge of safe food practices and personal hygiene, are two significant food safety hazards in the street food sector. This is because kiosks are often located on busy roads or crowded footpaths, and vendors typically have little to no formal training in safe food preparation (FAO/WHO, 2003; WHO, 2006; FAO, 2009, 2013).[6]

In our study, we focus on three areas in Kolkata, India; namely, Dalhousie, Hazra, and Sector V. These areas have a large number of street vendors who prepare and cook food at the kiosks and typically handle items at a higher risk of contamination and require more extensive equipment for food preparation.[7] In the Appendix, Figure A1 shows the locations of these areas in the city, and Figure A2 shows some pictures of the typical vendor in our sample. Using data collected at baseline and during our initial context assessment, we document several key facts about the street food market.

Table 1: Initial Context Assessment: Problems and Facilities

	Obs.	Mean	S.D.	Min	Max
Main problems encountered during normal business operations:					
Bribes, licensing, permits	284	0.43	0.50	0	1
Access to toilets	284	0.42	0.49	0	1
Access to potable water	284	0.41	0.49	0	1
Access to electricity	284	0.29	0.46	0	1
Competition from others	284	0.24	0.43	0	1
Cost or access to finance	284	0.20	0.40	0	1
Facilities and inputs:					
Kiosk has drinking water facility	523	1.00	0.06	0	1
Kiosk has handwashing facility	523	0.95	0.22	0	1
Kiosk has garbage bin	523	0.88	0.33	0	1
Handwashing facility has soap	497	0.43	0.50	0	1
Vendor uses an apron	523	0.08	0.27	0	1
Vendor wears gloves	523	0.00	0.04	0	1
Vendor wears hair cover	523	0.01	0.11	0	1
Treats water in primary storage	523	0.06	0.23	0	1

Notes: The data in the top section ("Main problems encountered during normal business operations") is gathered from the baseline survey conducted in April 2022. Vendors could select multiple options. The data in bottom section ("Facilities and inputs") are pooled from two pre-treatment monitoring surveys conducted during our initial assessment of the context in May 2022. See Section 4.3 for details on the data collection and Section 4.4 for details on the baseline sample characteristics. Observations are missing when a vendor is not present at the kiosk at the time of the visit, or the data collector does not observe an outcome at the time of the visit.

[5] One of the most common are diarrheal diseases, which are estimated to cause over 1.7 million deaths per year, the majority of which are children under 5 (Dadonaite et al., 2018).

[6] A large literature has documented the presence of harmful pathogens in street food across many middle- and low-income countries. See, for example, Vollaard et al. (2004) for Jakarta, Indonesia, Mustafa and Abdallah (2011) for Khartoum, Sudan, Manguiat and Fang (2013) for Taiwan and the Philippines, Cho et al. (2011) for Korea, Ganguli et al. (2004) for Patiala City, India, Tambekar et al. (2008) for Amravati City, India.

[7] Given our interest in the role of equipment and training, we do not focus on street food vendors who sell drinks or cold snacks, and who prepare food at home rather than at the kiosk. More information on our sample of vendors is provided in Section 4.

The top section of Table 1 provides a comprehensive breakdown of the main operational issues reported by vendors in our sample. The most pressing problem identified is the lack of essential sanitary infrastructure for safe food preparation, specifically access to toilets (cited by 42% of vendors) and potable water (41%). Equally concerning are the significant hurdles vendors face related to the local institutional environment. Notably, 43% of vendors report regulatory uncertainty, bribes, and the lack of proper licenses and permits as major concerns. Unlike the issues related to sanitary infrastructure, these challenges arise from the fact that none of the vendors in our study held a license at the time. This left them vulnerable to bribery and extortion in exchange for permission to operate, creating significant barriers to potential quality upgrades.[8] Other key challenges include the lack of electricity (29%), which is mainly used for lighting or powering small hand-held tools, as most vendors rely on gas stoves for cooking. Additionally, competition from other vendors or formal businesses (24%) and difficulties related to cost or access to finance (20%) are also prevalent concerns.

In our initial context assessment, we also aimed to gather information about kiosk facilities and inputs related to food safety. The bottom section of Table 1 provides an overview of these findings. While the majority of vendors have a drinking water facility, hand washing facility, or garbage bin, the quality of these facilities were provisional and rudimentary in almost all instances, as revealed in the qualitative segment of our data collection.[9] Additionally, basic items such as hand washing soap for customers are not consistently available at kiosks, aprons are rarely used by vendors in their daily operations, very few of them wear gloves or hair covers, and most vendors report not chlorinating their water before use. This assessment aligns with findings from studies in many other developing country contexts.[10]

Table 2: Bacterial Quality of Local Water Sources

	(1) Dalhousie	(2) Hazra	(3) Sector V	(4) Total
Laboratory analysis:				
Total coliform detected [0,1]	0.68	0.50	0.80	0.69
E.Coli detected [0,1]	0.55	0.40	0.38	0.45
Total bacteria counts (CFUs/mL)	4413.25	3573.00	3368.35	3827.24
CFUs/ml>500 [0,1]	0.53	0.50	0.57	0.54
Obs.	40	20	40	100

Notes: The data were collected by a local independent inspection and testing company in Kolkata (Mitra S. K. Private Limited) between October 2022 and January 2023. Each column reports the mean value. Water sources are public, typically taps located in the city. Total coliforms indicates the overall bacterial quality of the water, with the recommended level in potable water being zero. E.coli is a subset of total coliforms, and CFU stands for Colony Forming Units. The recommended total bacterial counts for potable water is less than 500 CFU/mL.

[8] In our context, kiosks are typically only fastened with padlocks at night, and there seems to be limited police surveillance of kiosk areas. Government regulation exists, the most recent being the 2014 Street Vendors ("Protection of Livelihood and Regulation of Street Vending") Act (NPUSV, 2009). The primary goal of this Act is to safeguard the rights of street vendors of all types by creating designated vending zones with assigned lots. These zones should allow vendors to operate with greater legal stability, reducing the fear of eviction or persecution. The relocation of vendors to specific vending zones is expected to reduce congestion and litter on roads and sidewalks where vendors traditionally operate, providing them with a more sanitary environment and limited infrastructure, including regular garbage collection and public toilets. However, the implementation of the act has been slow, and measurable changes in terms of basic protections of vendors is yet to be seen.

[9] The qualitative evaluation of asset quality took place during a parallel round of initial field visits, with data being recorded on notepads. However, these statistics are not included in the table since nearly all observed vendors had poor-quality inputs.

[10] For example, Nizame et al. (2019) found that only 11% of street food vendors in Dhaka, Bangladesh, had soap and water for hand-washing, while Samapundo et al. (2015) notes that flies and animals were found around 60% of food kiosks in Port-au-Prince, Haiti, and 65% did not have access to potable water. Figure A3 provides some photographic examples of the conditions under which vendors in our study operate at baseline. It is clear that these are challenging conditions, with garbage and stagnant water located directly around the kiosk where food preparation takes place, and minimal equipment for washing dishes or hands.

A major input to street food kiosk operations is water, which is used for cooking, drinking, and cleaning. In our setting, no kiosk has direct access to a water source. Instead, most vendors collect water in containers from a local public tap, either for free or with a charge, in the morning and transport it to the kiosk.[11] To ascertain the quality of the water used by vendors in their kiosk operations, we randomly sample 25 water sources that vendors in our study area.[12] We collect four samples from each source over the course of four months and test the samples for: (i) total coliforms, which provide an overall indication of the bacterial condition of the water and indicate the presence of pathogens;[13] (ii) Escherichia coli (E. coli), a subset of total coliforms and a key indicator of fecal contamination;[14] and (iii) total bacterial counts, a complementary indicator to coliforms. Table 2 lists the results. Total coliforms is detected in 69% of the water samples we collect and E. coli is detected in 45% of samples. Total bacterial counts are also extremely high, with an average of almost 4,000 CFUs/mL. Finally, 54% of water samples have more than the recommended maximum count of 500 CFUs/mL.

Table 3: Food Safety Practices

	Obs.	Mean	S.D.	Min	Max
Kiosk environment:					
Uses soap for dishes	353	0.93	0.25	0	1
Dish water is clean	424	0.61	0.49	0	1
Garbage bin is clean and empty	460	0.41	0.49	0	1
Food handling:					
Uses towel/cloth for hands	523	0.98	0.16	0	1
Uses tongs or spoons	523	0.76	0.43	0	1
Counter is clean	523	0.68	0.47	0	1
Cooked food is covered or behind screen	523	0.57	0.50	0	1
Washes hands with soap	511	0.38	0.49	0	1
Raw food is fully covered	365	0.22	0.41	0	1
Uses disposable plates	523	0.21	0.41	0	1

Notes: Data are pooled from two pre-treatment surveys (surveys 1 and 2) conducted during our initial assessment of the context in May 2022. See section 4.3 for details on the data collection and section 4.4 for details on the baseline sample characteristics. Observations are missing when a vendor is not present at the kiosk at the time of the visit, or the data collector does not observe an outcome at the time of the visit. Each variable is binary taking value 1 if the food safety practice is observed, 0 otherwise. Note that "Uses soap for dishes" refers to the presence of soap in the dish water, "Counter" refers to the main counter where food is prepared in the kiosk, and "Washes hands with soap" refers to washing hands with soap before handling food.

In addition to problematic infrastructure and inputs, knowledge and practices regarding safe food preparation and handling are also an issue.[15] Practices in our study area were also recorded in our initial assessments during field visits at the kiosks. Table 3 provides descriptive statistics for outcomes related to the kiosk environment and food handling. In terms of the kiosk environment, we observed that while a large majority

[11] Kiosks have a substantial water requirement, with vendors reporting an average usage of around 174 liters per day. In areas with limited access to local taps, like Sector V, vendors often choose to purchase water from a local supplier who collects it from public taps and delivers it directly to the kiosk.

[12] We select 10 in Dalhousie and Sector V, and 5 sources in Hazra. We also test the water that the vendors have in their kiosks directly for the presence of chlorine; more information is provided in Section 4.4.

[13] Note that the presence of coliforms does not necessarily indicate unsafe water; however, the recommended level of total coliforms in potable water is zero (FAO, 2023).

[14] E. coli is naturally found in the intestines or humans and animals, and is a widely used indicator for detecting fecal contamination. While not all strands of E. coli are harmful, many strands cause diarrhea and vomiting, and can lead to respiratory illness or pneumonia.

[15] Poor food safety practices among street food vendors in many low- and middle-income countries have been well-documented (see, e.g., Vollaard et al., 2004; Choudhury et al., 2011; Cortese et al., 2016; Samapundo et al., 2016; Daniele et al., 2021).

of vendors (93%) use soap for washing dishes, compliance with other cleanliness practices is notably lower. Only 61% of vendors were found to be using clean dishwater, and just 49% had a garbage bin that was clean and empty. Regarding food handling practices, the data reveals that 98% of vendors use a towel or cloth for their hands, 76% use tongs or spoons during food preparation, and 68% keep their counters clean. However, less than 60% of vendors protect cooked food from potential contaminants by covering it or placing it behind a screen, and only 38% wash their hands with soap before handling food. The data also shows that just 22% of vendors ensure that raw food is fully covered, and only 21% use disposable plates, which could mitigate cross-contamination risks.

Table 4: Vendor Desires and Finances

	Obs.	Mean	S.D.	Min	Max
Primary way to spend 10,000₹ windfall for business:					
Maintenance, repair, and renovation of kiosk	284	0.50	0.50	0	1
Buying or upgrading equipment	284	0.24	0.43	0	1
Raw materials and items for resale	284	0.14	0.34	0	1
Introducing new food items	284	0.10	0.29	0	1
Repayment of loans	284	0.01	0.10	0	1
To hire more employees and apprentices	284	0.00	0.06	0	1
Finance:					
Has bank account	284	0.94	0.24	0	1
Use bank account	266	0.58	0.50	0	1
Ever applied for bank loan	284	0.15	0.36	0	1
No savings	284	0.53	0.50	0	1
Monthly savings (₹)	282	2739	4797	0	28000

Notes: The data is gathered from the baseline survey conducted in April 2022. In the windfall section, vendors were limited to selecting only one response. Monthly savings are in rupees. See Section 4.3 for details on the data collection and Section 4.4 for details on the baseline sample characteristics. Observations are missing when a vendor is not present at the kiosk at the time of the visit, or the data collector does not observe an outcome at the time of the visit.

To conclude our assessment, we gathered information about vendors' desire to upgrade the quality of their kiosks. As shown in the top section of Table 4, when asked how they would invest a hypothetical 10,000₹ windfall in their businesses, 74% of vendors indicate that they would prioritize spending on items related to the maintenance, repair, and renovation of their kiosks or the buying or upgrading customer service equipment. This response was far more common than those related to expanding the size of the kiosks through either new food items or hiring more. This aligns with our earlier observations of the rudimentary equipment currently in use at most kiosks. However, despite their recognition of and desire for quality improvements, credit constraints likely pose a significant barrier. Indeed, as reported at the bottom of Table 4, although 94% of vendors report owning a bank account and 57% of them use this account for their business operations, borrowing remains uncommon, with only 15% of vendors having ever applied for a business loan.[16] Furthermore, 53% of vendors report having no savings in their bank accounts or at home, and the average monthly savings in the sample is 2,739₹ (around 33 USD).

[16] Furthermore, fewer than 10% of vendors have applied for a loan through a microfinance institution or informal lender (not reported in the table). We do find that upon applying for a loan, most vendors report success in their application (75% for a formal bank loan, 92% from a microfinance institution, and 94% from an informal lender). At the time of our baseline survey, 10% of vendors currently had a bank loan, 8% had a microfinance loan, and 3% had a loan from an informal lender.

3 Consumer Preferences for Safe Food

In this section, we explore what consumers seek in street food and their willingness to pay for safer options. Presumably, most consumers naturally prefer safer and cleaner street food, all other factors being equal. While assessing food safety can be challenging, factors such as the cleanliness of the kiosk and the vendor's hygiene likely provide consumers with an indication of the safety of food from a particular kiosk. Consumers who prioritize safety are likely to value food from a clean kiosk where vendors adhere to food safety practices, even if these measures do not completely eliminate contaminants but do reduce the risk of contamination. Our analysis of consumers serves two purposes. Firstly, we aim to understand the demographics and preferences of street food consumers. Secondly, we employ a Discrete Choice Experiment (e.g., WHO, 2012; Mas and Pallais, 2017; Wiswall and Zafar, 2018; Daniele et al., 2021; Maestas et al., 2023), and quantify how much consumers are willing to pay for perceived safer street food options. This helps us quantify the factors that matter most to consumers when choosing street food, including the trade-offs between price and food safety.

3.1 Who Consumes Street Food?

We collect survey data from 2,684 consumers purchasing street food in the three areas of interest: Dalhousie, Hazra, and Sector V. Our focus is on consumers who are customers of vendors identified for the supply-side intervention, with the aim of surveying around 10 consumers per vendor. Sampling occurred during the main busy hours, between 11 am and 4 pm. Table 5 presents descriptive statistics broken down by sector and in aggregate. Customers tend to be predominantly male and in their mid to late 30s. Around 44% of consumers, on average, have a college degree, and around 32% report being high-skilled employees. Being the IT hub of the city, Sector V has a higher proportion of consumers who are younger, college-educated, and considered high-skilled workers. Almost three-quarters of respondents consume street food several times or more each week.

One important issue with food safety from the consumer perspective is that contaminated food is difficult to detect, with only 41% of respondents saying it is easy to identify unsafe food. In terms of experience with contaminated food, 32% of respondents report having been sick from consuming unsafe street food sometime in the past. However, only a little more than half of consumers surveyed say that they would change vendors if they become sick from food sold at that kiosk. This seems to hint at a potentially moderated preference for safe food; yet, 90% of consumers say that vendor and kiosk hygiene is a factor in their decision to choose a particular kiosk to consume food from. This is relative to taste (67%), price (43%), and location (10%). Indeed, when asked about the *most* important determinant in the decision to purchase food from a particular kiosk, 74% of consumers chose hygiene. On the other hand, consumer knowledge regarding food safety and hygiene appears relatively low: respondents were only able to correctly identify an average of 1.8 food contaminants out of the 7 possible in our questionnaire.

Table 5: Consumer Descriptive Statistics

	Dalhousie (1)	Hazra (2)	Sector V (3)	Total (4)
Demographics:				
Male	0.89	0.77	0.82	0.85
Age	37.52	36.88	30.62	35.60
Has college degree	0.39	0.37	0.61	0.44
Is high-skill employee	0.30	0.20	0.45	0.32
Is low-skill employee	0.34	0.23	0.21	0.29
Consumption habits:				
Eat street food frequently	0.75	0.69	0.69	0.72
Find it easy to detect unsafe food	0.41	0.39	0.42	0.41
Has been sick from street food before	0.30	0.33	0.35	0.32
Would change vendor after getting sick	0.53	0.59	0.55	0.54
Important factors when choosing street food:				
Hygiene	0.91	0.86	0.92	0.90
Taste	0.64	0.63	0.77	0.67
Price	0.40	0.53	0.42	0.43
Relationship	0.25	0.22	0.25	0.24
Location	0.11	0.10	0.08	0.10
Health	0.06	0.03	0.05	0.05
Most important determinant:				
Hygiene	0.73	0.72	0.76	0.74
Food safety knowledge:				
What is contaminated food? [0,7]	1.87	1.91	1.59	1.80
Obs.	1464	520	700	2684

Notes: Data from consumer survey. The table provides average values for a range of variables by area and for the full sample. With the exception of the variables "age" and the "food safety knowledge", all variables are indicator variables [0,1]. For important factors when choosing street food, respondents could multiple answers. For the most important determinant, respondents were asked to pick one answers out of the same set. Food safety knowledge is an index equal to the average of the number of correct responses to a question asking respondents to list common sources of food contamination. Answers were aggregated into 7 broad categories.

3.2 Discrete Choice Experiment

We utilize two hypothetical street food items in our DCE: vegetable thali and chicken thali. These items are chosen because they are relatively homogeneous and easily recognizable for consumers.[17] Each consumer is asked about one food item only, and this item is chosen randomly. Each consumer makes choices between option A and option B across 18 different choice scenarios, with the order of the choice scenarios randomized across consumers. We have four attributes in total: three attributes with two levels of options, and prices with five levels of options. Attributes and levels are labelled as follows: (i) kiosk's hygienic conditions: "appears very clean and hygienic" vs. "appears not very clean and hygienic;" (ii) vendor's personal hygiene: "appears very clean and hygienic" vs. "appears not very clean and hygienic"; (iii) location: "vendor is in front of you" vs. "vendor is a 5-minute walk from you (about 400 meters)"; and (iv) prices: 30, 40, 45, 50, and 60₹ for the

[17] Moreover, the vegetarian option carries a relatively lower food safety risk compared to the chicken option. Hence, we can employ both items as a robustness check to confirm that if consumers prefer safer food options, they should be willing to pay a larger amount for a safer option of a food item with a higher risk of contamination.

vegetable thali, and 50, 70, 80, 90, and 110₹ for the chicken thali.[18] The price levels are chosen to resemble the range found in the marketplace for each item. An example of a choice scenario is displayed in Figure A4 in the Appendix.[19]

We focus on these attributes for two main reasons. First and foremost, the two cleanliness attributes allow us to gain a deeper understanding of which dimension holds greater significance for consumers. Furthermore, they enable us to establish a direct link between the consumer experiment and the vendor experiment. The attribute "kiosk's hygienic conditions" provides insights into how much consumers would be willing to pay for food if there were improvements in kiosk cleanliness. Enhancing the cleanliness of a vendor's kiosk is a key element of our equipment intervention. On the other hand, the attribute "vendor's personal hygiene" informs us about the price premium consumers may associate with improvements in a vendor's personal hygiene and appearance. This dimension aligns with our training intervention focused on enhancing vendor hygienic behavior. Finally, we included the "location" attribute due to its potential significance, as highlighted during the piloting phase of the experiment. Vendors expressed concerns about potentially being relocated to a different vending zone if the National Act were to be implemented. They feared losing their established customer base in the process. By assessing consumer preferences related to kiosk location, we aim to determine whether this concern resonates with consumers in the marketplace.

3.3 Consumer Willingness-to-Pay for Safer Street Food

To estimate Willingness-to-Pay (WTP) using the choice experiment data, we specify a utility function for each alternative in the choice set. Then, we estimate the parameters of the utility function using a mixed logit model, maximizing the likelihood of the observed choices given the utility functions. In our mixed logit model, we assume that the parameters attached to the attributes vary across consumers. After estimating the parameters, we calculate the expected WTP for a change in an attribute. The WTP for attribute a is determined as the ratio of the coefficient for attribute a to the coefficient for price. This ratio indicates the average amount of money a consumer would be willing to pay for a one-unit increase in attribute a. Mathematically, if β^a represents the coefficient for attribute a and β^{price} represents the coefficient for price, then the WTP for attribute a is given by $-\frac{\beta^a}{\beta^{\text{price}}}$. More details are provided in Appendix B.

Table 6 lists our WTP estimates in rupees (₹).[20] The key finding is that consumers prioritize cleaner kiosks and vendors, with kiosk cleanliness being three times more important than vendor cleanliness. In contrast, distance appears to be a less significant factor. For example, in monetary terms, consumers are willing to pay 80₹ more for a vegetable thali that comes from a kiosk perceived as clean, which is nearly *three times* the current price of 33₹. Similarly, for a chicken thali, consumers are willing to pay more than *double* the current

[18] A vendor who "appears very clean and hygienic" means that they have clean personal hygiene, clean hands and clothes, a clean apron, clean surroundings, and are wearing a hair covering, among other things. A kiosk that "appears very clean and hygienic" means that it features a professional handwashing facility, a professional drinking facility, clean water, a clean cooking area, and a professional dustbin. To provide a benchmark for understanding the difference between "very clean and hygienic" vs. "not very clean and hygienic," we also provided consumers with example pictures of each scenario. Additional details, including the full questionnaire and enumerator manual, are available upon request.

[19] In designing our DCE, we follow to best practices and utilized a statistically efficient design to select the options shown to consumers, defined in terms of D-efficiency. D-efficiency can be interpreted as the minimization of the determinant of the covariance matrix. This ensures minimal variation around the parameter estimates by reducing the estimated standard errors.

[20] In Appendix, Table A1 presents the estimated coefficients for each attribute. As a robustness check, we also re-estimate the model using the more restrictive conditional logit model. The results, presented in Table A2 in the Appendix, are generally similar. However, there is an exception regarding willingness-to-pay for a clean kiosk, which is somewhat lower than the values obtained from the mixed logit model.

price if it is served from a perceived clean kiosk. Across both items, consumers are willing to pay an extra 30₹ for a vendor with good hygiene, which is double the price for the vegetable thali and 42% more than the price for a chicken thali. We also observe similar patterns when breaking down these results by area (see Table A3 in the Appendix). WTP in monetary amounts for a cleaner kiosk and vendor is highest in Sector V and lowest in Hazra, reflecting the relative economic differences in the consumer base between these areas.

4 Field Experiment with Vendors

Given that consumers have indicated they are willing to pay for street food that appears cleaner and more hygienic, why vendors are not investing in sanitation-related equipment or exerting more effort to ensure safer food practices? Such investment seems likely to increase their profits. We explore this question through a field experiment aimed at testing two hypotheses: Firstly, we posit that vendors might refrain from investing in necessary infrastructure due to credit constraints. If we alleviate this constraint through a "capital drop," then vendors should use this equipment to improve their business if it is profitable to do so. Secondly, we posit that vendors might lack the necessary know-how to provide safer food. Here, we assess whether offering food safety training in addition to the equipment further enhances any treatment effects.

4.1 Experimental Design

We restrict our sample to street food vendors who meet the following criteria: (i) they cook and sell food at their kiosks; (ii) they offer meal or lunch/dinner items; and (iii) they provide at least three varieties of food options. After conducting a comprehensive survey of vendors in the three specified areas of Kolkata, we identify 284 vendors who meet these criteria. Our local NGO then acts as an intermediary between our research team and the selected vendors, along with local union leaders, to secure their consent to participate.

In each of the three geographic areas, we categorize the sampled vendors into three types of natural urban clusters based on the number of other vendors within a 30-meter radius. The first set of clusters comprises

Table 6: Consumer Willingness to Pay by Attribute

	(1) Veg item	(2) Non-veg item	(3) Full sample
Clean kiosk (₹)	79.7***	96.1***	90.9***
Clean vendor (₹)	29.1***	30.6***	30.7***
Location > 5 min walk (₹)	-2.9***	-2.0***	-2.5***
Obs.	48,312	48,312	96,624
Avg. price in the market (₹)	32.9	73.4	51.8
Avg. price in non-AC restaurant (₹)	130-150	180-200	150-170
Avg. price in AC restaurant (₹)	160-180	230-250	200-220
Avg. price in luxury AC restaurant (₹)	230-250	320-350	280-300

Notes: Data from consumer survey. The top panel in the table reports implied WTP for safer street food options in Indian Rupees (₹). The bottom panel reports average prices for the same meals both in the street food market in Kolkata as well as in restaurants. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

vendors who have no other sampled vendors within this radius, making them the sole vendor in their cluster. The second set consists of vendors with one or two neighboring vendors within the 30-meter radius. The third set includes vendors with three or more other sampled vendors nearby. In streets where vendors are situated closely to one another, we measure the distance from the leftmost vendor to the rightmost vendor and consider a cluster to be a collection of those vendors located within 30 meters of each other. Approximately 89% of the vendors fall within cluster sizes ranging from one to five vendors.[21] This sampling yields 111 clusters in total: 36 in Sector V, 54 in Dalhousie, and 21 in Hazra.

Three primary considerations guide our clustering strategy. The first consideration is fairness. We want to avoid giving a vendor an advantage over their neighbor. In a few cases where a control vendor and a treatment vendor were neighbors, we worked closely with local union leaders to ensure that our randomization process did not disrupt social cohesion. The second consideration was to ensure we effectively divided treatment clusters from control clusters. The 30-meters distance between vendors is sufficient to ensure that a vendor cannot observe what is happening at another kiosk so that treatment does not taint the control clusters. The third was the need to account for similar competing environments and operating conditions. For example, vendors with nearby competitors in the street food market may operate their businesses differently from those without nearby competition.

We conduct a stratified random assignment with two levels. Stratification is done at the area and cluster size level.[22] Hence, with three areas and three types of cluster sizes, this yields nine strata. Vendor clusters are then randomly assigned to one of two treatment groups (described below) and a control group. Our randomization procedure yields 40 clusters in the control group (97 vendors), 35 clusters in the first treatment (94 vendors), and 36 clusters in the second treatment (93 vendors).

4.2 Details of the Intervention

We provide all vendors in our study with personalized banners for display, should they wish it, containing the kiosk's name and a menu card. All choose to display them, and they therefore serve our purposes of making it easier for us to identify them for monitoring after the intervention. Vendors in both treatment groups ("T1" and "T2") are equipped with essential sanitary facilities, which are costly to obtain and are not provided by local authorities, addressing the challenges highlighted in Table 1 and 2. The equipment is provided in June-July 2022,[23] at the beginning of the study period. In one of the treatments groups (T2), we also cross-randomize short training sessions on the proper use of these facilities, aiming to address the challenges highlighted in Table 3. No vendors in the treatment groups decline to receive the facilities or the training.

The new equipment supplied to both T1 and T2 consists of both "large equipment" and "small equipment". The former are durable, highly visible items worth approximately $350 USD per vendor, roughly equivalent to two months' worth of profits in our context. The items include (i) a water storage drum, (ii) a stainless steel drinking water container with a tap, (iii) a handwashing basin with a fitted water tank, and (iv) an 80-liter

[21] The remaining 11% belong to larger clusters. Figure A5 in the Appendix provides a graphical example of how we define a cluster.

[22] See, e.g., Imai et al. (2009), Imbens (2011), and Blair et al. (2019) for a technical discussion of randomization at the cluster size level.

[23] Due to logistical constraints, the delivery of the large equipment took place over three weeks, with the first group of vendors receiving the items at the end of June 2023.

waste bin. Most vendors already have some analogous, but inferior or very worn, equipment, although in some cases the additions were entirely new. Vendors have full discretion in using these items, as no usage restrictions are imposed. The small equipment consists of non-durable supplies we provide on a weekly basis throughout the initial 12-week treatment period.[24] This set includes (i) hand washing soap, (ii) aprons, (iii) hairnets, and (iv) chlorine tablets for treating the water from the vendor's primary water source.[25] These are items vendors do not typically have and require that they change their behavior to use, such as by adding the chlorine tablets to their water source each morning and cleaning and wearing the apron. Treated vendors also receive instructions on where to buy chlorine tablets based on their specific location at the end of the 12-week period.

The food safety training and support is provided to T2 over the initial 12-week treatment period as well. Each vendor receives short (15-minute) weekly visits from a trainer.[26] The training focuses on explaining the purpose of each provided item in relation to safe food practices and how to use them effectively. It covers a set of rules for safer and more hygienic food practices, accompanied by brief exercises to enhance vendor understanding. Trainers follow specific objectives and key messages for each visit, centered around the use of the equipment and general food safety practices.[27] Trainers track their interactions with vendors using reports and workbooks, including details such as whether or not vendors are using the equipment and how the trainings proceed. For example, they record whether the vendors seem interested or have made any progress on stated food safety goals.

4.3 Data Collection

Figure 1 provides a timeline summarizing our data collection. We collected baseline data in April 2022. At the end of the 12-week treatment period, in September 2022, we conducted our first endline survey (Endline 1). Both surveys gathered socio-economic and business data, including information about vendors' demographic characteristics, household welfare, business practices (such as work hours, number of employees, and suppliers), business assets, business financing (including current loans and savings), and vendors' behavior and awareness regarding food safety. Additionally, the endline data collected detailed information on how vendors utilized the provided equipment or if they purchased any new equipment. To assess the longer-term impacts of the intervention, we conducted a second endline survey (Endline 2) in February 2023, approximately 8 months after the initial delivery of the equipment.

To allow us to track changes throughout the study period, we collected detailed monitoring surveys. Specifically, we conducted two monitoring surveys before the delivery of equipment and training (in May 2022), nine weekly monitoring surveys during the treatment period (between July and September 2022), and five monitoring surveys administered every two weeks in the post-treatment period (between November 2022 and February 2023). These surveys aimed to quantify vendor behavior during their busy business hours, with a

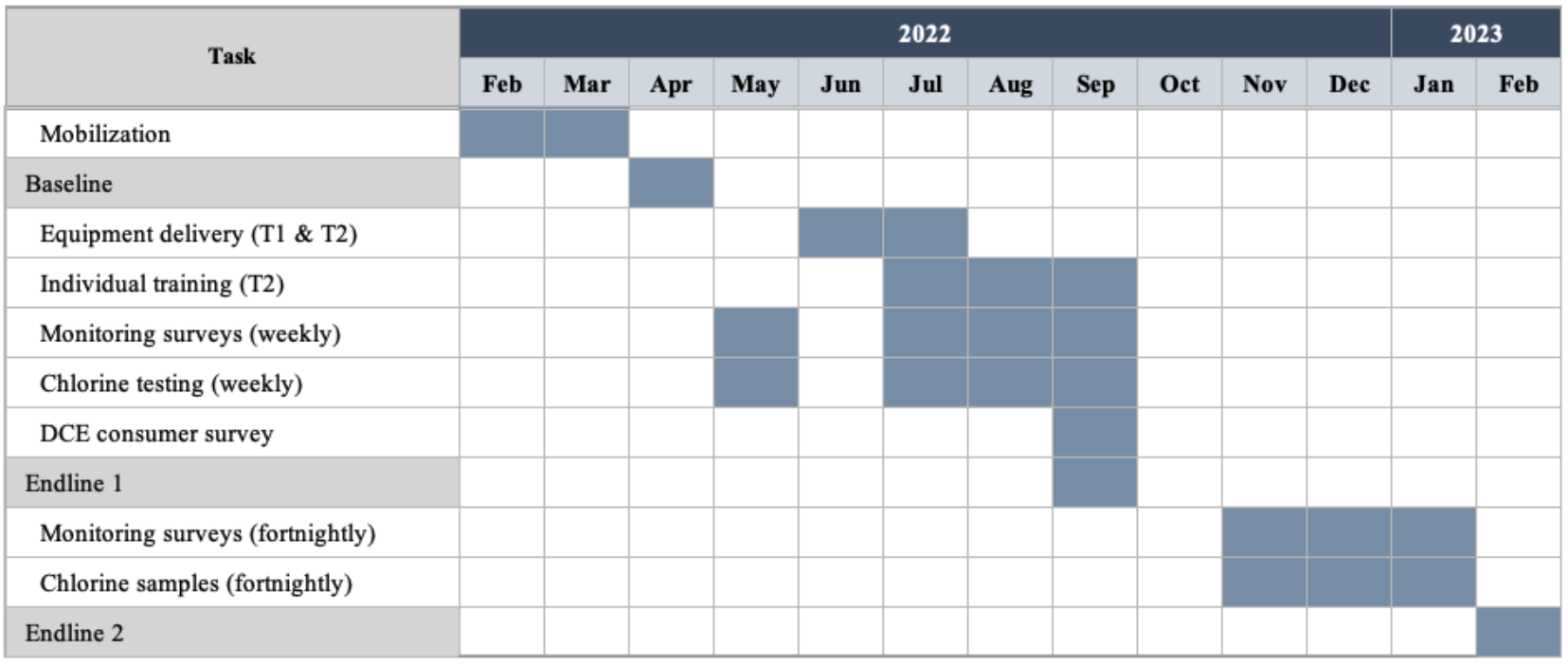
[24] They were delivered starting in the second week of July 2023 and continued throughout the 12-week treatment period.

[25] Treating water with chlorine tablets is one of the more straightforward ways to make water potable. A large literature has shown that treated water reduces diarrheal disease at the household-level in households; see, for example, Fewtrell et al. (2005), Arnold and Colford (2007), Clasen et al. (2007), and Haushofer et al. (2021).

[26] The trainings were delivered at the same time as the small equipment, starting in the second week of July 2023 and continuing throughout the 12-week treatment period.

[27] An excerpt from the booklet with the set of rules can be found in Figure A6 in the Appendix. The full booklet can be found here.

Figure 1: Timeline of Data Collection



Notes: Street Food Project Timeline 2022-2023.

specific focus on behaviors related to safe food practices, such as kiosk cleanliness and the vendor's hygienic behavior. Importantly, this information was collected through random audits of the vendors during their regular business operations to ensure (self-report) bias did not affect our results.[28] Additionally, during each visit, we asked vendors a limited set of questions about their business operations and food safety norms.[29]

To assess both the quality of the water each vendor is using and whether those in the treatment groups are using the provided chlorine tablets, we conduct random audits and collect individual water samples every two weeks. These samples are then tested for chlorine presence. Specifically, we collect 10ml of water between 12pm and 2pm and test the samples using a professional chlorine tester, which provides reliable estimates of the amount of free chlorine in the water.[30] We collect three pre-treatment water samples and continue sampling during and after the treatment period up to 10 samples in total between July 2022 and February 2023.

Attrition during the study was relatively minimal. Ten vendors dropped out after the baseline due to personal reasons, such as illness or returning to their villages. Consequently, our post-baseline sample consists of 274 vendors, 97 in the control group (40 clusters), 92 in the first treatment (35 clusters) and 85 in the second treatment (33 clusters). During the monitoring surveys, there were instances in which vendors were not present at their kiosks when enumerators visited. However, as demonstrated in Table A4 in the Appendix, we successfully maintained low and non-differential attrition rates during the entire study period, including for Endline 1 (3% attrition rate), and for Endline 2 (7% attrition rate).

[28] In the monitoring surveys, our data collectors were asked to evaluate the relevant equipment based on whether it looked "clean and professional", and we did not ask them to record whether or not the vendor was using the exact item that we provided. The questions on vendor valuations of the equipment were asked in Endline 1.

[29] To economize on vendor time, considering the frequency of our visits, we structured our surveys as follows: during weekly visits in odd weeks, vendors answered questions about their business, including sales, expenditures, profits, and the number of customers. In even weeks, they responded to a set of questions about food safety practices. During the post-treatment monitoring, which occurred fortnightly, both sets of questions (business practices and food safety norms) were asked during each monitoring round.

[30] Specifically, we use the "Hanna Instrument Free Chlorine Checker" (product link is available here). We record both the amount of free chlorine and the time and date of sample collection. Free chlorine, also known as residual chlorine, represents the amount of chlorine available for disinfection.

4.4 Pre-Intervention Summary Statistics and Balance Checks

Columns (1) to (4) in Table 7 provides summary statistics and balance checks for a range of pre-intervention variables. We regress the left variable on strata fixed effects and report the parameter estimates for the treatments and the standard errors. On average, the kiosk owners are predominantly male, with an average age of 44 years, and 38% have at least primary-level education. Vendors typically have extensive experience and do not change kiosks frequently; the average vendor has been at their current kiosk for 19 years.[31] The kiosks themselves are small, with an average of 2 employees in total. Despite their size, vendors work long hours, with kiosks open an average of 6 days a week, and stay at their stalls for around 13 hours per day. Most of this time is spent selling food (an average of 7.8 hours), 1.4 hours are spent on tasks defined as "cleaning," while the rest is dedicated to activities related to food preparation. Vendors report catering to an average of 71 consumers per day and earning an average of 660₹ in daily profits, which is approximately $8 USD.

In terms of food safety operations, as anticipated earlier, kiosks do have many of the assets that we provide, although they are provisional and rudimentary, and few vendors possess or wear an apron or hairnets and display basic sanitary items such as a hand washing soap. Furthermore, only 18% of vendors in our sample have ever received a training on food safety practices and handling, and even less (6%) report treating their primary water source to make it potable. Finally, the last row of the table reports the levels of free chlorine in the primary water storage container. The average level is 0.12 per million (ppm), which is below the range 0.20-0.50, the minimum recommended level for drinking water recommended by the WHO.[32].

In terms of the balance between the assigned groups, joint orthogonality F-tests do not indicate any significant differences across the groups at the 10% level for the range of pre-treatment variables under consideration. Additionally, we conducted checks for balance between each treatment group and the control group, as well as among the different treatment groups separately. The results, in terms of p-values for difference-in-means tests, are presented in columns (5) to (8). Out of 75 coefficients, only 3 show some significance, whereas the rest are well balanced.

5 Estimation Strategy and Results

In this section we estimate the effect of quality upgrading on various kiosk outcomes. We firstly aim to assess whether vendors utilize the provided equipment and whether we observe safer food preparation practices during regular kiosk operations. Second, we test to see whether food safety training amplifies any of these effects, particularly those regarding vendor behavior. Third, we investigate the treatment effects on various business outcomes and labor supply measures. If consumer demand responds positively to quality upgrading, we anticipate increases in customer numbers and profits for the treatment group vendors, which may, in turn, incentivize them to maintain higher food safety standards.

[31] Nearly all vendors in our context are affiliated with unions, which are relatively informal organizations that serve as intermediaries between vendors and the municipality. Local leaders of these unions play a crucial role in managing the operations of the street food market in Kolkata.

[32] See technical note by WHO here. Similar recommendations are provided by the CDC here

Table 7: Pre-Intervention Summary Statistics and Balancing

Variable	(1) Total Mean/(SE)	(2) Control Mean/(SE)	(3) Treatment 1 Mean/(SE)	(4) Treatment 2 Mean/(SE)	(5) Joint F-Test P-value	(6) (2)-(3) P-value	(7) (2)-(4) P-value	(8) (3)-(4) P-value
Demographics:								
Male	0.898	0.907	0.926	0.860	0.442	0.712	0.427	0.218
	(0.021)	(0.038)	(0.027)	(0.044)				
Age	43.863	44.175	43.819	43.581	0.999	0.996	0.922	0.970
	(0.747)	(1.437)	(1.366)	(1.067)				
At least primary education	0.384	0.423	0.340	0.387	0.330	0.154	0.412	0.405
	(0.031)	(0.052)	(0.061)	(0.048)				
Years at this kiosk	19.173	19.351	18.351	19.817	0.357	0.540	0.604	0.156
	(0.770)	(1.535)	(1.372)	(1.067)				
Business:								
Number of employees	2.268	2.412	2.138	2.247	0.548	0.250	0.493	0.799
	(0.123)	(0.187)	(0.238)	(0.220)				
Weekly number of work days	6.243	6.293	6.210	6.225	0.595	0.293	0.383	0.636
	(0.041)	(0.065)	(0.082)	(0.069)				
Hours of work per day	13.134	13.158	13.453	12.787	0.218	0.565	0.274	0.124
	(0.165)	(0.282)	(0.277)	(0.270)				
Hours of work per day	7.785	7.799	8.088	7.461	0.153	0.472	0.214	0.078*
	(0.138)	(0.211)	(0.240)	(0.237)				
Hours spent cleaning	1.355	1.413	1.318	1.332	0.478	0.307	0.305	0.878
	(0.035)	(0.052)	(0.063)	(0.064)				
Daily number of customers	75.714	70.345	74.598	82.353	0.102	0.539	0.018**	0.255
	(3.351)	(4.778)	(6.887)	(5.384)				
Daily profits (₹)	659.098	630.163	688.122	659.494	0.803	0.600	0.515	0.873
	(27.578)	(37.386)	(60.866)	(41.383)				
Food safety:								
Kiosk has handwashing facility	0.950	0.967	0.931	0.952	0.430	0.177	0.507	0.512
	(0.012)	(0.013)	(0.026)	(0.019)				
Kiosk has garbage bin	0.880	0.878	0.874	0.887	0.941	0.972	0.816	0.749
	(0.018)	(0.024)	(0.038)	(0.030)				
Kiosk has drinking water facility	0.996	0.994	1.000	0.994	0.331	0.306	0.973	0.197
	(0.003)	(0.005)	(0.000)	(0.006)				
Vendor uses an apron	0.082	0.072	0.103	0.071	0.690	0.568	0.731	0.343
	(0.016)	(0.023)	(0.036)	(0.024)				
Vendor wears hair cover	0.011	0.011	0.017	0.006	0.675	0.582	0.531	0.415
	(0.005)	(0.007)	(0.013)	(0.006)				
Previous food safety training	0.183	0.175	0.170	0.204	0.975	0.956	0.924	0.858
	(0.030)	(0.043)	(0.038)	(0.071)				
Awareness [0, 6]	2.229	2.186	2.245	2.258	0.939	0.704	0.870	0.928
	(0.094)	(0.131)	(0.139)	(0.212)				
Water:								
Treats main water source	0.055	0.072	0.040	0.054	0.813	0.569	0.583	0.993
	(0.018)	(0.035)	(0.025)	(0.032)				
Chlorine (ppm)	0.160	0.150	0.165	0.164	0.776	0.536	0.580	0.992
	(0.008)	(0.016)	(0.016)	(0.011)				

Notes: Data from the baseline and two pre-treatment monitoring surveys (surveys 1 and 2). Columns (1) to (4) present the parameter estimates and the associated standard errors for the treatment dummies, derived from a regression of the left variable on strata dummies and treatment dummies. Columns (5) to (8) report the p-values from the difference tests. Variables "male" through "number of employees" are from the baseline survey and have 284 observations; variables "work days" through "profits" are from the baseline and first pre-treatment monitoring surveys and have 543 observations; variables "handwashing facility" through "water treatment" are from the two pre-treatment monitoring surveys and have 523 observations. "Chlorine" is free chlorine parts per million, and has 698 observations. Panel (a) of Figure A7 in the Appendix illustrates the distribution of chlorine levels for the entire sample, and panel (b) for each area separately. The WHO recommends residual chlorine levels between 0.20 and 0.50 ppm for potable water (see technical note here). These visual representations show that, at baseline, the vast majority of vendors have a chlorine level in the water falling below the range of 0.20-0.50.

5.1 Outcome Variables

We create four outcome variables to measure street food safety. Two variables focus on the usage of sanitary equipment, while two others focus on daily food safety practices. Our aim is to capture "best behavior," which encompasses equipment or practices considered "clean and professional."[33] Each variable represents a count of observed "best behaviors" within its respective category, taking on integer values between zero and the maximum number of "best behaviors" that can be observed for that category. Consequently, a higher count indicates a greater occurrence of "best behavior" outcomes. For example, if a count variable for a vendor takes a value of three out of four, it means that the vendor exhibited three instances of "best behavior" within that category when monitored.

Concerning item usage, the "large equipment" count variable can take a value between zero and four if the kiosk is observed to display a clean and professional-looking (i) handwashing facility, (ii) primary water storage container, (iii) drinking water facility, and (iv) garbage bin. Each of these is considered a "best behavior" for large items and contributes to the count. The "small equipment" count variable can take a value between zero and three if the vendor is observed (i) wearing a clean and professional-looking apron, (ii) a hair cover, and (iii) using the handwashing facility with soap. Each of these contributes to the count of "best behaviors" for small equipment.

Concerning food-safety practices, the "kiosk environment" count variable can take a value between zero and six if the vendor (i) uses soap to wash dishes, (ii) the dishwater is clean, (iii) the garbage bin is clean and empty, and (iv) there is no visible garbage, (v) stagnant water, or (vi) food on the ground in or around the kiosk. Each of these is considered a "best behavior" for kiosk environment and contributes to the count. The "food handling practices" count variable can take a value between zero and seven if the vendor (i) uses disposable plates, (ii) keeps the counter where food is prepared clean, (iii) uses a clean towel, (iv) keeps cooked and (v) raw food covered, (vi) uses tongs or serving spoons to handle food, and (vii) washes their hands before touching food. Each of these also contributes to the count of "best behavior" for food handling practices.

Additionally, we also consider the amount of chlorine content in the primary water source at the kiosk as an outcome, where sufficiently high levels of chlorine indicate that the water is safe to drink. We consider this outcome variable separately from the small equipment count variable because this is not a count measure. This is a binary variable taking value one if the amount of chlorine is above 0.20 ppm, and zero otherwise.

5.2 Estimation Approach

For the four count variables described earlier, we estimate intent-to-treat (ITT) effects using the following Poisson specification:

$$\ln \mathrm{E}[Y_{i,c,t}|\mathbf{X}_{i,c,t}] = \beta_0 + \beta_1 T_{1,c,t} + \beta_2 T_{2,c,t} + \theta \bar{a}_{i,c,-1} + \mu_{strata} + \boldsymbol{W}'_{i,c,t}\boldsymbol{\gamma} \tag{1}$$

[33] Note that we provide enumerators with example pictures illustrating what is considered clean and professional in this context. We avoid using pictures of the equipment we provided to prevent potential data bias, as it is highly unlikely that vendors in the control group possess the same items, such as a handwashing station or drinking water facility.

where for vendor i, within cluster c, at time t, $Y_{i,c,t}$ represents a vector of outcome variables, including "large items", "small items", "kiosk environment" and "food handling". In equation (1), $E[Y_{i,c,t}|\mathbf{X}_{i,c,t}] = e^{\mathbf{X}'_{i,c,t}\beta}$ represents the expected value of the dependent variable, which is the exponential of the product between the vector of explanatory variables $\mathbf{X}_{i,c,t}$ and the coefficients β. The model is estimated via maximum likelihood. Whereas, for "chlorine $>$ 0.2ppm" and other outcome variables, such as business outcomes and labor supply, we estimate ITT effects with OLS using a log-linear specification. The variables $T_{1,c,t}$ and $T_{2,c,t}$ are dummies indicating assignment to two different treatments, with the control group as the reference category. Specifically, $T_{1,c,t}$ equals 1 if the vendor belongs to the "equipment" treatment group at time t, and 0 otherwise; $T_{2,c,t}$ is equal to 1 if the vendor is in the "equipment w/ training" treatment group at time t, and 0 otherwise. $\bar{a}_{i,c,-1}$ denotes the pre-treatment average sanitary equipment observed at the kiosk, and μ_{strata} represents strata fixed effects. The vector $\boldsymbol{W}_{i,c,t}$ comprises a small set of control variables, including fixed effects for the survey period, interviewer, number of employees, and years of experience. Since treatment assignment occurs randomly at the cluster level, we employ clustered standard errors in all specifications. Here, β_1 and β_2 identify the effect of equipment provision and equipment with training, and the relative difference between them reflects the effect of training.

5.3 Treatment Effects on Equipment Usage and Practices

Table 8 presents the first set of results which focus on the short-term impacts of the treatment, measured during the 3-month treatment period (monitoring surveys 3-11) up until the first endline survey in September 2022.[34] During this period, treated vendors were receiving the equipment (T1 and T2) or the individual training (T2). Columns (1), (2), and (3) display treatment effects on "equipment usage," which indicate the extent to which vendors improved their kiosk equipment over the course of the experiment. Columns (4) and (5) consider the broader impacts of the treatment on kiosk operations, which we refer to as "food-safety practices."

Looking first at Column (1), we observe that both treatment groups are much more likely to have cleaner and more professional-looking large equipment than the control group. The average count for this variable in the control group is 0.83 (less than one such equipment item out of four). In the treatment groups, this number doubles, with 207% more in T1 and 184% more in T2, with the two coefficients not statistically different. This indicates that treated vendors regularly utilize roughly 59-64% of the large equipment provided to them (two to three large equipment out of four).[35] Turning to Column (2), very few vendors in the control group use any of the small equipment (almost zero out of three). We find a modest yet significant improvement in small equipment use for T1, while the coefficient for T2 is again not statistically different from that of T1. The largest treatment effects we find are for chlorine levels in Column (3). During the treatment period, only 8% of control group vendors had free chlorine levels above the minimum of 0.20 ppm in their water containers, while almost all T1 (97%) and T2 (99%) vendors surpassed this level.

[34] As a robustness check, we adopt an alternative approach by creating four linear indices instead of the count variables in Column (1), (2), (4) and (5). Each index is calculated as the count of the observed "best behaviors" divided by the number of maximum "best behaviors" in that category. Consequently, a higher index value signifies better (safer) outcomes. Each index ranges from 0 to 1. For example, if the mean of an index for a vendor is 0.20, it indicates that the vendor exhibits 20% of their "best behavior." The results are presented in Table A5 in the Appendix.

[35] Table A6 in the Appendix showcases the treatment effects for each component of the count variable "large equipment" (Columns 1-4) and "small equipment" (Columns 5-7). Furthermore, Table A9, also in the Appendix, reveals that the larger treatment effect for both count variables is observed among vendors operating in Sector V, which is the most affluent area in our study.

Table 8: Treatment Effects on Equipment Usage and Practices

	(1)	(2)	(3)	(4)	(5)
	Equipment Usage			Food-Safety Practices	
	Large equip. (0-4)	Small equip. (0-3)	Chlorine $\mathbb{1}(> 0.20)$ (ppm)	Kiosk environm. (0-6)	Food handling (0-7)
Equipment (T1)	1.123^{***}	0.258^{*}	0.887^{***}	0.174^{***}	0.060^{**}
	(0.075)	(0.141)	(0.018)	(0.031)	(0.027)
w/ training (T2)	1.045^{***}	0.210	0.907^{***}	0.120^{***}	0.050
	(0.089)	(0.146)	(0.017)	(0.036)	(0.032)
Control mean:	0.83	0.23	0.08	2.82	3.30
T1 effect (%):	207.6	29.5	1121.7	19.0	6.2
T2 effect (%):	184.3	23.4	1147.6	12.7	5.2
Clusters:	107	107	106	107	107
Observations:	2303	2303	1169	2303	2303
Log-likelihood:	-3032.68	-1229.30	-	-3663.27	-3814.65
p-value T1-T2:	0.21	0.73	0.22	0.12	0.77

Notes: Data from monitoring surveys (random audits) measured during the 3-month treatment period (monitoring surveys 3-11), up until the first endline survey in September 2022. Outcome variables in Column (1), (2), (4) and (5) are equal to the number of components of each count variable observed at the time of data collection. We use a Poisson regression model for estimation. Whereas, in Column (3) the outcome variable is a binary variable taking value one if the amount of chlorine is above 0.20 ppm, and zero otherwise. "T1" equals one if the vendor belongs to the "equipment" treatment group, and zero otherwise. "T2" is equal to one if the vendor is in the "equipment w/ training" treatment group, and zero otherwise. All regressions include strata fixed effects and the pre-treatment average sanitary equipment observed at the kiosk. To increase precision, we also include fixed effects for the survey period, interviewer, number of employees, and years of experience. The results do not change with or without these controls. Standard errors at the cluster level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Moving to Columns (4) and (5), the average number of best behaviors related to the kiosk environment in the control group is 2.73 (out of six), and related to food handling is 3.28 (out of seven). Looking at the results, we uncover small yet significant treatment effects on broader kiosk operations. Based on the estimates, treated vendors are slightly more likely to maintain a cleaner kiosk environment and slightly better food handling practices than their counterparts in the control group. Upon examining the single components of the count variables (see Table A7 and Table A8 in the Appendix), we find that vendors in the treatment group are more inclined to use soap when cleaning dishes and demonstrate improved maintenance of cleanliness in their garbage bins and dishwater. However, we do not observe significant changes in the presence of garbage, water, or food on the ground around the kiosk, and we note limited improvements in maintaining clean counters or employing clean towels.

5.4 Food Safety Trainings

We find limited effects of the food safety trainings. T2 did not show greater safe food preparation practices as compared to vendors in T1; in fact, T2 vendors even exhibit statistically smaller values in some of the equipment components (see Table A6 in the Appendix). Additionally, we observe relatively few differences between T1 and T2 even when we look at the specific outcomes that the training covers (see Table A7 and A8 in the Appendix). T2 vendors demonstrated a better ability to identify reasons for hand washing, though this was only weakly significant and disappeared after the treatment period ended (Table A10 provides detailed results). We do not find any discernible differences among the three groups in terms of how often vendors

emptied their garbage bins or in their ease of performing standard food practices, such as handwashing before food preparation or covering cooked food.

The lack of additional behavioral changes resulting from the training sessions may be attributed to vendors not perceiving significant value in them. To investigate this possibility, we collect data to evaluate vendors' perceptions. Only 25% of T2 group vendors reported that they (i) found the training useful, (ii) would recommend it to other vendors, (iii) changed their behavior as a result of the training, or (iv) believed the training added value to their business. When asked why they did not adopt these changes, several vendors mention that they are not accustomed to these new practices or cite a lack of time as the primary constraint.

These results align with data on vendor participation collected by our training team. After each of the 12 training sessions, we ask our team to assess how engaged and knowledgeable vendors are about each training topic. At the beginning of the treatment period, our team reports very high engagement levels: for the first four weeks, over 90% of vendors report being either engaged or highly engaged with the training topics, as illustrated in Figure A11 in the Appendix. However, this declines to 20% after week six, and then to approximately 6% for the remaining four weeks.

5.5 Treatment Effects in the Medium-Term

In Table 8, we documented that treatment group vendors do tend to use the equipment provided and there is evidence of some broader behavioural changes in other areas of kiosk operations. However, we are interested to see whether these changes persist after the treatment period has ended and the small items are no longer provided on a weekly basis. In this case, if the effort to obtain these items is too great, we may see a drop-off in small item usage. Table 9 presents results on the medium-term effects of the treatment using data collected over the entire study period. This includes data collected during both the treatment period and the 5-month post-treatment period (monitoring surveys 12-16), up until the second endline survey in February 2023. The outcomes in columns (1)-(5) correspond to those in Table 8 and we include an interaction term for the 5-month post-treatment period.

Across treatment groups and outcomes, we observe a drop off in both equipment usage and food-safety practices after the end of the treatment period. This is true not only for the small items, but also for the large equipment. We also see negative (though not significant) effects on food-safety practices. Chlorine usage in particular drops from almost universal compliance among treatment group vendors during the treatment period to pre-treatment levels (where close to zero vendors have more than 0.2ppm of free chlorine in their primary water storage container). This decline occurred despite treated vendors receiving clear instructions on where to buy chlorine tablets based on their specific location. Figure A9-a) in the Appendix depicts the distribution of chlorine presence in primary water storage containers, and A9-b) compares the percentage of vendors with free chlorine levels in the water above the minimum requirement during the observational period. Both demonstrate the significant behavioral change when we ceased providing chlorine tablets for free.

These results lead to several conclusions. Firstly, simple and low-cost food safety practices that requires additional effort does not guarantee compliance of vendors, even when vendors are informed of the benefits of such practices. Secondly, merely delivering chlorine tablets to vendors with straightforward usage instructions

markedly enhances the likelihood that water used in kiosk operations is potable. Thirdly, the large, durable and low-effort items are also subject to decline in usage, suggesting that additional factors to vendor effort may be at play in maintaining improved kiosk environments.

Table 9: Medium-Term Treatment Effects on Equipment Usage and Practices

	(1)	(2)	(3)	(4)	(5)
	Equipment Usage			Food-Safety Practices	
	Large equip. (0-4)	Small equip. (0-3)	Chlorine $\mathbb{1}(> 0.20)$ (ppm)	Kiosk environm. (0-6)	Food handling (0-7)
Equipment (T1)	1.129***	0.300**	0.885***	0.147***	0.057**
	(0.076)	(0.129)	(0.018)	(0.040)	(0.028)
w/ training (T2)	1.033***	0.235*	0.900***	0.111***	0.074**
	(0.087)	(0.135)	(0.016)	(0.037)	(0.034)
Equipment (T1) × post	-0.213**	-0.158	-0.834***	-0.019	-0.034
	(0.089)	(0.150)	(0.022)	(0.061)	(0.039)
w/ training (T2) × post	-0.201**	-0.281*	-0.844***	-0.008	-0.039
	(0.091)	(0.166)	(0.027)	(0.061)	(0.048)
Control mean:	0.88	0.29	0.04	2.73	3.28
T1 effect (%):	209.4	35.0	2055.3	15.9	5.8
T2 effect (%):	180.8	26.5	2092.2	11.7	7.7
Clusters:	108	108	106	108	108
Observations:	3587	3587	2400	3587	3587
Log-likelihood:	-4791.15	-2142.66	-	-5797.49	-6080.75
p-value T1-T2:	0.10	0.62	0.31	0.29	0.63

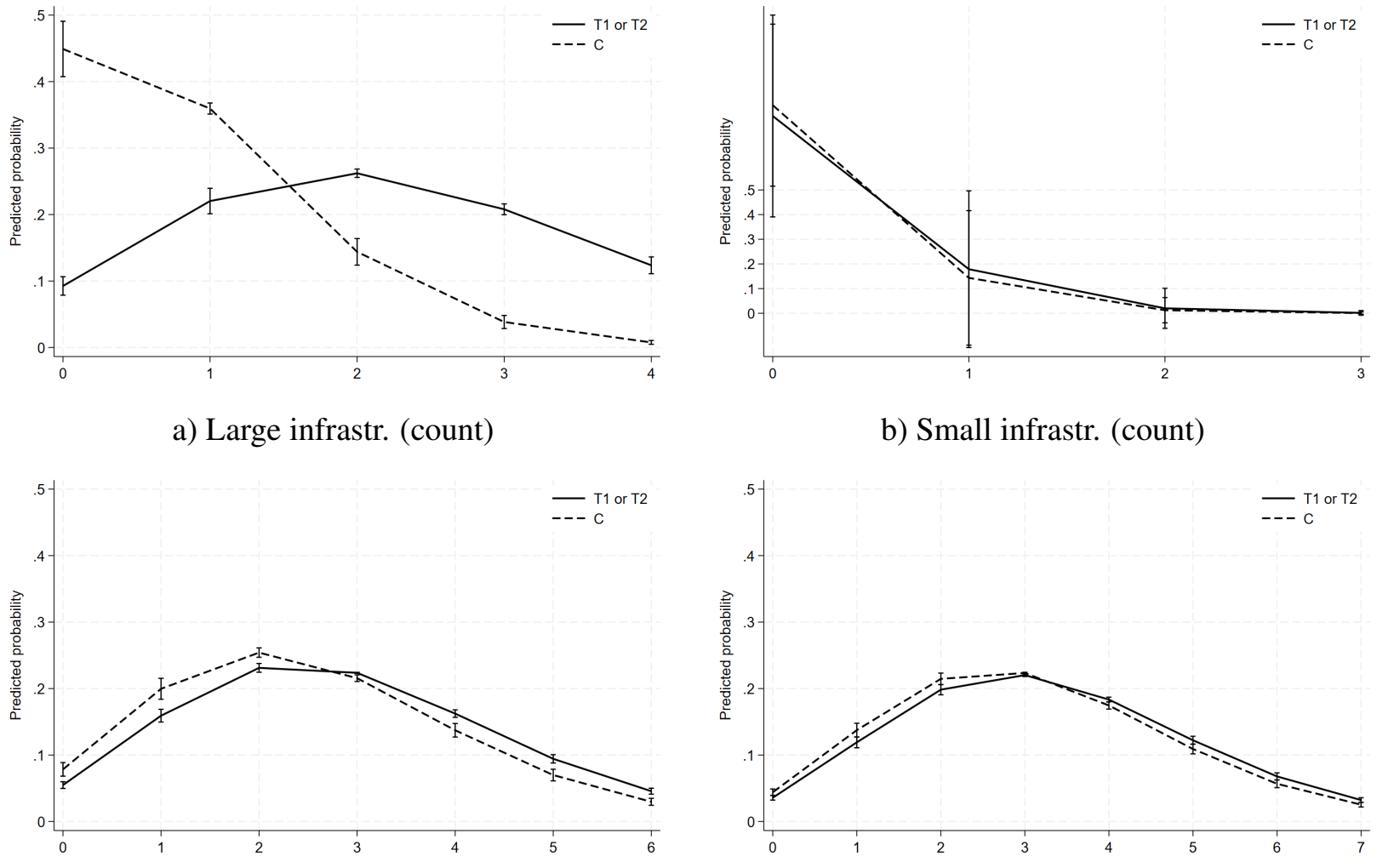
Notes: Data from monitoring surveys (random audits) measured during the entire study period up until the second endline survey in February 2023. Outcome variables in Column (1), (2), (4) and (5) are equal to the number of components of each count variable observed at the time of data collection. We use a Poisson regression model for estimation. Whereas, in Column (3) the outcome variable is a binary variable taking value one if the amount of chlorine is above 0.20 ppm, and zero otherwise. "T1" equals one if the vendor belongs to the "equipment" treatment group, and zero otherwise. "T2" is equal to one if the vendor is in the "equipment w/ training" treatment group, and zero otherwise. "post" is a binary variable taking value one for observations after the end of the treatment period (after Endline 1), and zero otherwise. All regressions include strata fixed effects and the pre-treatment average sanitary equipment observed at the kiosk. To increase precision, we also include fixed effects for the survey period, interviewer, number of employees, and years of experience. The results do not change with or without these controls. Standard errors at the cluster level. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

5.6 Distributional Treatment Effects

While the above results provide an overview of the average effects, examining the distributional treatment effects on equipment usage and practice offers a more comprehensive understanding of our intervention. Given the similarity in treatment effects observed in T1 and T2, we combine vendors into one treatment group to facilitate visualizing the effects of providing the equipment. Figure 2-a) presents the average predicted probabilities for large equipment, ranging from zero to four counts, for both treatment and control vendors. The probability of observing zero clean and professional-looking equipment drops from 45% to 10%, while the probability of observing one large equipment decreases from 35% to 22%. The treatment primarily increases the probability of vendors in the treatment group being observed with two to four large equipment items. Figures 2-b), 2-c), and 2-d) present the average predicted probabilities for small equipment, kiosk environment, and food handling, respectively. In the case of both food safety practice counts, the treatment's distributional effects are consistent with the results in 2-a)– it reduces the probability of observing a small count of "best

behaviors" and increases the probability of observing a large count. However, while statistically significant on average, the effects are visually small in practice. Consequently, we infer that treatment effects on food safety practices requiring daily effort are marginal and challenging to discern.

Figure 2: Distributional Treatment Effects on Equipment Usage and Practice



a) Large infrastr. (count)

b) Small infrastr. (count)

c) Kiosk environm. (count)

d) Food handling (count)

Notes: Data from monitoring surveys (random audits). All the figures are based on the estimates from Table 9. Figure a) shows the average predicted probabilities for large equipment usage, ranging from zero to four counts, for both treatment and control vendors. Figures b), c), and d) depict the average predicted probabilities for small equipment (ranging from zero to three counts), kiosk environment (ranging from zero to six counts), and food handling (ranging from zero to seven counts), respectively.

5.7 Treatment Effects on Business Outcomes and Labor Supply

Table 10 examines the impact of the treatment on various business outcomes and labor supply measures. To increase statistical power, we consolidated all observations into one treatment group dummy to yield a single comprehensive estimate for the entire observation period. As shown in Panel A, Column (1), equipment provision led to an average profit increase of 5%. This rise appears to stem from increased turnover, with vendors in the treatment group reporting a 5.9% increase in customers (Column 4), and higher sales and expenditures (Columns 2 and 3). The null effect on prices in Column (5) is particularly notable, given that: (i) the value of the equipment transfer was quite large; and (ii) street food consumers report being willing to pay substantially higher prices for food that comes from a cleaner kiosk and vendor. We come back to this point in Section 6.1. Panel B reveals that vendors did not extend their time at work, with no noticeable changes in the number of days per week (Column 1) or hours worked per day (Column 2). Additionally, we find no

significant differences in the hours vendors spent on preparation, selling, or cleaning (Columns 3, 4, and 5, respectively).[36]

Table 10: Treatment Effects on Business Outcomes and Labor Supply

	(1)	(2)	(3)	(4)	(5)
	Panel A: Business Outcomes				
	Profits, daily	Sales, daily	Expend., daily	Custom., daily	Prices
Equipment (T1 or T2)	0.048**	0.067**	0.081***	0.057*	-0.001
	(0.024)	(0.026)	(0.029)	(0.030)	(0.014)
Control mean:	6.48	8.15	7.93	4.28	3.68
T effect (%):	5.0	7.0	8.4	5.9	-0.1
Clusters:	108	108	108	108	103
Observations:	3106	3109	3109	2896	1576
Adjusted R^2:	0.51	0.71	0.69	0.54	0.98
	Panel B: Labor Supply				
	Days, weekly	Total, daily hrs.	Prepare, daily hrs.	Sell, daily hrs.	Cleaning daily hrs.
Equipment (T1 or T2)	0.003	0.011	0.014	0.003	0.023
	(0.006)	(0.009)	(0.011)	(0.013)	(0.015)
Control mean:	1.80	2.52	1.30	1.97	0.30
T effect (%):	0.3	1.1	1.4	0.3	2.3
Clusters:	108	108	108	108	108
Observations:	3105	3110	3110	3110	3110
Adjusted R^2:	0.19	0.47	0.24	0.50	0.44

Notes: Data from monitoring surveys (random audits), except for price data which comes from Endline 2. All outcome are logged. In Panel A, profits, sales, expenditures, and prices are in rupees. "Customers, daily" refers to the average number of customers per day in the previous week. "Prices" refers to the price of each item sold at a kiosk. In Panel B, "Days, weekly" refers to the number of days that the kiosk was open in the previous week. "Total, daily hrs." refers to the average number of hours per day the kiosk was open in the previous week. "Prepare, daily hrs." refers to the average number of hours per day the vendor spent preparing food to sell in the previous week. "Sell, daily hrs." refers to the average hours per day spent selling in the previous week. "Cleaning, daily hrs." refers to the average number of hours per day the vendor spent cleaning the kiosk in the previous week. OLS regressions are conducted at the vendor level and pooled for the entire study period, except for price regressions which are conducted at the item level and only for Endline 2. "Equipment (T1 or T2)" equals one if the vendor belongs to T1 or T2, and zero otherwise. All OLS regressions include strata fixed effects and logged average pre-treatment outcome measured at baseline. This means that we adopt an ANCOVA specification for all these regressions (e.g., McKenzie, 2012). To increase precision, we also include a set of controls that predict the outcome variables. These include fixed effects for the survey period, interviewer, number of employees, years of experience, as well as a control for whether the vendors keep their accounting. The results do not change with or without these controls. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

5.8 Returns From Using the Large Equipment

The ITT effects on business outcomes and labor supply provide an average result for all participants, grouped by their assigned treatment, irrespective of their compliance. However, in our context, this approach might limit our understanding of the intervention's effects, given that compliance with the utilization of large and valuable equipment items is approximately 60%. Consequently, overall noncompliance rates may underestimate the true benefits of the intervention. To address this limitation, we shift our focus to the treatment effects among compliers – vendors who were prompted to utilize large equipment by their assignment – using instrumental variable (IV) techniques. We define the treatment as a binary variable taking a value of one if

[36] Nor do we find any differences in the selection of menu items sold at the kiosks; results are available upon request.

the vendor was observed using three or four (out of four) large, clean, and professional-looking equipment items, and zero otherwise. The results presented in Table 11 indicate that the returns from utilizing such large equipment items were substantial. Treated vendors experienced a 10.8% increase in profits compared to the control group over the entire study period, resulting from selling to 12.4% more customers. These effects are more than two times larger than the ITT effects. In absolute terms, this translates to approximately 74₹ in daily profits (or approximately $0.90 USD) and an increase of 9 customers daily.

Table 11: Returns From Using Large Equipment (IV analysis)

	(1)	(2)	(3)	(4)	(5)
	Panel A: Business Outcomes				
	Profits, daily	Sales, daily	Expend., daily	Custom., daily	Prices
Use large equipment	0.108**	0.147***	0.177***	0.124*	-0.004
	(0.052)	(0.057)	(0.064)	(0.063)	(0.055)
Control mean:	6.48	8.15	7.93	4.28	3.68
T effect (%):	11.4	15.9	19.4	13.2	-0.4
Clusters:	108	108	108	108	103
Observations:	3106	3109	3109	2896	1576
Adjusted R^2:	0.34	0.50	0.46	0.37	0.98
	Panel B: Labor Supply				
	Days, weekly	Total, daily hrs.	Prepare, daily hrs.	Sell, daily hrs.	Cleaning daily hrs.
Use large equipment	0.007	0.024	0.034	0.008	0.051
	(0.012)	(0.020)	(0.024)	(0.029)	(0.032)
Control mean:	1.80	2.52	1.30	1.97	0.30
T effect (%):	0.7	2.5	3.4	0.8	5.2
Clusters:	108	108	108	108	108
Observations:	3105	3110	3110	3110	3110
Adjusted R^2:	0.09	0.38	0.12	0.46	0.35

Notes: Data from monitoring surveys (random audits), except for price data which comes from Endline 2. All outcome are logged. In Panel A, profits, sales, expenditures, and prices are in rupees. "Customers, daily" refers to the average number of customers per day in the previous week. "Prices" refers to the price of each item sold at a kiosk. In Panel B, "Days, weekly" refers to the number of days that the kiosk was open in the previous week. "Total, daily hrs." refers to the average number of hours per day the kiosk was open in the previous week. "Prepare, daily hrs." refers to the average number of hours per day the vendor spent preparing food to sell in the previous week. "Sell, daily hrs." refers to the average hours per day spent selling in the previous week. "Cleaning, daily hrs." refers to the average number of hours per day the vendor spent cleaning the kiosk in the previous week. 2SLS regressions are conducted at the vendor level and pooled for the entire study period, except for price regressions which are conducted at the item level and only for Endline 2. "Use large equipment" is the treatment variable which equals one if the vendor was observed using three or four (out of four) large, clean, and professional-looking equipment items, and zero otherwise. The treatment is instrumented with the variable "Equipment (T1 or T2)", which is equal one if the vendor belongs to T1 or T2, and zero otherwise. All 2SLS regressions include strata fixed effects and logged average pre-treatment outcome measured at baseline. This means that we adopt an ANCOVA specification for all these regressions (e.g., McKenzie, 2012). To increase precision, we also include a set of controls that predict the outcome variables. These include fixed effects for the survey period, interviewer, number of employees, years of experience, as well as a control for whether the vendors keep their accounting. The results do not change with or without these controls. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

6 Why Are Improved Equipment and Training Not Sufficient?

In the previous section, we uncovered four main findings. Firstly, a significant number of vendors who received treatment made use of the large equipment we provided. However, despite the value of these facilities

and the relatively low effort required for their use, we did not achieve full compliance. We found smaller effects for the smaller items that required some effort for use, with the exception of chlorine, for which there was almost full compliance during the treatment period. Second, we find considerable depreciation effects of the capital, with steep declines in usage of both the large and small items following the end of the treatment period. Chlorine usage in particular returns to near zero compliance. Thirdly, these changes translated into marginal shifts in business outcomes for the average vendor. However, when focusing on vendors fully utilizing the large equipment, we found non-negligible economic returns, suggesting that customers do respond to visible signals of quality. The equipment's total cost was 29,117₹. A simple back-of-the-envelope calculation suggests that, with an average daily profit increase of 74₹, it would take 393 days to recoup the investment (roughly one year). Lastly, despite extensive effort in the 1:1 training on food safety practices with vendors for nearly three months, we found no additional effect on vendors' practices. This leads us back to our initial question: if consumers value safer street food and the actual use and display of more sanitary kiosk equipment can yield some economic return, why do most vendors refrain from investing in equipment or exerting more effort to ensure safer food practices? In other words, why do we see a convergence back to a low-quality equilibrium, despite vendors with the new equipment earning more? In this section, we utilize the data collected during the Endline 2 survey to explore likely answers.

6.1 Constraints to Kiosk Investments

Bounded Rationality: Firstly, vendors may fail to recognize the potential returns on investment in equipment and safer food practices, suggesting they could be constrained by bounded rationality. During Endline 2, we asked vendors whether they were making regular use of the large and small equipment items we provided and their perception of these items' value to their business. As shown in Table 12, vendors that received the equipment items were more likely (ranging from 84% to 100% for different items) to report regular usage of the large equipment items than the smaller equipment items (ranging from 4% to 62%). These self-reported measures overstate the usage of equipment compared to our random audits, but, much as in our audits, larger equipment items get greater usage than smaller ones. For each equipment item, we observed a strong correlation between vendors' reported regular usage and their belief that the item adds value to their business that customers value it. These findings contradict the bounded rationality explanation, as they suggest that vendors are aware of the potential benefits of the provided equipment and will choose to utilize them only when they perceive value, both for their business and for customers.

Credit constraints: Vendors also may be facing overly stringent credit constraints. The low savings rate they reported means that most cannot afford to invest 29,117₹ in food safety equipment without taking out a loan. And in fact 95% of respondents at Endline 2 agree or strongly agree with the statement "It is too expensive for me to invest in large equipment items for my business" (see Figure 3). However, our results regarding treatment effects on profits suggest that vendors could recoup their investment in roughly 12 months. Whether this duration is considered excessively long depends on the vendors' access to finance and their risk aversion. Only 4% and 18% of vendors, respectively, reported that access to or the cost of finance was a major problem for their business (see Table 1). Furthermore, vendors in our sample have an average of 19 years of experience as informal entrepreneurs. Therefore, they are used to operating in a highly uncertain environment. This suggests that risk aversion alone does not provide a wholly satisfactory explanation for our findings.

Table 12: Vendor Perceptions of Equipment Value

	(1)	(2)	(3)	(4)	(5)	(6)
	Use regularly		Adds value to business		Customer values	
	Total Mean/(SE)	Pairwise t-test (T2-T1)	Total Mean/(SE)	Pairwise t-test (T2-T1)	Total Mean/(SE)	Pairwise t-test (T2-T1)
Large equipment:						
Handwash facility	0.843 (0.033)	0.413	0.861 (0.030)	0.674	0.849 (0.030)	0.680
Water container	1.000 (0.000)	-	1.000 (0.000)	-	1.000 (0.000)	-
Drinking water	1.000 (0.000)	-	1.000 (0.000)	-	1.000 (0.000)	-
Garbage bin	0.976 (0.012)	0.924	0.982 (0.010)	0.456	0.976 (0.012)	0.961
Small equipment:						
Apron	0.187 (0.039)	0.377	0.217 (0.041)	1.019	0.205 (0.041)	0.587
Hair cover	0.036 (0.014)	1.104	0.036 (0.014)	1.016	0.042 (0.015)	1.324
Handwash soap	0.620 (0.045)	-0.355	0.639 (0.045)	-0.187	0.548 (0.053)	1.350
Chlorine tablets	0.042 (0.018)	1.022	0.054 (0.019)	0.956	0.036 (0.013)	0.841

Notes: Data from Endline 2. Only treatment group vendors included. Columns (1), (3) and (5) present the parameter estimates and the associated standard errors for the excluded group dummy, derived from a regression of the left variable on strata dummies and treatment dummies. Columns (2), (4) and (6) report the t-statistics from the difference tests. "Use regularly" refers to whether or not the vendor uses the equipment provided regularly; "Adds value to business" indicates whether or not the vendor thinks that the equipment adds value to the kiosk; "Customer values" refers to whether or not the vendor believes that customers value the equipment. Strata fixed and clustered standard errors used when comparing means. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Local environment (1): To understand further why vendors may not be investing in quality upgrading, we used a set of Likert-type questions regarding the local institutional environment into the Endline 2 questionnaire. To enhance the clarity of the results, and given the consistent responses across both treatment groups, we combined their responses into a single group for analysis. Figure 3 visually presents these outcomes. The red horizontal bar to the left of the vertical solid black line represents vendors answering "Strongly disagree" or "Disagree" with the statement. The blue horizontal bar to the right aggregates vendors indicating "Neutral", "Strongly agree" or "Agree" responses. We include "Neutral" in this category because less than 1% of vendors respond neutrally. The dashed grey vertical lines each represent 20%. From this analysis, two suggestive results emerge.

Nearly all vendors either agreed or strongly agreed with the assertion that expensive tools or equipment pertinent to their business are frequently targeted for theft in their locale. Virtually all (95%) vendors cited theft as a significant impediment to investing in large equipment items. Anecdotal evidence from the 12-month study period corroborated this, with 15 vendors (9%) reporting theft of some large items provided as part of the treatment. Kiosks are typically situated in busy public areas, and their semi-permanent structures make it challenging to secure items when the kiosk is closed. However, vendors cannot legally insure any of their belongings at the kiosks, given their status in the informal sector.

No vendor included in our study possessed a license or any other documentation from the municipality granting them the right to operate. We found anecdotal evidence that vendors face harassment and threats to their operations from both the municipality and the police.[37] For example, the municipality often requests that the police evict vendors from their space or confiscate their products or equipment. Paying bribes to police officers is extremely common. For instance, in Dalhousie, every vendor pays a fixed amount weekly (around 100₹) to the police to continue operating. Vendors are regularly fined for illegally occupying street space, with the fine amount varying depending on the profitability of the kiosk. Our calculation regarding how long it would take them to recoup the investment did not account for the risk of theft nor the uncertainty and potential costs that comes with informality. Consequently, the actual returns on investments are likely to be much smaller than our back-of-the envelope calculations and could certainly help explain why vendors do not invest in quality upgrading.

Local environment (2): A large portion of vendors, 67%, acknowledged some level of price coordination, and 86% agreed that significant deviations from prevailing prices could lead to social repercussions within their community. A similar phenomenon is observed in the choice of meals to sell. Almost three-quarters, 72%, of vendors acknowledged some level of coordination in item choices, and 87% agreed that choosing to sell a meal very similar to those of other vendors would generate negative social consequences. Both these results suggest a strong inflexibility in their entrepreneurial activity in response to market dynamics. Despite limited "menu costs" in this sector, price adjustments are infrequent, with nearly 80% of vendors revising prices only once per year and an additional 10% doing so even less frequently. Vendors possess extensive knowledge of competitors' offerings, with the vast majority (95%) aware of both the meal varieties and pricing (80%) of their peers. Moreover, almost 95% of vendors attribute their profit fluctuations primarily to competition from fellow street food vendors, rather than from alternative dining establishments like restaurants. This suggests that vendors perceive price fluctuations as potentially detrimental to the cohesion of their social group, reflecting the constraining influence of local economic conditions on their entrepreneurial activities. To recoup any investments in kiosk quality, under these conditions vendors would likely be reliant on increased customer numbers only.

6.2 Constraints to Behavioral Change

While costly kiosk quality upgrading such as purchasing large equipment items may be problematic, most vendors also chose not to undertake better food safety practices in their kiosk operations. Many of these practices are low cost; for example, chlorine tablets for water purification are inexpensive. However, these practices also require that vendors are aware of safer food practices and put effort into implementing them. To evaluate vendors' understanding of these practices, we used the following method: we presented all vendors in the sample with a series of statements related to the "12 Golden Rules" of safe food preparation practices, as outlined by the Food Safety and Standards Authority of India (FSSAI). These principles align with the guidelines followed during the training sessions for T2 throughout the treatment period (Figure A6 in the Appendix provides an excerpt from the training booklet with the list of rules). Vendors were then asked to indicate how closely they believe they are already following each of these practices in their daily activities

[37] This has also been documented in Bhowmik (e.g., 2005); Patel et al. (e.g., 2014) and McKay et al. (2016). Due to the sensitivity of the issue, we did not ask vendors questions directly about harassment.

Figure 3: Self-Reported Constraints to Kiosk Investments

Notes: Data from a set of Likert-type questions incorporated into our Endline 2 questionnaire. All responses across treatment groups are combined into a single group for analysis. The red horizontal bar to the left of the vertical solid black line represents vendors answering "Strongly disagree" or "Disagree" with the statement. The blue horizontal bar to the right aggregates vendors indicating "Neutral", "Strongly agree" or "Agree" responses. We include "Neutral" in this category because less than 1% of vendors respond neutrally. Additionally, dashed grey vertical lines, each representing 20%, depict percentages.

using a Likert scale.

The results, presented in Figure A10 in the Appendix, highlight a significant gap between self-reported food safety behaviors and observed practices. More than 95% of vendors agree with the following statements: (i) they use potable water for food preparation; (ii) they keep their stall clean and pest-free; (iii) they wear clean clothes while preparing and cooking food; and (iv) they wash their hands before and after handling food. However, chlorine levels in our post-treatment water samples are below the recommended 0.20 ppm level for almost all vendors, and observations indicate 85% of vendors operate with visible garbage, stagnant water, or food on the ground in or around their kiosk. Other behaviors, such as maintaining the correct temperature of cooked and raw foods to prevent bacteria from forming and using separate cloths for cleaning, generate responses almost as high (more than 90%). However it seems unlikely that vendors simply respond affirmatively to all questions. Most acknowledge that they do not keep cold food at cool temperatures, use separate bins for different types of food waste, or use separate chopping boards and knives for raw meat and raw vegetables. Only one vendor agreed with all 12 behavior-related questions, but 75% agreed with between 8 and 10. We also do not observe significant differences between reported and observed outcomes for other behaviors; for example, vendors' responses regarding whether or not they treated the water in their primary

water storage container are very consistent with our chlorine test results.[38]

There are several potential explanations for this discrepancy. One is social desirability bias, where vendors may exaggerate the cleanliness of their stalls and practices to create a favorable impression for data collectors.[39] Bias resulting from the inaccurate interpretation of key terms in the questions or the Likert scale categories, which is sometimes referred to as reporting bias, may be another issue (da Cunha et al., 2019).[40] Memory recall may also be a factor, and systematic bias in self-reports tends to be more prominent for questions related to routine behaviors, such as hand-washing (Hansen et al., 2022). While we cannot definitively determine which of these biases is most likely to influence vendor responses, they can provide insights into why vendors may seem hesitant to make significant changes to their food preparation practices or to consistently purchase and use items like chlorine tablets and aprons. If reporting or recall bias is significant, vendors may believe that they are already adhering to proper food safety practices in their daily operations, such as regular hand-washing with soap or maintaining the cleanliness of their kiosk.

7 Conclusion

Street food is an important source of nutrition for urban-dwellers in low- and middle-income countries; however, it is also frequently considered a public health risk due to high levels of food contamination. In this paper, we considered both the demand and supply sides of the market for safe street food in Kolkata, India. While our consumer survey revealed considerable demand for safer street food, with consumers willing to pay almost three times the price for food from a clean kiosk, vendors nonetheless supply food prepared in unsafe environments. Using a field experiment with two treatment arms, we test whether quality upgrading through the provision of visible sanitation-related equipment and food safety training improves both the hygienic environment of the kiosk and general food safety practices by vendors. Findings indicate that vendors do use the equipment provided during the treatment period, though there is considerable drop-off in usage after the treatment period ends. Spillover effects on the broader kiosk environment and safe food handling practices are positive but small. Finally, we find no evidence that the training had impacts on kiosk operations or vendor behavior independent of providing the equipment.

The drop off in equipment usage and lack of broader substantive changes in kiosk operations regarding food safety raises the question as to whether this type of intervention can result in lasting improvements. The finding that treatment group vendors have higher customer numbers and profits suggests improvements are possible. However, the precarious nature of their business, which leaves them open to extortion and theft, highlights the difficulty of addressing a lemon market for informal "survivalist" firms in an emerging economy.

Our findings also have bearing for policy that can be used to better local conditions. Vendors do use equipment when it is provided, though our results indicate they are unlikely to purchase these items on their own, and it would be prohibitively expensive for local governments to provide all of the equipment provided here.

[38] Note that other studies have documented discrepancies between self-reported and observed behavior in a food safety setting (e.g., DeDonder et al., 2009; Sani and Siow, 2014; da Cunha et al., 2019; Zhang et al., 2022).

[39] Social desirability bias (SDB) in self-reported behavior has been documented across a range of topics; for example, illicit drug use (Latkin et al., 2017), alcohol consumption (Davis et al., 2010), vote buying (Gonzalez-Ocantos et al., 2012), and exercise (Adams et al., 2005; Brenner and DeLamater, 2014).

[40] For instance, the definition of a "clean kiosk" may vary among vendors and from a food safety perspective. Vendors might agree with a statement even if they engage in the behavior only occasionally. While we used photos to benchmark data collector responses, we did not do the same for vendors.

However, providing some low-cost items that are known to reduce the risk of contamination such as chlorine tablets and soap free of charge to vendors might be feasible, and ensuring that water treatment products are readily available and affordable could provide significant return on investment.

While in this study we focused on street food consumers and vendors, the municipal, state, and federal governments are clearly important. While India's 2014 Street Vending Act addresses many of the obvious issues with the regulatory environment that hamper the street vending sector, key components of the law are yet to be implemented in many parts of the country a decade later. Discussions within the municipality on the issue are ongoing, and it is likely that some vendors will be issued with a licence in the near future as a trial period. The Town Vending Committee, which encompasses a range of parties such as the municipality, vendors, and other local leaders, will need to define the conditions for licencing before this can occur, however, as the federal law does not provide such definitions. [41] To our knowledge, none of the discussions regarding the criteria for licencing include standards for food safety, with the exception of broad directives such as keeping the kiosk area clean and free of garbage.

While licensure will impose a greater cost on vendors, our results indicate a greater need to protect them from theft and extortion, which would support greater investments in kiosks by vendors. Bribes and evictions often occur due to vendors not fully understanding the existing (complicated) legal environment, so it is imperative that licencing procedures make vendors aware of their rights and obligations. Creating special vending zones away from busy streets and crowded areas, another key component of the 2014 Act, will likely improve hygienic conditions, particularly if these zones have access to basic sanitation services. However, finding appropriate areas and convincing vendors to relocate will prove challenging, and no substantive changes will be made in the short run. In Kolkata, these zones are only possible in the extended parts of the city , given the lack of space for such areas in the city center. The municipality has attempted to set up one such area in Sector V, which is located on the ground floor of a multi-story car garage; however, no vendors have at the time of writing located there, reflecting concerns about lack of pedestrian traffic and, therefore, customers. In the short- and medium-term, it therefore seems prudent for policy to focus on improving hygienic standards at the kiosks where they are located currently.

[41] The state government of West Bengal has directed that kiosks must i) be on pavement, not road; ii) take up a third or less of the width of pavement, leaving the rest for pedestrians; iii) operate at a minimum distance from major crossings and store entrances, and iv) be free of tarpaulin and other inflammable material.

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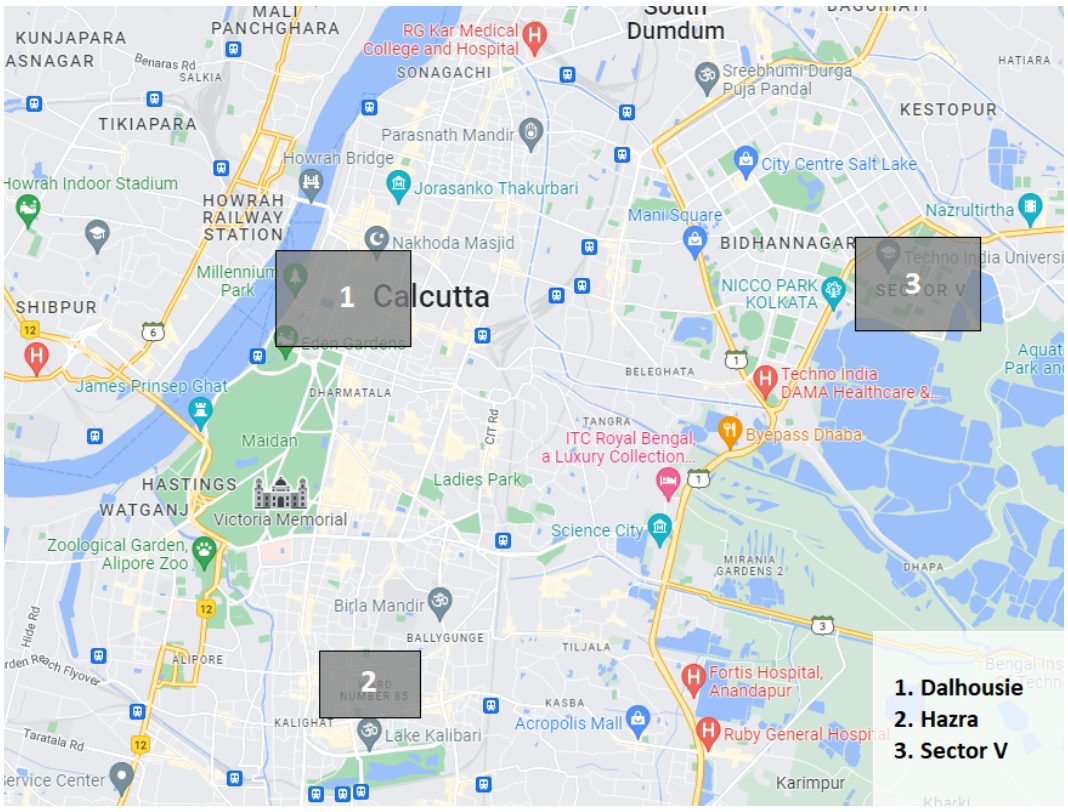
Online Appendix

A Context: Details

Figure A1: Areas of Kolkata Included in the Sample



Notes: This figure shows a map of Kolkata with the 3 selected areas of our intervention. Dalhousie, in Kolkata's central business district, offers diverse food options primarily for larger business employees. Hazra, known for its offices, hospitals, religious sites, and residential areas, attracts a varied consumer base with lower incomes. It features fewer food vendors, limited food variety, and various non-food vendors like clothing and jewelry. Sector V, Kolkata's IT hub, caters to higher-income consumers and maintains better food safety practices. Our post-baseline sample consists of 274 vendors spread out across these 3 areas. Each area is represented by both treated and non treated vendors. There are 97 vendors in the control group (40 clusters), 92 in the first treatment (35 clusters) and 85 in the second treatment (33 clusters).

Figure A2: Example of Street Vendors

Notes: Dalhousie, Hazra and Sector V have a large number of street vendors who prepare and cook food at the kiosks.

Figure A3: Examples of Conditions of Kiosk Operations

Notes: Photos collected from vendors included in our sample during the pre-intervention period.

B Consumers Experiment: Details

To estimate Willingness-to-Pay (WTP) using the choice experiment data, we follow standard practice by starting with a random utility model (McFadden, 1973). Assume that the utility a consumer i, derives from a specific alternative, labeled as a, within choice scenario t, can be expressed as follows:

$$U_{iat} = \mathbf{x}'_{iat}\boldsymbol{\beta}_i + \mathbf{w}'_{ia}\boldsymbol{\alpha} + \mathbf{z}'_i\boldsymbol{\delta}_a + \varepsilon_{iat} \tag{A1}$$

where $\boldsymbol{\beta}_i$ represents a vector of individual-specific coefficients, $\mathbf{x}_{iat}$ stands for a vector of alternative-specific variables, $\boldsymbol{\alpha}$ denotes fixed coefficients pertaining to $\mathbf{w}_{ia}$, a vector of alternative-specific variables, $\boldsymbol{\delta}_a$ signifies fixed alternative-specific coefficients for $\mathbf{z}_i$, a vector of consumer-specific variables, and ε_{iat} is a random term following a Type I extreme value distribution. Allowing $\boldsymbol{\beta}_i$ to vary among consumers accounts for the fact that different consumers may exhibit distinct preferences.

Following McFadden and Train (2000), the mixed logit choice probability is given by:

$$P_{iat} = \int \frac{\exp(\mathbf{x}'_{iat}\boldsymbol{\beta}_i)}{\sum_{j=1}^{J}\exp(\mathbf{x}'_{iat}\boldsymbol{\beta}_j)} f(\boldsymbol{\beta}|\boldsymbol{\theta})d\boldsymbol{\beta}$$

The integral represents the integration over the distribution of $\boldsymbol{\beta}$, where $f(\boldsymbol{\beta}|\boldsymbol{\theta})$ is the density function, and $\boldsymbol{\theta}$ represents the vector of parameters that describe the characteristics of the distribution.[42] These parameters are typically estimated via simulated maximum likelihood techniques (Revelt and Train, 2000).

In the context of consumer's WTP for an attribute, the vector of coefficients $\boldsymbol{\beta}_i$ plays a central role in quantifying how changes in attribute levels impact consumer choices. The formulation of the WTP can be broken down into four steps. First, simulate draws of individual-specific coefficients $\boldsymbol{\beta}_i$ from the distribution $\boldsymbol{\beta}_i^* \sim f(\boldsymbol{\beta}|\boldsymbol{\theta})$, which represents different sets of coefficients for each consumer in our dataset. Second, for each set of simulated coefficients $\boldsymbol{\beta}_i^*$, calculate the choice probabilities P_{iat}^* for each alternative a in each choice scenario t using the utility representation. Third, for each set of simulated coefficients $\boldsymbol{\beta}_i^*$, calculate the MWP for the specific attribute a using $MWP_{iat}^a = -(\frac{\partial P_{iat}^*}{\partial \beta^a})/(\frac{\partial P_{iat}^*}{\partial \beta^{\text{price}}})$. Finally, calculate the expected MWP for attribute a by averaging the MWP values across all sets of simulated coefficients:

$$E[WTP^a] = -\frac{E[\beta^a]}{\beta^{price}}$$

This formula quantifies how much consumers are willing to pay for a change in attribute a while considering the fixed price coefficient.

[42] Hence, $\boldsymbol{\theta}$ controls the shape and variability of the distribution from which the individual-specific coefficients $\boldsymbol{\theta}_i$ are drawn. It is important to note that $\boldsymbol{\beta}$ is treated as a random variable in the mixed logit model, and its values are drawn from the distribution described by $\boldsymbol{\theta}$.

Figure A4: Example Question from the Discrete Choice Experiment

2 vendors selling a CHICKEN THALI (combo dish).
Both meals look equally tasty, but you have not tried either of them before.
Which option would you choose?

	Option A	**Option B**
Distance	Vendor is in front of you	Vendor is a 5 minute walk from you
Vendor's personal hygiene	Appears not very clean and hygienic	Appears very clean and hygienic
Kiosk's hygienic conditions	Appears not very clean and hygienic	Appears very clean and hygienic
Price	Rs 50	Rs 80

Notes: An example from the consumer DCE. The full set of questions as well as the survey manual is available upon request.

Table A1: Mixed Logit Estimates and Consumer Willingness to Pay by Attribute

	(1) Veg item	(2) Non-veg item	(3) Full sample
Coefficients:			
Price	-0.10***	-0.07***	-0.08***
	(0.00)	(0.00)	(0.00)
Clean kiosk	7.94***	6.71***	7.10***
	(0.29)	(0.22)	(0.18)
Clean vendor	2.91***	2.14***	2.40***
	(0.14)	(0.10)	(0.09)
Far location	-0.29***	-0.14***	-0.20***
	(0.05)	(0.04)	(0.03)
Standard deviations:			
Clean kiosk	5.47***	4.94***	5.16***
	(0.24)	(0.20)	(0.16)
Clean vendor	2.95***	2.34***	2.64***
	(0.14)	(0.11)	(0.10)
Far location	-0.56***	-0.19**	-0.40***
	(0.06)	(0.08)	(0.05)
Observations	48,312	48,312	96,624
Pseudo R-squared	0.530	0.478	0.503
Willingness-to-pay in ₹			
Clean kiosk (₹)	79.7	96.1	90.9
Clean vendor (₹)	29.1	30.6	30.7
Location > 5 min walk (₹)	-2.9	-2.0	-2.5

Notes: Data from consumer survey. The top panels report mixed logit estimates of coefficients and standard deviations for each attribution. The bottom panel reports implied WTP for safer street food options in Indian Rupees. Robust standard errors, clustered at the cluster level, are in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.

Table A2: Conditional Logit Estimates and Consumer Willingness to Pay by Attribute

	(1) Veg item	(2) Non-veg item	(3) Full sample
Price	-0.035***	-0.027***	-0.029***
	(0.001)	(0.001)	(0.001)
Clean kiosk	2.362***	2.134***	2.231***
	(0.030)	(0.040)	(0.020)
Clean vendor	1.086***	0.835***	0.946***
	(0.026)	(0.022)	(0.017)
Far location	-0.102***	-0.069***	-0.084***
	(0.023)	(0.021)	(0.016)
Observations	48,312	48,312	96,624
Pseudo R-squared	0.530	0.478	0.503
Willingness-to-pay in ₹			
Clean kiosk (₹)	67.8	79.6	76.9
Clean vendor (₹)	31.1	31.1	32.6
Location > 5 min walk (₹)	-2.9	-2.6	-2.9

Notes: Data from consumer survey. The top panels report conditional logit estimates of coefficients for each attribution. The bottom panel reports implied WTP for safer street food options in Indian Rupees. Robust standard errors, clustered at the cluster level, are in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01.

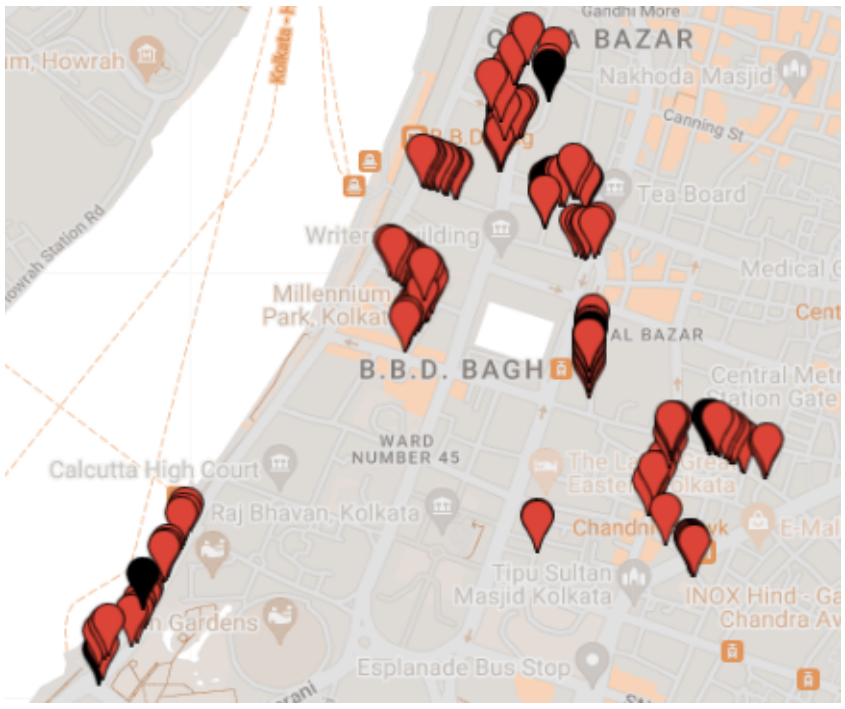
Table A3: Consumer Willingness to Pay by Area

	Veg item			**Non-veg item**			**Both items**		
	(1) Dalhousie	(2) Hazra	(3) Sector V	(4) Dalhousie	(5) Hazra	(6) Sector V	(7) Dalhousie	(8) Hazra	(9) Sector V
Price	-0.04***	-0.04***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Clean kiosk	2.28***	2.22***	2.77***	2.13***	1.91***	2.36***	2.19***	2.03***	2.53***
	(0.04)	(0.07)	(0.08)	(0.04)	(0.06)	(0.06)	(0.03)	(0.04)	(0.04)
Clean vendor	0.99***	1.20***	1.32***	0.80***	0.91***	0.86***	0.89***	1.03***	1.04***
	(0.03)	(0.06)	(0.07)	(0.03)	(0.05)	(0.05)	(0.02)	(0.04)	(0.04)
Far location	-0.10***	-0.08	-0.12**	-0.05*	-0.11**	-0.06	-0.08***	-0.09***	-0.09***
	(0.03)	(0.05)	(0.05)	(0.03)	(0.04)	(0.04)	(0.02)	(0.03)	(0.03)
Obs.:	26964	8820	12528	25740	9900	12672	52704	18720	25200
Pseudo R^2:	0.51	0.49	0.61	0.48	0.43	0.53	0.50	0.45	0.57
WTP kiosk hyg. (₹):	63.0	53.4	110.5	79.3	66.3	93.2	75.7	64.0	93.7
WTP vendor hyg. (₹):	27.4	28.9	52.7	29.7	31.7	34.1	30.7	32.5	38.5
WTP distance (₹):	-2.9	-1.8	-4.8	-2.0	-3.8	-2.4	-2.6	-2.9	-3.5

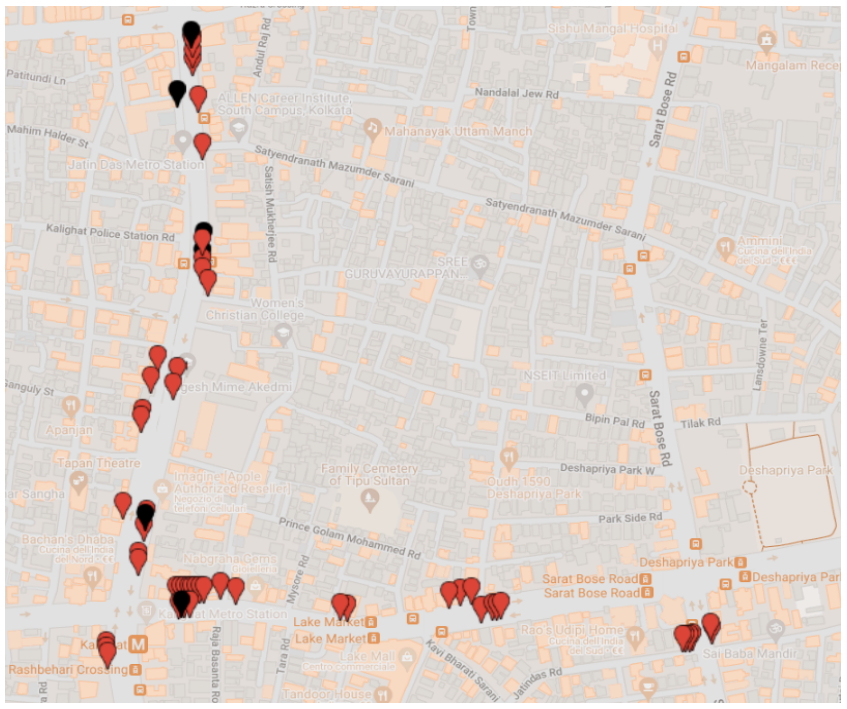
Notes: Data from consumer survey. The top panels report conditional logit estimates of coefficients for each attribution by area. The bottom panel reports implied WTP for safer street food options in Indian Rupees. Robust standard errors, clustered at the cluster level, are in parentheses. *p $<$ 0.10, **p $<$ 0.05, ***p $<$ 0.01.

C Vendors Experiment: Details

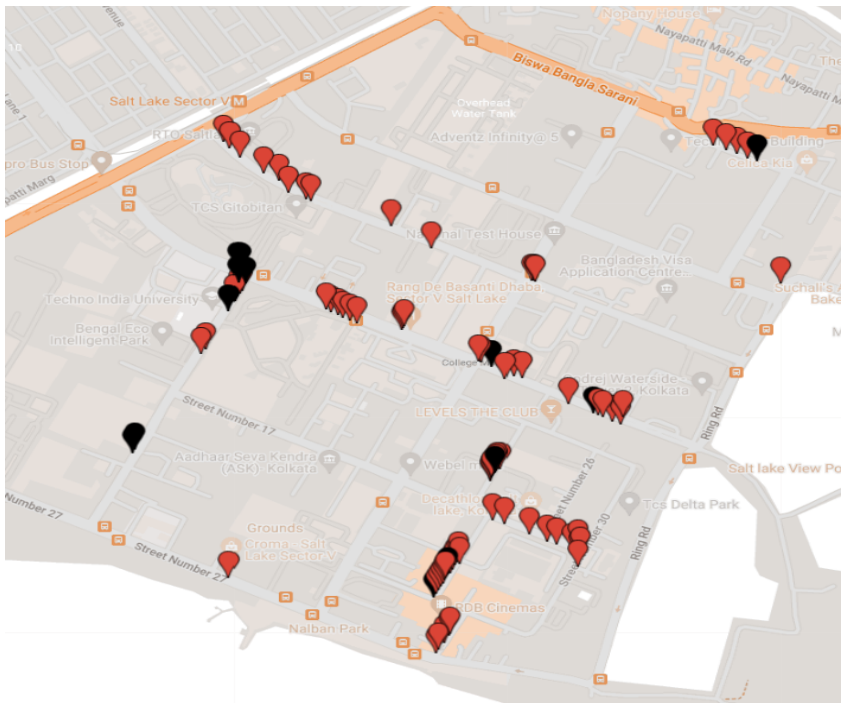
Figure A5: Distribution of Sampled Vendors



a) Distribution of vendors in Dalhousie



b) Distribution of vendors in Hazra



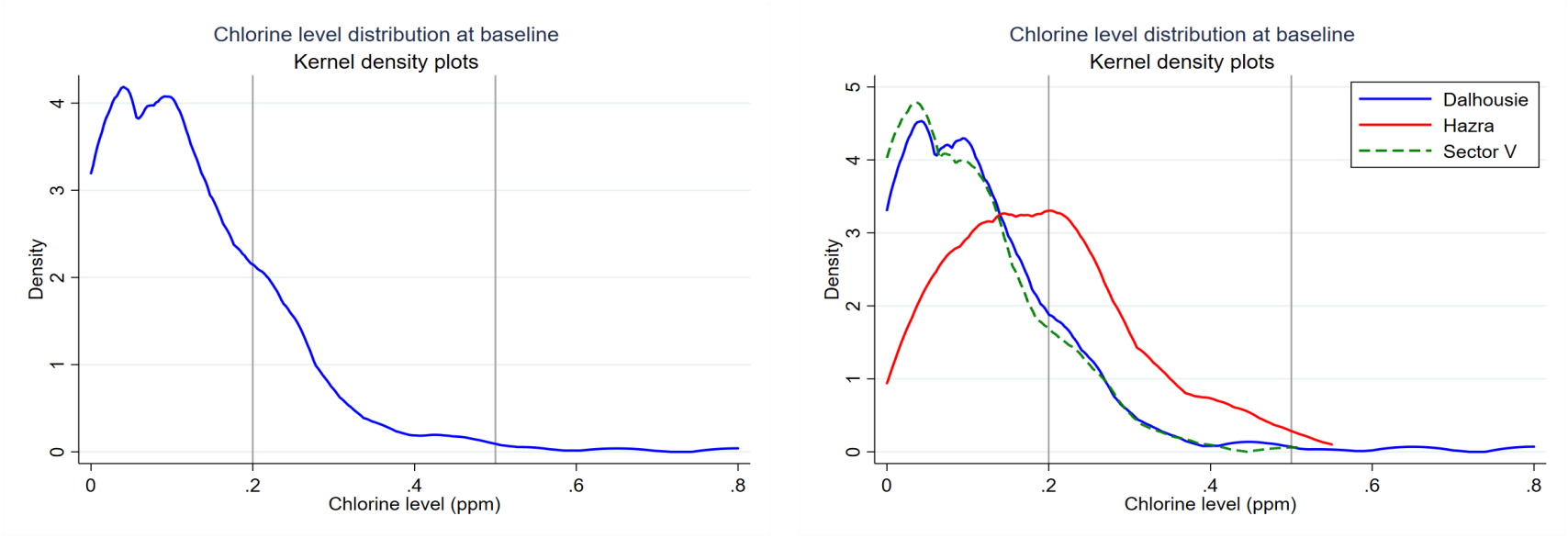
c) Distribution of vendors in Sector 5

d) Example street and clusters

Notes: Figure (a) shows the distribution of sampled vendors in the Dalhousie area; Figure (b) provides an example of vendors on a street and how we divide them into natural clusters (each color block represents a cluster). The black markers indicate a vendor who was included in the baseline sample, but dropped out of the study before the treatment period began.

Figure A6: Excerpt from Training Booklet for T2 Vendors

Figure A7: Chlorine level distribution at baseline



a) Chlorine level distribution

b) By area

Notes: In Figure (a), we plot the distribution of chlorine levels across the entire vendor sample. In Figure (b), we plot the distribution of chlorine levels within each specific area. Solid lines in both figures demarcate the recommended chlorine concentration boundaries for water, as advised by the World Health Organization (WHO).

Table A4: Monitoring and Attrition

	Total		Control (T0)		Equipment (T1)		Equipment w/ training (T2)	
	Obs.	Attr.	Obs.	Attr.	Obs.	Attr.	Obs.	Attr.
Design								
# Areas	3		3		3		3	
# Clusters	108		40		35		33	
Monitoring and Attrition								
Pre-treatment (April to May 2022):								
Baseline	274		97		92		85	
Period #1	252	0.08	87	0.10	86	0.07	79	0.07
Period #2	256	0.07	93	0.04	87	0.05	76	0.11
Treatment period (July to September 2022):								
Period #3	257	0.06	91	0.06	87	0.05	79	0.07
Period #4	263	0.04	92	0.05	88	0.04	83	0.02
Period #5	257	0.06	88	0.09	87	0.05	82	0.04
Period #6	263	0.04	92	0.05	90	0.02	81	0.05
Period #7	256	0.07	89	0.08	88	0.04	79	0.07
Period #8	256	0.07	88	0.09	87	0.05	81	0.05
Period #9	259	0.05	89	0.08	88	0.04	82	0.04
Period #10	258	0.06	91	0.06	86	0.07	81	0.05
Period #11	265	0.03	93	0.04	91	0.01	81	0.05
Endline 1	267	0.03	93	0.04	91	0.01	83	0.02
Post-treatment (November 2022 to February 2023):								
Period #12	260	0.05	91	0.06	89	0.03	80	0.06
Period #13	261	0.05	91	0.06	89	0.03	81	0.05
Period #14	259	0.05	91	0.06	88	0.04	80	0.06
Period #15	259	0.05	91	0.06	88	0.04	80	0.06
Period #16	261	0.05	91	0.06	89	0.03	81	0.05
Endline 2	255	0.07	89	0.08	86	0.07	80	0.06
Total	4,938	0.05	1,727	0.06	1,677	0.04	1,534	0.05

Notes: The table provides summary statistics of the monitoring surveys. Our post-baseline sample consists of 274 vendors, 97 in the control group (40 clusters), 92 in the first treatment (35 clusters) and 85 in the second treatment (33 clusters). The left (right) column of each panel shows the number of observations per monitoring period (attrition rates). The attrition is low in all cases.

D Vendors Experiment: Results

Table A5: Treatment Effects on Infrastructure Usage and Practices (Linear Indices)

	(1)	(2)	(3)	(4)	(5)
	Equipment Usage			Food-Safety Practices	
	Large infrastr.	Small infrastr.	Chlorine $\mathbb{1}(> 0.20)$	Kiosk environm.	Food handling
	Panel A: Treatment Period Effects (up to Endline 1)				
Equipment (T1)	0.430***	0.024**	0.887***	0.050***	0.027**
	(0.024)	(0.011)	(0.019)	(0.018)	(0.013)
w/ training (T2)	0.374***	0.013	0.907***	0.032	0.027*
	(0.036)	(0.012)	(0.016)	(0.020)	(0.016)
Control mean:	0.21	0.08	0.08	0.57	0.49
T1 effect (%):	206.7	31.2	1122.3	8.7	5.4
T2 effect (%):	180.0	17.2	1146.9	5.6	5.6
Clusters:	107	107	101	107	107
Observations:	2303	2303	1118	2303	2303
Adjusted R^2:	0.61	0.39	0.79	0.39	0.55
p-value T1-T2:	0.13	0.45	0.27	0.35	0.97
	Panel B: Total Study Period Effects (up to Endline 2)				
Equipment (T1)	0.436***	0.027**	0.888***	0.043**	0.027**
	(0.025)	(0.012)	(0.019)	(0.021)	(0.014)
w/ training (T2)	0.377***	0.015	0.901***	0.027	0.038**
	(0.036)	(0.013)	(0.016)	(0.021)	(0.017)
Equipment (T1) × post	-0.074**	-0.001	-0.839***	0.018	-0.013
	(0.030)	(0.015)	(0.023)	(0.027)	(0.018)
w/ training (T2) × post	-0.067**	-0.026*	-0.844***	0.025	-0.024
	(0.032)	(0.015)	(0.027)	(0.031)	(0.022)
Control mean:	0.22	0.10	0.04	0.53	0.48
T1 effect (%):	198.8	28.8	2055.3	8.1	5.6
T2 effect (%):	171.9	15.5	2092.2	5.1	7.9
Clusters:	108	108	106	108	108
Observations:	3587	3587	2400	3587	3587
Adjusted R^2:	0.56	0.39	0.82	0.34	0.45
p-value T1-T2:	0.10	0.42	0.31	0.42	0.54

Notes: Data from monitoring surveys (random audits). Outcome variables in column (1), (2), (4) and (5) are linear indices calculated as the count of the observed "best behaviors" divided by the number of maximum "best behaviors" in that category. Whereas, in column (3) the outcome variable is a binary variable taking value one if the amount of chlorine is above 0.20 ppm, and zero otherwise. Panel A presents the short-term impacts of the treatment, measured during the 3-month treatment period (monitoring surveys 3-11), up until the first endline survey in September 2022. Panel B presents results for the entire study period, which includes data collected during both the treatment period and the 5-month post-treatment period (monitoring surveys 12-16), up until the second endline survey in February 2023. "T1" equals one if the vendor belongs to the "infrastructure" treatment group, and zero otherwise. "T2" is equal to one if the vendor is in the "infrastructure w/ training" treatment group, and zero otherwise. "post" is a binary variable taking value one for observations after the end of the treatment period (after Endline 1), and zero otherwise. All OLS regressions include strata fixed effects and the pre-treatment average sanitary infrastructure observed at the kiosk. To increase precision, we also include a set of controls that predict the outcome variables. These include fixed effects for the survey period, interviewer, number of employees, and years of experience. The results do not change with or without these controls. Standard errors are always clustered at the cluster level. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table A6: Treatment Effects on Infrastructure Usage (By Index Component)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Large equipment				Small equipment	
	Handwash facility	Water container	Drinking water	Garbage bin	Clean apron	Hair cover	Handwash soap
	Panel A: Treatment Period Effects (up to Endline 1)						
Equipment (T1)	0.453***	0.222***	0.361***	0.679***	0.084***	0.044***	-0.058***
	(0.049)	(0.035)	(0.038)	(0.038)	(0.024)	(0.008)	(0.021)
w/ training (T2)	0.391***	0.223***	0.266***	0.615***	0.032	0.005	0.002
	(0.063)	(0.036)	(0.049)	(0.049)	(0.023)	(0.009)	(0.022)
Control mean:	0.04	0.71	0.03	0.06	0.03	0.00	0.20
T1 effect (%):	1178.4	31.2	1426.2	1177.7	297.3	4308.5	-28.4
T2 effect (%):	1017.2	31.2	1052.1	1065.3	112.5	529.4	1.0
Clusters:	107	107	107	107	107	107	107
Observations:	2303	2293	2303	2303	2303	2303	2267
Adjusted R^2:	0.50	0.41	0.29	0.56	0.21	0.08	0.54
p-value T1-T2:	0.37	0.99	0.08	0.20	0.09	0.01	0.01
	Panel B: Total Study Period Effects (up to Endline 2)						
Equipment (T1)	0.476***	0.215***	0.373***	0.677***	0.090***	0.047***	-0.057***
	(0.051)	(0.036)	(0.039)	(0.039)	(0.025)	(0.009)	(0.021)
w/ training (T2)	0.396***	0.223***	0.275***	0.613***	0.044**	0.008	-0.009
	(0.065)	(0.037)	(0.051)	(0.047)	(0.022)	(0.008)	(0.022)
Equipment (T1) × post	0.125*	-0.077*	-0.247***	-0.093**	-0.071**	-0.027**	0.098***
	(0.073)	(0.040)	(0.043)	(0.043)	(0.029)	(0.011)	(0.031)
w/ training (T2) × post	0.119*	-0.093**	-0.217***	-0.075**	-0.074***	-0.018**	0.017
	(0.067)	(0.042)	(0.053)	(0.035)	(0.026)	(0.007)	(0.030)
Control mean:	0.06	0.75	0.02	0.05	0.04	0.00	0.25
T1 effect (%):	771.7	28.8	1921.9	1303.4	213.0	6769.4	-23.1
T2 effect (%):	642.3	29.8	1418.3	1179.0	104.9	1196.2	-3.6
Clusters:	108	108	108	108	108	108	108
Observations:	3587	3577	3587	3587	3587	3587	3548
Adjusted R^2:	0.47	0.32	0.27	0.51	0.17	0.08	0.54
p-value T1-T2:	0.27	0.79	0.09	0.19	0.14	0.01	0.03

Notes: Data from monitoring surveys (random audits). Outcomes are binary variables taking value one if "Best behaviour" in the described category is observed, and zero otherwise. Panel A presents the short-term impacts of the treatment, measured during the 3-month treatment period (monitoring surveys 3-11), up until the first endline survey in September 2022. Panel B presents results for the entire study period, which includes data collected during both the treatment period and the 5-month post-treatment period (monitoring surveys 12-16), up until the second endline survey in February 2023. "T1" equals one if the vendor belongs to the "infrastructure" treatment group, and zero otherwise. "T2" is equal to one if the vendor is in the "infrastructure w/ training" treatment group, and zero otherwise. "post" is a binary variable taking value one for observations after the end of the treatment period (after Endline 1), and zero otherwise. All OLS regressions include strata fixed effects and the pre-treatment average sanitary infrastructure observed at the kiosk. To increase precision, we also include a set of controls that predict the outcome variables. These include fixed effects for the survey period, interviewer, number of employees, and years of experience. The results do not change with or without these controls. Standard errors are always clustered at the cluster level. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A7: Treatment Effects on Kiosk Environment (By Index Component)

	(1) Uses soap for dishes	(2) Dish water clean	(3) Garbage bin clean	(4) Garbage on ground	(5) Water on ground	(6) Food on ground
	Panel A: Treatment Period Effects (up to Endline 1)					
Equipment (T1)	0.032*	0.092***	0.188***	0.041	0.066	-0.012
	(0.018)	(0.022)	(0.041)	(0.039)	(0.046)	(0.018)
w/ training (T2)	0.034**	0.069***	0.173***	0.049	0.001	-0.044*
	(0.015)	(0.025)	(0.040)	(0.046)	(0.043)	(0.026)
Control mean:	0.95	0.77	0.07	0.34	0.38	0.83
T1 effect (%):	3.4	12.0	257.1	12.0	17.4	-1.4
T2 effect (%):	3.6	9.0	237.3	14.4	0.2	-5.4
Clusters:	89	103	107	107	107	107
Observations:	1241	2108	1539	2271	2267	2256
Adjusted R^2:	0.09	0.42	0.54	0.31	0.36	0.38
p-value T1-T2:	0.89	0.34	0.63	0.85	0.13	0.21
	Panel B: Total Study Period Effects (up to Endline 2)					
Equipment (T1)	0.026**	0.080***	0.208***	0.043	0.073	-0.035
	(0.012)	(0.028)	(0.046)	(0.041)	(0.048)	(0.033)
w/ training (T2)	0.032***	0.074***	0.182***	0.035	-0.000	-0.057*
	(0.010)	(0.027)	(0.042)	(0.044)	(0.039)	(0.033)
Equipment (T1) × post	-0.014	0.001	0.068	-0.054	-0.085	0.031
	(0.014)	(0.042)	(0.053)	(0.043)	(0.056)	(0.057)
w/ training (T2) × post	-0.014	0.020	0.056	-0.047	-0.032	0.030
	(0.012)	(0.038)	(0.048)	(0.047)	(0.049)	(0.065)
Control mean:	0.96	0.75	0.05	0.27	0.31	0.76
T1 effect (%):	2.7	10.7	382.5	15.7	23.6	-4.6
T2 effect (%):	3.3	9.9	334.5	12.9	-0.1	-7.5
Clusters:	108	108	108	108	108	108
Observations:	2348	3390	2821	3555	3551	3540
Adjusted R^2:	0.10	0.35	0.42	0.35	0.38	0.45
p-value T1-T2:	0.59	0.85	0.52	0.86	0.10	0.55

Notes: Data from monitoring surveys (random audits). Outcomes are binary variables taking value one if "Best behaviour" in the described category is observed, and zero otherwise. Panel A presents the short-term impacts of the treatment, measured during the 3-month treatment period (monitoring surveys 3-11), up until the first endline survey in September 2022. Panel B presents results for the entire study period, which includes data collected during both the treatment period and the 5-month post-treatment period (monitoring surveys 12-16), up until the second endline survey in February 2023. "T1" equals one if the vendor belongs to the "infrastructure" treatment group, and zero otherwise. "T2" is equal to one if the vendor is in the "infrastructure w/ training" treatment group, and zero otherwise. "post" is a binary variable taking value one for observations after the end of the treatment period (after Endline 1), and zero otherwise. All OLS regressions include strata fixed effects and the pre-treatment average sanitary infrastructure observed at the kiosk. To increase precision, we also include a set of controls that predict the outcome variables. These include fixed effects for the survey period, interviewer, number of employees, and years of experience. The results do not change with or without these controls. Standard errors are always clustered at the cluster level. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table A8: Treatment Effects on Food Handling (By Index Component)

	(1) Disposable plates	(2) Clean towel	(3) Counter clean	(4) Cooked food covered	(5) Raw food covered	(6) Use tongs or spoons	(7) Wash hands with soap
	Panel A: Treatment Period Effects (up to Endline 1)						
Equipment (T1)	-0.016	0.048**	0.026	0.098**	0.072**	-0.021	-0.009
	(0.054)	(0.022)	(0.029)	(0.045)	(0.035)	(0.021)	(0.013)
w/ training (T2)	0.035	0.016	-0.000	0.091**	0.124***	-0.042	0.012
	(0.042)	(0.023)	(0.025)	(0.039)	(0.044)	(0.026)	(0.015)
Control mean:	0.39	0.32	0.78	0.62	0.23	0.94	0.08
T1 effect (%):	-4.0	15.0	3.3	15.9	31.2	-2.2	-11.4
T2 effect (%):	8.9	5.2	-0.1	14.7	53.4	-4.5	15.1
Clusters:	107	107	107	107	103	107	107
Observations:	2303	2303	2303	2303	1843	2303	2221
Adjusted R^2:	0.46	0.72	0.45	0.45	0.47	0.40	0.09
p-value T1-T2:	0.29	0.17	0.28	0.89	0.23	0.43	0.13
	Panel B: Total Study Period Effects (up to Endline 2)						
Equipment (T1)	0.008	0.039	0.019	0.091*	0.065**	-0.015	-0.007
	(0.052)	(0.026)	(0.031)	(0.049)	(0.031)	(0.021)	(0.012)
w/ training (T2)	0.058	0.022	0.012	0.102**	0.119***	-0.026	0.016
	(0.042)	(0.028)	(0.028)	(0.049)	(0.040)	(0.028)	(0.013)
Equipment (T1) × post	-0.004	-0.009	0.024	-0.102	-0.024	0.013	0.006
	(0.047)	(0.033)	(0.042)	(0.067)	(0.037)	(0.061)	(0.014)
w/ training (T2) × post	-0.002	0.025	0.037	-0.121*	-0.083**	-0.018	-0.029**
	(0.050)	(0.037)	(0.044)	(0.065)	(0.042)	(0.057)	(0.014)
Control mean:	0.46	0.45	0.76	0.58	0.17	0.83	0.05
T1 effect (%):	1.8	8.6	2.5	15.6	38.3	-1.8	-12.6
T2 effect (%):	12.4	4.9	1.5	17.4	70.1	-3.1	29.9
Clusters:	108	108	108	108	108	108	108
Observations:	3587	3587	3587	3587	2991	3587	3505
Adjusted R^2:	0.43	0.63	0.35	0.28	0.46	0.43	0.10
p-value T1-T2:	0.32	0.57	0.80	0.87	0.19	0.71	0.09

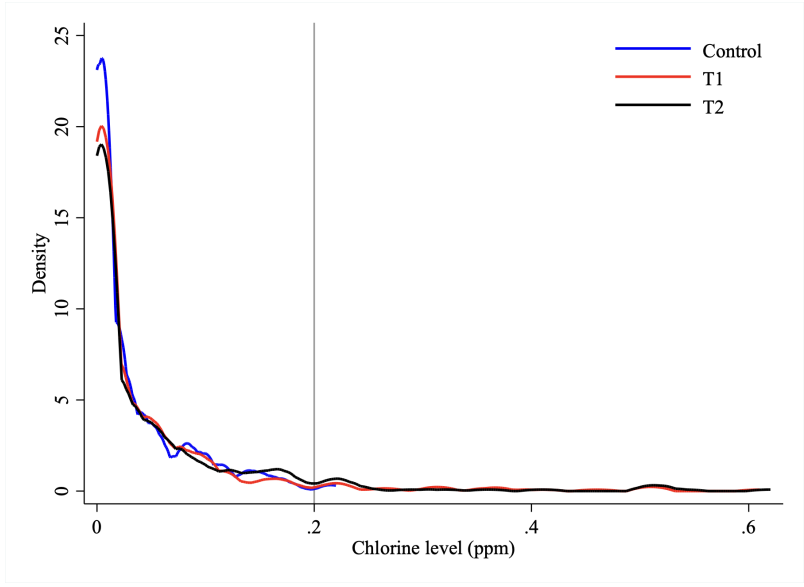
Note: Data from monitoring surveys (random audits). Outcomes are binary variables taking value one if "Best behaviour" in the described category is observed, and zero otherwise. Panel A presents the short-term impacts of the treatment, measured during the 3-month treatment period (monitoring surveys 3-11), up until the first endline survey in September 2022. Panel B presents results for the entire study period, which includes data collected during both the treatment period and the 5-month post-treatment period (monitoring surveys 12-16), up until the second endline survey in February 2023. "T1" equals one if the vendor belongs to the "infrastructure" treatment group, and zero otherwise. "T2" is equal to one if the vendor is in the "infrastructure w/ training" treatment group, and zero otherwise. "post" is a binary variable taking value one for observations after the end of the treatment period (after Endline 1), and zero otherwise. All OLS regressions include strata fixed effects and the pre-treatment average sanitary infrastructure observed at the kiosk. To increase precision, we also include a set of controls that predict the outcome variables. These include fixed effects for the survey period, interviewer, number of employees, and years of experience. The results do not change with or without these controls. Standard errors are always clustered at the cluster level. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table A9: Treatment Effects on Infrastructure Usage and Practices (By Area)

	(1)	(2)	(3)	(4)	(5)
	Equipment Usage			Food-Safety Practices	
	Large infrastr.	Small infrastr.	Chlorine $\mathbb{1}(> 0.20)$	Kiosk environm.	Food handling
	Panel A: Treatment Period Effects (up to Endline 1)				
Equipment (T1)	0.338***	-0.024	0.852***	0.009	0.028
	(0.040)	(0.019)	(0.042)	(0.043)	(0.028)
w/ training (T2)	0.288***	-0.019	0.878***	0.068	0.021
	(0.058)	(0.027)	(0.031)	(0.043)	(0.038)
Equipment (T1) × Dalhousie	0.069	0.060**	0.016	0.041	-0.002
	(0.048)	(0.025)	(0.049)	(0.049)	(0.034)
Equipment (T1) × Sector V	0.207***	0.057*	0.092*	0.075	-0.001
	(0.060)	(0.034)	(0.050)	(0.056)	(0.035)
w/ training (T2) × Dalhousie	0.080	0.041	0.009	-0.060	0.025
	(0.082)	(0.031)	(0.042)	(0.047)	(0.042)
w/ training (T2) × Sector V	0.175**	0.037	0.094**	-0.010	-0.032
	(0.088)	(0.036)	(0.041)	(0.058)	(0.045)
Control mean:	0.21	0.08	0.08	0.57	0.49
T1 effect (%):	162.7	-31.3	1078.1	1.5	5.6
T2 effect (%):	138.4	-24.9	1110.5	11.9	4.3
Clusters:	107	107	106	107	107
Observations:	2303	2303	1169	2303	2303
Adjusted R^2:	0.61	0.39	0.79	0.39	0.55
p-value T1-T2:	0.42	0.87	0.53	0.26	0.86
	Panel B: Total Study Period Effects (up to Endline 2)				
Equipment (T1)	0.337***	-0.028	0.471***	0.047	0.011
	(0.044)	(0.018)	(0.032)	(0.046)	(0.027)
w/ training (T2)	0.299***	-0.038*	0.414***	0.056	0.017
	(0.059)	(0.020)	(0.022)	(0.036)	(0.031)
Equipment (T1) × Dalhousie	0.052	0.069***	-0.022	-0.000	0.015
	(0.049)	(0.024)	(0.036)	(0.049)	(0.032)
Equipment (T1) × Sector V	0.162***	0.063*	-0.003	0.011	0.012
	(0.057)	(0.032)	(0.036)	(0.056)	(0.035)
w/ training (T2) × Dalhousie	0.047	0.052**	0.062**	-0.036	0.021
	(0.081)	(0.025)	(0.028)	(0.038)	(0.035)
w/ training (T2) × Sector V	0.107	0.059**	0.059**	-0.001	-0.001
	(0.085)	(0.027)	(0.028)	(0.047)	(0.037)
Control mean:	0.22	0.10	0.08	0.53	0.48
T1 effect (%):	153.5	-28.9	596.1	8.8	2.3
T2 effect (%):	136.4	-40.2	524.2	10.6	3.6
Clusters:	108	108	106	108	108
Observations:	3587	3587	2400	3587	3587
Adjusted R^2:	0.56	0.39	0.62	0.34	0.45
p-value T1-T2:	0.58	0.65	0.04	0.84	0.83

Notes: Data from monitoring surveys (random audits). Outcomes are binary variables taking value one if "Best behaviour" in the described category is observed, and zero otherwise. Panel A presents the short-term impacts of the treatment, measured during the 3-month treatment period (monitoring surveys 3-11), up until the first endline survey in September 2022. Panel B presents results for the entire study period, which includes data collected during both the treatment period and the 5-month post-treatment period (monitoring surveys 12-16), up until the second endline survey in February 2023. "T1" equals one if the vendor belongs to the "infrastructure" treatment group, and zero otherwise. "T2" is equal to one if the vendor is in the "infrastructure w/ training" treatment group, and zero otherwise. "post" is a binary variable taking value one for observations after the end of the treatment period (after Endline 1), and zero otherwise. All OLS regressions include strata fixed effects and the pre-treatment average sanitary infrastructure observed at the kiosk. To increase precision, we also include a set of controls that predict the outcome variables. These include fixed effects for the survey period, interviewer, number of employees, and years of experience. The results do not change with or without these controls. Standard errors are always clustered at the cluster level. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

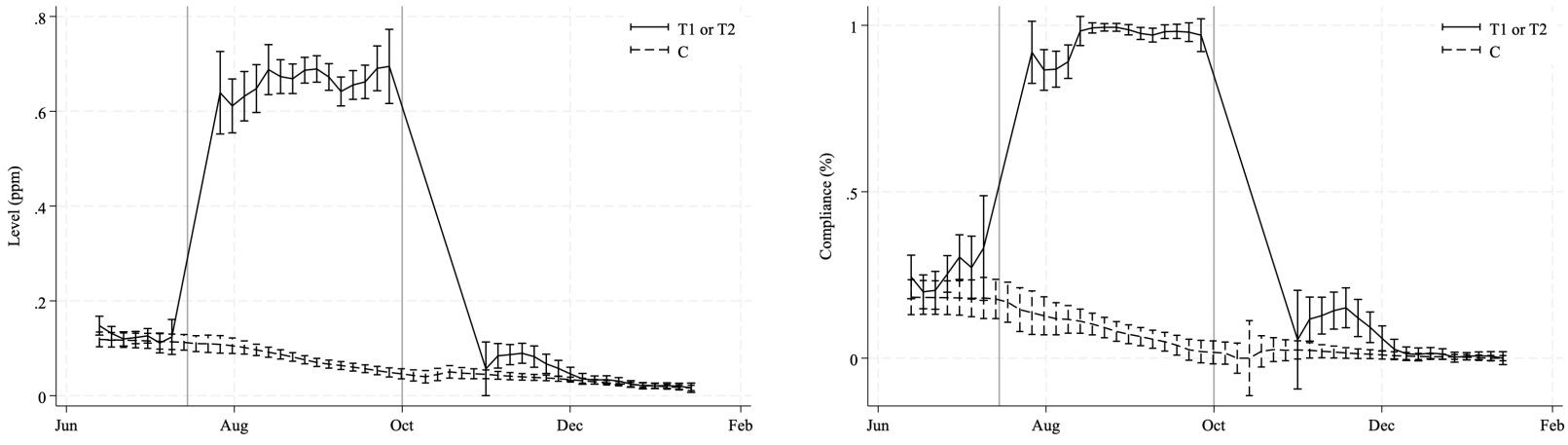
Figure A8: Chlorine level distribution during the treatment



a) Treatment Period Levels b) Total Study Period Levels

Notes: In Figure (a), we plot the distribution of chlorine levels across the entire vendor sample. In Figure (b), we plot the distribution of chlorine levels within each specific area. Solid lines in both figures demarcate the recommended chlorine concentration boundaries for water, as advised by the World Health Organization (WHO).

Figure A9: Chlorine Compliance over Time



a) Chlorine level (ppm) b) Chlorine compliance (%)

Notes: Data from monitoring surveys (random audits). Figure a) presents the distribution of chlorine presence (in ppm) in primary water storage containers. Figure b) compares the percentage of vendors with free chlorine levels in the water above 0.20 ppm, which is the minimum requirement, during the observational period.

E Vendors Experiment: Mechanisms

Table A10: Self-Reported Vendor Food Safety Knowledge and Behavior

	(1) Hand-washing frequency	(2) Reasons to wash hands	(3) Empty garbage more than once	(4) Ease of safe food practices
	Panel A: Treatment Period Effects (up to Endline 1)			
T1	0.041	0.007	-0.028	0.007
	(0.037)	(0.008)	(0.097)	(0.054)
T2	0.004	0.018*	-0.032	0.009
	(0.038)	(0.009)	(0.098)	(0.058)
Control mean:	1.56	0.43	0.22	3.59
T1 effect (%):	2.6	1.6	-12.9	0.2
T2 effect (%):	0.2	4.1	-14.5	0.2
Clusters:	107	107	74	107
Observations:	1030	1040	375	267
Adjusted R^2:	0.22	0.67	0.48	0.46
p-value T1-T2:	0.35	0.17	0.94	0.98
	Panel B: Total Study Period Effects (up to Endline 2)			
T1	0.055*	0.005	-0.015	0.024
	(0.030)	(0.007)	(0.026)	(0.047)
T2	0.036	0.011	-0.015	-0.029
	(0.028)	(0.007)	(0.024)	(0.048)
Control mean:	1.56	0.43	0.22	3.59
T1 effect (%):	3.6	1.2	-6.7	0.7
T2 effect (%):	2.3	2.6	-6.9	-0.8
Clusters:	108	108	105	108
Observations:	2597	2607	943	522
Adjusted R^2:	0.19	0.55	0.61	0.29
p-value T1-T2:	0.53	0.40	0.99	0.27

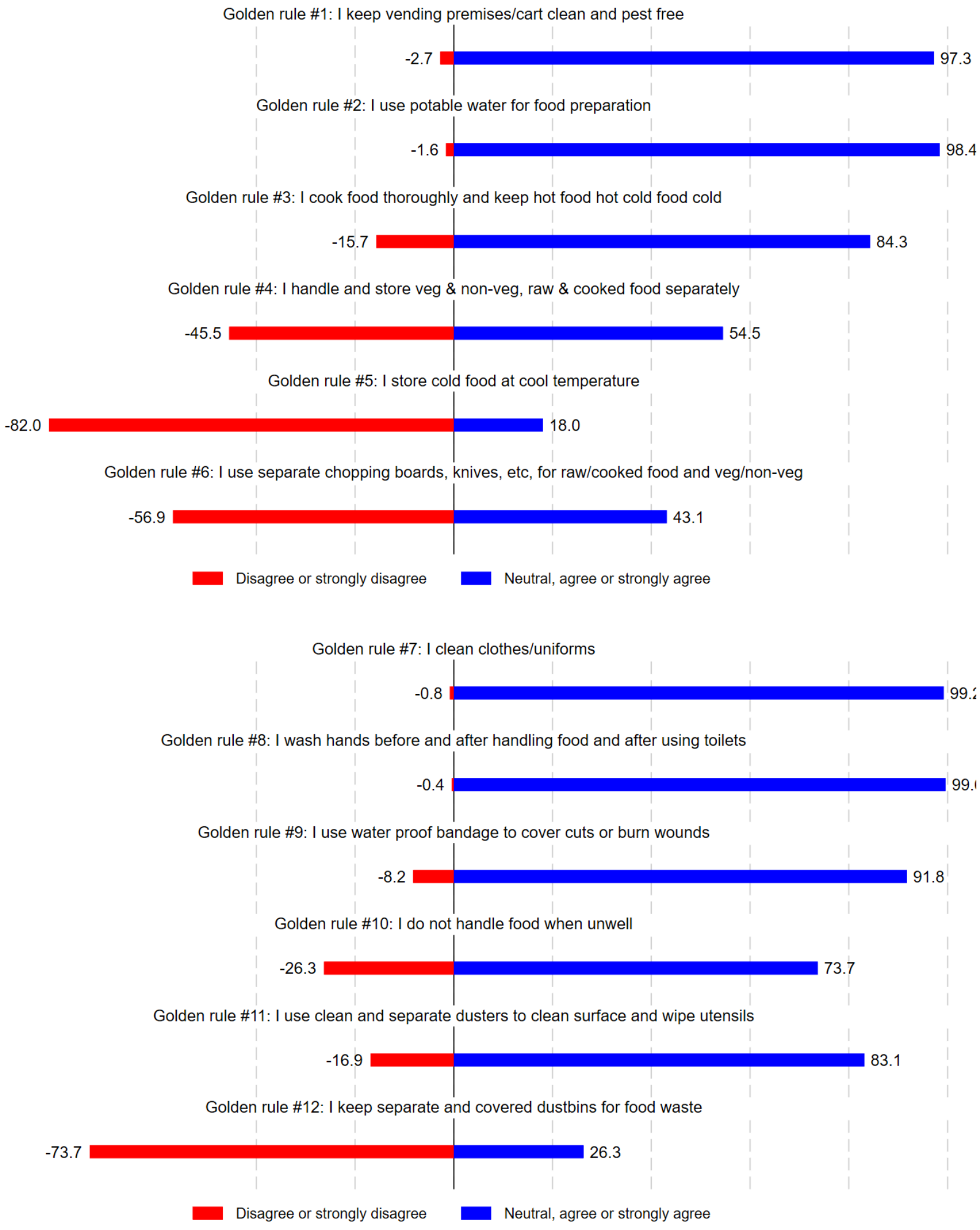
Note: Data from monitoring and endline surveys. The first three columns come from both monitoring and endline surveys; the last column is only available in the two endline surveys. OLS used for estimation. Hand-washing frequency refers to how many times in the past hour the vendor reports washing his/her hands with soap. Reasons to wash hands is an index variable indicating how many correct reasons a vendor can identify when hand-washing is necessary. Empty garbage is equal to one if vendors report emptying their garbage more than once per day. Ease of safe food preparation is an index measuring how easy is it for a vendor to perform a range of standard hygiene practices, such as washing hands before preparing food or covering cooked food. Strata, period, and interviewer fixed effects and clustered standard errors are used. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table A11: Vendor Perceptions of Infrastructure Value (Endline 1)

	(1)	(2)	(3)	(4)	(5)	(6)
	Use regularly		Adds value to business		Customer values	
	Total Mean/(SE)	Pairwise t-test (T2-T1)	Total Mean/(SE)	Pairwise t-test (T2-T1)	Total Mean/(SE)	Pairwise t-test (T2-T1)
Large equipment:						
Handwash facility	0.905 (0.040)	1.713*	0.919 (0.039)	1.855*	0.899 (0.040)	1.996*
Water container	0.938 (0.018)	-0.787	0.963 (0.016)	-0.567	0.933 (0.020)	-0.256
Drinking water	0.762 (0.045)	0.110	0.800 (0.045)	-0.191	0.762 (0.045)	0.110
Garbage bin	0.915 (0.027)	0.656	0.921 (0.027)	0.600	0.902 (0.029)	0.672
Small equipment:						
Apron	0.591 (0.053)	-0.212	0.645 (0.052)	0.350	0.619 (0.051)	-0.425
Hair cover	0.506 (0.060)	-1.019	0.523 (0.060)	1.203	0.497 (0.059)	-1.061
Handwash soap	0.914 (0.039)	0.395	0.921 (0.039)	0.496	0.927 (0.040)	0.670
Chlorine tablets	0.821 (0.032)	-1.398	0.770 (0.033)	-1.261	0.684 (0.042)	-0.809

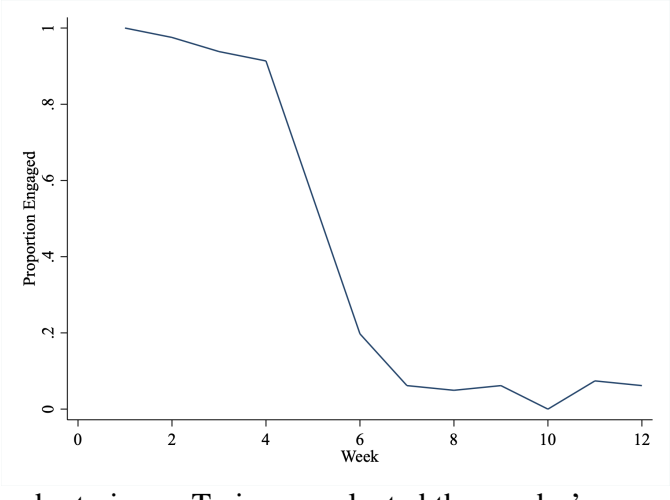
Notes: Data from Endline 1. Only treatment group vendors included. "Use regularly" refers to whether or not the vendor uses the infrastructure provided regularly; "Adds value to business" indicates whether or not the vendor thinks that the infrastructure adds value to the kiosk; "Customer values" refers to whether or not the vendor believes that customers value the infrastructure. Strata fixed and clustered standard errors used when comparing means. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Figure A10: Reported Vendor Food Safety Practices



Notes: Data from a set of Likert-type questions incorporated into our Endline 2 questionnaire. All responses across treatment groups are combined into a single group for analysis. The red horizontal bar to the left of the vertical solid black line represents vendors answering "Strongly disagree" or "Disagree" with the statement. The white central bar represent “Neutral” responses. The blue horizontal bar to the right aggregates vendors indicating “Neutral” "Strongly agree" or "Agree" responses. We include “Neutral” into this category because less than 1% of vendors respond neutrally. Additionally, dashed grey vertical lines, each representing 20%, depict percentages.

Figure A11: Proportion of Vendors Considered Engaged in Training Sessions



Notes: Data from evaluations of sessions by trainers. Trainers evaluated the vendor's engagement following each training session, using a Likert scale to assess engagement. Only T2 vendors included; 891 observations collected over a 12 week period.