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A Business Case for Human Rights at Work? Experimental Evidence on Labor Trafficking and Child Labor at Brick Kilns in Bangladesh

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ABSTRACT

Globally, coercive labor (i.e., forced, bonded, and/or trafficked labor) and child labor are disproportionately prevalent in environments with weak regulatory enforcement and state capacity. Effective strategies for addressing them may therefore need to align with the private incentives of business owners, not relying on government action alone. Recognizing this, we test a 'business case' for improving work conditions and promoting human rights using a randomized controlled trial across nearly 300 brick kilns in Bangladesh. Among study kilns, rates of coercive and child labor are high: about 50% of sampled workers are trafficked, and about 70% of kilns use child labor. Our experiment introduced a production method that increased kiln productivity and revenue, and we test if these productivity gains in turn increase worker "compensation" (including better work conditions). Because adoption of the method requires important changes in worker routines, we also test if providing information to kiln owners about positively incentivizing workers to enhance adoption (and hence business revenue) can lead to better work conditions. We find no evidence that productivity gains alone reduced labor trafficking or child labor, but adding the information intervention reduced child labor by 25-30% without reducing revenue or increasing costs.

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A randomized controlled trials registry entry is available at:
https://www.socialscienceregistry.org/trials/10127

1 Introduction

Coercive labor (i.e. forced, bonded, and/or trafficked labor) and child labor are disproportionately prevalent in environments with weak regulatory enforcement and state capacity. A growing literature demonstrates the limitations of law enforcement in such settings, as well as the strategic offsetting responses of producers (Rozo 2014; Dell 2015; Mejía, Restrepo, and Rozo 2017; Mejía and Restrepo 2016; Saavedra 2023).[1] Reducing coercive labor and child labor may therefore require solutions that do not rely on state capacity alone, but that are also aligned with the private incentives of business owners. For example, technologies that improve productivity could, in labor markets with some degree of competition, lead to improved work conditions (or an increase in worker "compensation," broadly defined). Alternatively, if improving work conditions can increase the productivity of workers (and hence the economic outcomes of businesses), conveying this information to business owners may create incentives for them to voluntarily make such improvements.[2]

In this project, we experimentally investigate these possibilities, testing for a "business case" for reducing coercive labor and child labor at brick kilns in Bangladesh. Coercive labor has been documented in brick production in more countries than in any other economic sector (US Department of Labor 2022)—and it has been extensively documented in Bangladesh as well.[3] Work at brick kilns across South Asia is seasonal and often characterized by debt bondage, excessive work

[1] Collusion between government agents and illegal actors is also common in weak states (Acemoglu, Robinson, and Santos 2013)

[2] Considerable prior research has focused on families' supply of child labor, incentivizing parents not to send their children to work. For example, research has shown declines in child labor from insurance schemes (Landmann and Frölich 2015), schooling incentives (Edmonds and Shrestha 2014), and access to credit (Edmonds 2006; Guarcello, Mealli, and Rosati 2010; Baland, Demont, and Somanathan 2020) although there is limited evidence on aligning firm incentives to reduce child labor. Additionally, some of these reductions in child labor are only transitory (Edmonds and Shrestha 2014), and child labor does not seem to directly displace schooling in some cases (Ravallion and Wodon 2000; Martin 2023). There is also heterogeneity in the schooling substitution effect, with some finding instead a strong negative relationship between child labor and schooling (e.g., Kruger 2007; Bai and Wang 2020). This relationship might be dependent in part on the length of a school day, with longer school days leading to substitution of labor for schooling, while shorter school days allow simultaneous school attendance and work (Ravallion and Wodon 2000). See also Shah and Steinberg (2017) on the relationship between economic conditions and child labor more broadly.

[3] Global prevalence of coercive labor in brick production is difficult to estimate, but some estimate prevalence rates of 60% or higher (Kara 2014). Within Bangladesh, see Das et al. (2017) for information on work conditions at brick kilns.

requirements (12-16 hour work days), and hazardous or degrading work conditions (including lack of personal protective equipment and exposure to toxic chemicals) (International Labour Organization 2017). Many workers are migrants, often bringing their families with them to kilns, leading to substantial child labor as well (Van de Glind 2010; Larmar et al. 2017; Daly et al. 2020; Ahad et al. 2021).[4]

The context of our project is a large-scale effort to introduce a more productive and energy efficient method of brick production (which also reduces pollution emissions) across six districts in Bangladesh (Brooks et al. 2024). In 2010, the Government of Bangladesh banned fixed chimney kilns in an attempt to reduce ambient air pollution, promoting zigzag kilns (ZZKs) instead.[5] Although the majority of brick producers in Bangladesh now operate ZZKs, very few do so correctly (meaning little realized reduction in emissions or productivity gain). This low rate of proper ZZK operation is puzzling because proper operation not only yields social and environmental benefits (Luby et al. 2015; Eil et al. 2020; Khaliquzzaman et al. 2020), but it also increases kiln profitability (Eil et al. 2020). Importantly, proper ZZK operation requires substantial behavior change among workers. In our pilot work, we found that a key reason identified by kiln owners for improper ZZK operation is concern that workers will not correctly adhere to proper ZZK production practices (analogous to Atkin et al. (2017)) (Brooks et al. 2024).

Addressing these concerns, we conducted a large randomized controlled trial (RCT) with three arms: (1) a measurement-only control group (in which we only collect data), (2) a technical intervention group, and (3) a technical+incentive information group. The technical intervention provided information, training, and technical support to promote the adoption of operational improvements at kilns. Because proper ZZK operation also requires important changes in worker routines, our technical+incentive information arm also provided explicit information to kiln owners about positively incentivizing workers for better adoption of these operational improvements, including

[4]Bangladesh's Labour Act of 2006 formally outlawed labor for children under the age of 14 and hazardous labor (which can include work at brick kilns) for children under 18. However, due to the informal nature of most brick production, this law is not strongly enforced at brick kilns (Ministry of Labor and Employment 2010).

[5]This notification was issued in July 2010, set to be implemented in 2013. However, due to court injunctions, the law was not in effect until July 2016 (Khaliquzzaman et al. 2020). Enforcement of the law has been quite limited in practice.

specific examples of strategies successfully used at peer kilns. Improvements in work conditions (broadly defined) due to gains in kiln productivity under the technical intervention should be evident in both treatment arms (relative to the control arm).[6] And if providing information to kiln owners about positively incentivizing workers to enhance adoption leads to better work conditions, we should find this effect incrementally in the technical+incentive information group (relative to the technical intervention group).[7]

We study the impact of these interventions on both adult labor trafficking and child labor (as well as work conditions generally) through privately-conducted surveys with kiln workers measuring work conditions, including labor trafficking indicators based on U.S. Department of State criteria (several of which were explicitly addressed by the incentive information) (*Trafficking Victims Protection Act (TVPA)* 2000; Okech, Aletraris, and Schroeder 2020). Although we did not interview children directly, we also collected information about child labor from adult workers at each kiln as well.[8]

2 Data and Methods

2.1 Experimental Design

We conducted our study in Chuadanga, Jashore, Jhenaidah, Khulna, Kushtia, and Narail Districts of the Khulna Division of Bangladesh (see Appendix Figure A1). To identify kilns for inclusion, we first contacted the Brick Manufacturing Owner Association in each district, compiling a list of 410 kilns from which we aimed to enroll 300 kilns in the trial (based on power calculations and logistical considerations). We collected baseline data from an initial sample of 328 kilns. Due

[6]The technical intervention introduced a technology that improves coal use efficiency and increases quality-adjusted output (by increasing the fraction of high-quality bricks (Brooks et al. 2024)). These changes increase the return to worker effort, and therefore imply an increase in the marginal revenue product of labor.

[7]Because bricks can be sold at any time during a season (or in a future season), we are unable to accurately measure profits, but Brooks et al. (2024) show that our two treatment arms increase estimated kiln revenue and decreased kiln fuel costs (see Brooks et al. (2024) for more details).

[8]Child labor is defined as any work by a child under the age of 18 which is hazardous, dangerous, or interferes with education. It also includes any child working under the age of 14, regardless of job (*Trafficking Victims Protection Act (TVPA)* 2000).

to high coal prices in 2022, we observed that some kilns in our initial sample switched to exclusive firewood combustion, a fuel source for which our technical intervention is not suitable, and some kilns also did not operate during that season. We therefore also collected baseline data from an additional 29 kilns in Jashore District, resulting in a total initial sample of 357 kilns.

We randomly assigned study kilns to experimental arms, stratifying assignment both by district and by quality of bricks produced during the previous season (above or below median share of "class 1" bricks).[9] Using this approach, we generated 1,000 random allocation sets, and for actual treatment assignment, we chose the allocation that maximized the sum of the p-values of the t-tests for kiln characteristics and for which none of the individual t-tests between arms was statistically significant at the 5% level (Kasy 2016).[10] After randomization, we discovered that 63 kilns were ineligible for treatment (due either to exclusive firewood combustion or non-operation during 2022). Among the 294 remaining eligible kilns, 48 were unable to participate in the study, yielding a final sample of 246 kilns.[11] Appendix Table A1 shows evidence of balance on observable kiln characteristics in this final study sample.

Our three randomly-assigned study arms are: (1) a measurement-only control group, (2) a technical intervention group, and (3) a technical+incentive information group receiving both the technical intervention and information about positive worker incentives for proper operation of ZZKs.

Kilns assigned to the technical intervention arm received information, training, and technical support to assist in the adoption of technical and operational improvements to their ZZKs.[12]

[9] "Class 1"bricks must have a "minimum compressive strength of 3,000 pounds per square inch, maximum water absorption of 20% dry weight after five hours of soaking in water, minimum weight of 3.5 kg per brick and the dimensions of 240mm x 115 mm x 70 mm ... uniformly burnt, homogeneous in texture, uniform in color, free from cracks, nodules of free lime and other flaws, have plane rectangular faces with parallel sides and sharp straight right-angled edges" (Eil et al. 2020). Class 2 bricks and lower relate to bricks that are of non-uniform colors, less uniformly burnt, and with deformed shapes or surface cracks (Eil et al. 2020).

[10] Specifically, t-tests were done using the following variables: owner experience, owner education, existence of additional owners, knowledge of pilot intervention in Jashore, personal interaction with pilot kilns in Jashore, year of ZZK adoption, location, proximity to water, number of bricks fired in previous year, percent Class 1 bricks in the preceding year, production costs per thousand bricks, number of workers in each kiln job, and average weight of fired bricks.

[11] Among these 294 kilns, 3 declined to participate in the study, 9 were closed by the government, and 36 ceased production early because of Ramadan (and so were not surveyed). See Appendix Figure A2 for more information.

[12] These improvements included: changing brick stacking patterns (air flows in a "zig-zag" pattern when bricks are

The technical intervention also highlighted the financial benefits of these improvements, directly addressing kiln owners' uncertainty about economic returns. Because the intervention decreased coal use and costs and increased brick quality and estimated revenue (Brooks et al. 2024)), we explicitly test if these improvements in productivity led to improved work conditions (a form of worker "compensation," broadly defined). Appendix Section A3 provides more detail about the technical intervention.

Because proper ZZK operation requires important changes in worker routines, our technical+incentive information arm not only included the technical intervention, but it also provided additional information to kiln owners about positively incentivizing workers for better adoption of the operational improvements. Along with this information, we provided specific examples of strategies used at peer kilns to effectively motivate workers – including financial incentives (e.g., bonuses, higher wages, and return bonuses[13]) and non-financial incentives (e.g., better work conditions and provision of meals, housing, clothing, or schooling of children—see Appendix Section A4 for more detail about the information provided to kiln owners.) These examples were directly informed by the experience of other kiln owners successfully operating ZZKs, our own pilot study in Jashore district, and the management literature (Atkin et al. 2017) – including evidence from brick kilns in Nepal (Bajracharya et al. 2022) and garment factories in Bangladesh (Saha and Mazumder 2015).[14] We also conducted two follow-up visits with technical+incentive arm kilns to

stacked less densely) to improve airflow and combustion; implementing more frequent coal feeding with smaller quantities of coal to improve combustion; closing gates to reduce heat loss; creating a thicker ash layer to improve insulation; and using sawdust or other biomass in front chambers to increase combustion efficiency (see Appendix Section A3 and Brooks et al. (2024)). Training also included separate sessions for firing and loading sardars (labor supervisors) followed by on-site assistance.

[13]"Bonus" refers to any money paid over the agreed upon piece rate or salary, often at or near the end of the season. These are often conditional on reaching some quantity or quality of bricks produced. On the other hand, "Return bonus" refers to bonuses paid to workers who return to the same kiln in the following season.

[14]Other examples include: Liu et al. (2019), who show that Bangladeshi garment factories with better work conditions are considered more trustworthy by retailers; Luken and Stares (2005), who show that targeted policies to meet corporate social responsibility requirements can improve short term profitability and long-term competitiveness; Adhvaryu, Kala, and Nyshadham (2020), who show that improving work conditions (with more efficient lights that decrease indoor temperature on hot days) led to sizeable energy savings and productivity gains; Harrison and Scorse (2010), who show that anti-sweatshop activism increased wages for workers, although these effects may have been offset by lower profits and greater risk of plant closure; and Verhoogen (2008), who shows that in Mexico's manufacturing sector, more productive firms can produce higher quality goods, and in turn pay higher wages to retain a high quality workforce.

reinforce this information. This intervention tests if providing information about the ability of positive incentives for workers to increase worker productivity (and hence profitability) leads owners to improve work conditions.

Appendix Figure A3 shows the timeline of our study activities during the 2022-2023 brick production season.

2.2 Data Collection, Measurement, and Balance

To measure work conditions, we conducted a detailed survey in private with workers at brick kilns between March and May 2023.[15] At each study kiln, we interviewed 6 individuals (5 workers and 1 sardar, or work supervisor), focusing on 4 types of workers: brick molders (who shape clay to make "green" bricks before they are fired), brick loaders (who load shaped bricks into kilns), brick unloaders (who remove fired bricks from kilns), and firemen (who feed fires in kilns to bake bricks).[16] Through these surveys, we collected detailed information about wages, work conditions, migration status, occupational hazards, and the age range of workers at kilns.

Our survey instrument also included a multi-indicator human trafficking measurement tool developed by the U.S. Department of State through its Prevalence Reduction Innovation Forum (PRIF) (Okech, Aletraris, and Schroeder 2020).[17] Following standard practice, this instrument

[15] Our team addressed the complex issue of referring individuals (both children and adults) who are, or might be, suffering from harm to appropriate services in an environment in which trustworthy and reliable service providers are scarce. To develop our approach, we sought guidance from other researchers, non-governmental organizations (NGOs), and funding bodies involved in anti-trafficking work who have grappled with these challenges. This included qualitative interviews with workers, owners, and key informants in the area. The consensus from our planning work was that there is no universally recognized protocol for referrals and support, especially in the context of work at brick kilns which employ many seasonal migrant workers (the International Labour Organization (ILO) is currently developing guidelines for such circumstances). Given a lack of reliable support services in our study area, we decided to provide participants in our study with information about government hotlines, specifically advising about 109 telephone resources, and for rescue from worksites or other emergencies, 999 telephone resources. During our interviews with workers, we received no direct requests for assistance.

[16] Because we conducted our worker surveys near the end of the firing season, some brick molders had already left kilns for the season (molding is the first step in the brick production process). To account for this, we developed a secondary sampling method. See Appendix Section A2 for more information about this method.

[17] This method draws on the definition of human trafficking adopted by the United Nations Convention against Transnational Organized Crime's Protocol to Prevent, Suppress and Punish Trafficking in Persons Especially Women and Children (Palermo Protocol) as well as the United States' *Trafficking Victims Protection Act (TVPA)* (2000). Labor trafficking in particular includes both debt bondage and forced labor. Debt bondage is labor demanded as a means of servicing a loan or debt when the labor is undervalued and the debt is ill-defined or ever-increasing such that an

consists of 39 "medium" and "strong" indicators of human trafficking across seven domains (recruitment, employment practices, personal life and property, degrading conditions, freedom of movement, debt and dependency, and violence) (see Appendix Section A1). Three different combinations of indicators are sufficient to qualify as human trafficking: 1) Any of four strong indicators by itself (no freedom of movement/communication, hereditary bonded labor, being sold for labor or sex, or being made to work in commercial sex); 2) Two or more strong indicators from two different domains (e.g., coercive or deceptive recruitment, confiscation of documents or identification, etc.); and 3) One strong and three medium indicators (e.g., debt imposed without consent along with the absence of a formal contract, wages withheld and not guaranteed, and constant surveillance at work). Because some indicators require subjective judgment, we also generate two versions: one "liberal" and one "conservative."[18] Appendix Section A1 gives a complete description of our trafficking classification methodology.

The sensitive nature of the indicators suggests that misreporting could also be a concern.[19] To the extent that any misreporting is independent of treatment assignment (which is plausible), its effect on our treatment effect estimates depends on the nature of the outcome variable. For a continuously distributed outcome (with unbounded support), our estimates would be consistent and unbiased, but estimated with reduced precision. Alternatively, for a binary dependent variable (with limited misclassification), treatment effects estimated using Ordinary Least Squares (OLS) will be attenuated toward zero.[20]

Our analysis has several primary outcomes. First, we construct a count of indicators at both worker- and kiln-levels. To incorporate differences in severity between "medium" and "strong" indicators, we assign medium indicators two-thirds of the weight of strong indicators (as stated in

individual cannot reasonably "repay" the debt. Forced labor is labor coerced by means of violence or the threat of violence, restricted movement or confinement, or threats of punishment (*Trafficking Victims Protection Act (TVPA)* 2000).

[18]For example, for Degrading Conditions Indicator 4 (see Appendix Section A1), the liberal definition requires that the housing provided at the kiln site harms health (no sanitation, etc.), while the conservative definition also requires that the individual was forced to live in employer-provided housing.

[19]Workers fearing retaliation may be reluctant to report adverse conditions, but this is likely not correlated with treatment assignment. Experimenter demand effects are also possible, but likely lead us to underestimate the effects of our experimental interventions.

[20]See Hausman (2001) for a general discussion of estimation with measurement error in the dependent variable.

our pre-analysis plan). Second, we code human trafficking at the individual- and kiln- level using the combinations of indicators described above.[21] Because workers may be reluctant to report adverse work conditions, especially while at worksites, we speculate that the resulting prevalence of trafficking and trafficking indicators are likely lower bounds. Third, we measure child labor using reports by surveyed adult workers, each of whom was asked about the presence, and approximate ages, of children working at kilns. We consider any child under age 14 who was working and any child age 17 or younger who was working under hazardous conditions (conditions at brick kilns are generally hazardous) to be child labor.[22]

We use October 2022 baseline data collected on kilns to demonstrate balance on observable kiln characteristics (given that we did not conduct a baseline worker survey) (Appendix Table A1), and we also demonstrate balance using time-invariant worker characteristics (Appendix Table A2). Appendix Table A3 presents descriptive statistics from our worker survey.

2.3 Estimation

We estimate the effects of our interventions on three pre-specified outcomes: (a) a weighted count of trafficking indicators (giving medium indicators two-thirds the weight of strong indicators, as prespecified), (b) dummy variables for adult labor trafficking (at the individual- and kiln-level), and (c) dummy variables for child labor (at the individual- and kiln-level). We estimate both Intention-to-Treat (ITT) and Instrumental Variables (IV) models, instrumenting for treatment status with randomized arm assignment.

[21] As Appendix Figures A4 and A5 show, we also estimate the impact of our intervention on measures of benefits including wages and in-kind transfers from the owner.

[22] We use the definition of hazardous conditions from the Worst Forms of Child Labor Convention of 1999: "Work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children." Survey respondents are coded as observing child labor if they report that their own child works at the kiln or that at least one child under 18 works on their team at the kiln. Although the definition of child labor that we adopt requires that children ages 15-17 be working under "hazardous" conditions, given the universal lack of personal protective equipment (PPE) that we find among all surveyed workers at all study kilns (along with prior research on children in brick kilns—e.g., Joshi et al. (2013), Zakar et al. (2015), and Larmar et al. (2017)), we consider all jobs at study kilns to qualify as "hazardous." This definition of child labor is also generally consistent with the Government of Bangladesh's definition.

Specifically, we estimate ITT effects for each treatment arm using the following basic framework:

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 I_i + \gamma_s + \pi_e + \epsilon_i \tag{1}$$

where Y_i is an outcome of interest for kiln i, T_i is a binary indicator for assignment to the technical intervention arm, I_i is a binary indicator for assignment to the technical+incentive information intervention arm, γ_s are randomization strata fixed effects, and π_e are survey enumerator fixed effects.[23] The coefficients for each treatment indicator (β_1 and β_2) capture the ITT effect of assignment to the treatment arms on each of the outcomes relative to the control arm. For individual-level outcomes, we compute heteroskedasticity-robust standard errors clustered at the kiln level.

Because we did not anticipate universal compliance (either compliance with treatment assignment or intervention adoption—e.g., some kilns assigned to the control arm adopted the intervention, and not all kilns assigned to intervention arms adopted the assigned interventions), we also use an IV model:

$$\hat{Adopt}_i = \theta_0 + \theta_1 \phi_i + \gamma_s + \pi_e + \epsilon_i \tag{2a}$$

$$Y_i = \delta_0 + \delta_1 \hat{Adopt}_i + \gamma_s + \pi_e + \mu_i \tag{2b}$$

where $Adopt_i$ is a binary indicator for whether or not kiln i adopted operational improvements (specifically, the two most critical components of the intervention—improved zigzag brick stacking and single fireman continuous coal feeding), ϕ_i is an indicator for treatment assignment (equal to 1 if observation i was assigned to a specific treatment arm), and all other variables are defined as in Equation 1. Equations 2a and 2b allow us to compute arm-specific local average treatment effect (LATE) estimates, yielding separate LATE estimates of δ_1 for each intervention arm relative to the control arm.[24]

[23] We did not pre-specify the inclusion of enumerator fixed effects, but experience during data collection led us to believe that their inclusion is appropriate. Appendix Tables A4-A7 show that our results are similar without enumerator fixed effects.

[24] As Equation 1 indicates, we use a single equation to estimate ITT effects, but we estimate the two IV effects separately. Estimating ITT coefficients separately yields statistically equivalent results (Appendix Tables A8-A10).

3 Results

In this section, we present results analyzing the impact of our interventions on coercive labor practices and other work conditions. We report estimates of the impact of our interventions on kiln fuel use, combustion efficiency, and estimated revenue elsewhere (Brooks et al. 2024). For context, the technical intervention decreased fuel costs by 8% and increased brick quality by 8% relative to the control group. These effects did not differ between the two treatment groups.

3.1 Prevalence of Trafficking Indicators, Labor Trafficking, and Child Labor

Figure 1 first shows the prevalence of individual trafficking indicators at our study kilns. Overwhelmingly, workers report a lack of personal protective equipment (PPE). All workers (100%) do so using a liberal definition, and a large majority (70%) do so using a conservative definition. Lack of PPE at brick kilns commonly leads to burns, head injuries, eye irritation, and smoke inhalation (Shaikh et al. 2012; Sanjel et al. 2016; Das et al. 2017). More than three-quarters (76%) of workers also report that pay was withheld and not guaranteed, and two thirds (66%) report that they do not have a formal labor contract. 42% of workers say that they have limited freedom of movement and communication, conditions often implying inability to leave a worksite voluntarily. Other trafficking indicators reported less commonly by workers include confiscation of papers or documents, confiscation of mobile phones, surveillance of personal space, and violence or threats of violence. Appendix Figures A6-A8 show the corresponding distributions of trafficking indicators by study arm.

We next apply PRIF definitions to work conditions to measure labor trafficking (Okech, Aletraris, and Schroeder 2020). Figure 2 shows counts of trafficking cases at brick kilns using both liberal and conservative definitions. At the vast majority of kilns (roughly 80%), at least 1 worker out of 6 meets the definition of human trafficking (i.e., we detect trafficking at about four-fifths of kilns). Across all surveyed workers, the average number of trafficked workers per kiln (out of 6

workers) is nearly 3 workers per kiln—a trafficking rate of about 50%.

Figure 3 Panel A presents results for the prevalence of child labor, showing that more than 70% of kilns in our sample use child labor according to reports by adult workers. The average number of workers per kiln reporting child labor is about 1.6 (out of 6). Panel B presents similar results to Panel A, but focuses on the youngest group of children (under age 14). In about 20% of kilns, at least one worker reported seeing children under the age of 14 working, and the average number of workers per kiln reporting child labor under age 14 is about 0.3 (a prevalence rate of about 5%). Taken together, Figure 3 Panels A and B imply that most of the child labor that we observe is concentrated among children ages 14-17 (working under hazardous or dangerous conditions) (*Trafficking Victims Protection Act (TVPA)* 2000).

3.2 Experimental Estimates for Coercive Labor and Child Labor

Labor Trafficking Indicators and Prevalence

Table 1 shows ITT and IV estimates from Equations 1 and 2 for the effect of the technical and technical+incentive information interventions on the number of trafficking indicators per worker and per kiln (generally out of 6 workers), using both liberal and conservative definitions. As the table shows, neither intervention significantly reduced the number of trafficking indicators, either at the individual- or at the kiln-level (Appendix Figures A4 and A5 show little evidence that the interventions led to changes in work amenities more generally as well). The ITT estimates in Table 1 are relatively precise, while the IV estimates are less so.[25] Table 2 repeats this analysis for labor trafficking, both at the individual- and at the kiln-level, also finding little evidence of statistically significant reductions. Overall, there is little evidence that our interventions reduced indicators of human trafficking or its prevalence.[26]

[25] In a few instances, the sign of the IV estimates differ from that of the ITT estimates (due to the inclusion of fixed effects). In all such cases, neither the IV nor the ITT estimates are significant at conventional levels.

[26] Although our pre-analysis plan includes a correction for multiple hypothesis testing following Anderson (2008), we do not make this correction for labor trafficking indicators or cases given that the uncorrected estimates are statistically insignificant.

Child Labor Prevalence

We also examine how our experimental interventions influenced child labor at brick kilns. Table 3 shows ITT and IV estimates from Equations 1 and 2 for the probability that adult workers observed child labor, both at the individual- and kiln-level. The first and third columns show that the technical+incentive information intervention reduced child labor, but that the technical intervention alone did not. Specifically, Column (1) shows ITT estimates suggesting that the technical+incentive information arm reduced the probability that child labor was reported by adult workers at a kiln by about 9 percentage points, a decline of about 28% relative to the control group (which remains significant at the 5% level after a multiple hypothesis test correction following Anderson (2008), as specified in our pre-analysis plan).[27,28] This estimate for the technical+incentive information arm is also significantly different from the estimate in the technical intervention arm.[29] Similarly, the IV estimates suggest that the technical+incentive information arm reduced this probability by 19 percentage points, a decline of roughly 65% relative to the control group, which also remains significant after correcting for multiple hypothesis tests.[30] Column (2) shows that among children under age 14, there is also a decline, but this reduction is statistically insignificant (we note that the baseline rate of child labor under age 14 is meaningfully lower than the rate of child labor).

Similarly, Column (3) shows ITT estimates indicating that the technical+incentive information intervention reduced the number of workers per kiln reporting child labor by 0.47 (out of 6), a relative decline of about 27% (which remains significant at the 10% level after correcting for multiple hypothesis testing).[31] The IV estimates in Column (3) suggest that the number of workers per kiln who report child labor decreased by 1.11 workers (out of 6) in the technical+incentive

[27] Estimated decline: 0.085; control mean: 0.3; percent change: -(0.085)/0.3 = 28.3% decline.

[28] In our pre-analysis plan, we pre-specified evaluating four outcomes jointly: a binary outcome for labor trafficking at the kiln level, a binary outcome for child labor at the kiln level, a weighted count of indicators present at kilns, and a measure of the indicators targeted by the technical+incentive information arm at the kiln level. In our final analysis, we evaluate a binary outcome for child labor both at the kiln level and at the worker level.

[29] A test of equality between the estimates for the two treatment groups yields a p-value of 0.076.

[30] Estimated decline: 0.194; control mean: 0.3; percent change: -(0.194)/0.3 = 64.5% decline.

[31] Estimated decline: 0.471; control mean: 1.77; percent change: -(0.471)/1.77 = 26.6% decline. A test of equality between the estimates on both treatment arms has a p-value of 0.205.

information arm, a relative decline of about 63% (although this reduction becomes imprecise and insignificant after correcting for multiple hypothesis testing).[32] Although these IV estimates are large in relative terms, they are similar in magnitude to child labor program effects reported by others (Edmonds and Schady 2012; Aygün et al. 2024).

What changes within kilns may have led to a reduction in child labor? One hypothesis suggested by past research is that an increase in family income can lead to reductions in child labor, so we therefore test for increases in worker earnings.[33] Table 4 Panel A shows estimates from Equations 1 and 2 for worker earnings, separately by type of worker.[34] We lack power, and the resulting estimates are imprecise, but they nonetheless suggest that earnings may have increased for some types of workers. Specifically, we find suggestive evidence that wages for brick molders in the technical+incentive information arm (but not the technical arm) may have risen.[35] Table 4 Panel B also re-estimates Equations 1 and 2 using reports from owners about wage rates paid to workers by type (either as piece rates or as seasonal payments). It shows similar suggestive but imprecise evidence that molder wage rates may have increased in the technical+incentive information arm (but again not the technical arm).[36] Although not conclusive, these results are consistent with the possibility that our incentive information, which included explicit information about financial incentives, led owners to increase wages. These wage increases may have reduced child labor in a manner consistent with Basu and Van (1998)—either because higher wages for parents reduced work by their children or because higher wages for children directly reduced child labor through an income effect (or both). Although we do not observe the specific jobs done by children at study kilns in our data, other studies suggest that brick molding accounts for a large share of child labor at

[32] Estimated decline: 1.114; control mean: 1.77; percent change: -(1.114)/1.77 = 62.9% decline

[33] Basu and Van (1998) show theoretically that higher adult wages can decrease child labor. Recent empirical studies report congruent results, focusing on cash transfers (Edmonds and Schady 2012; De Hoop and Rosati 2014), household land holding (Basu, Das, and Dutta 2010), and per capita spending (Edmonds 2005).

[34] Although workers have different bases of payment (e.g., piece rates, daily wages, or monthly wages), enumerators were instructed to ask respondents for separate estimates of weekly earnings.

[35] In particular, our IV estimates imply an increase in molder wages of about 15%. Because we show in a companion study that brick quantity does not increase (despite an increase in quality), we interpret these as changes in wage rates (Brooks et al. 2024).

[36] Because we conducted both baseline and endline owner surveys, although not pre-specified, we use owner by survey-wave observations to regress endline wages on treatment arm dummy variables, baseline wages, randomization strata fixed effects, and baseline and endline enumerator fixed effects.

brick kilns—and the suggestive evidence of higher wages that we find in the technical+information arm is also among molders.[37]

4 Conclusion

In this paper, we use a randomized controlled trial to test a "business case" for better work conditions at brick kilns in Bangladesh, focusing on how both productivity gains and information about the private business return to positively incentivizing workers influence adult labor trafficking and child labor. Our setting provides an important test case for at least two reasons. First, coercive labor and child labor are commonly documented in brick production in many countries (US Department of Labor 2022). Consistent with past research, we find high prevalence rates of both adult labor trafficking and child labor (Bhukuth and Ballet 2006; Shah, Alam, and Shabbir 2020). Among study kilns, about 80% of kilns had trafficked labor (and roughly 50% of workers were trafficked) and about 70% of kilns had child labor. Second, effective strategies to reduce coercive labor and child labor in environments with weak regulatory enforcement and state capacity like ours may require approaches that are aligned with the incentives of private business owners.

We find little evidence that the technical intervention by itself reduced labor trafficking or child labor. Given that the technical intervention increased kiln productivity/efficiency and estimated revenues, and that these gains could be realized throughout the brick season, our results suggest that improvements in productivity alone may be insufficient to reduce coercive labor or child labor in settings like ours. We also find that providing information to owners about positively incentivizing workers for better adoption of the technical intervention did not reduce adult labor trafficking.

By contrast, however, we do find that the provision of this information reduced child labor reported by adult workers by 25-30%.[38] Although we cannot conclusively say what actions taken by kiln owners led to these declines, we find evidence consistent with the interpretation that increases

[37] See e.g. Isabelle et al. 2007; Ercelawn and Nauman 2004 on the use of child labor in brick kilns in South Asia.

[38] These reductions are on par with those reported by others due to microinsurance, increases in the legal working age, incentives for remaining in school, and cash transfers (Edmonds and Schady 2012; Edmonds and Shrestha 2014; Landmann and Frölich 2015; Piza and Souza 2016).

in household income may have contributed to reductions in work done by children (Edmonds and Theoharides 2020; Aygün et al. 2024). In particular, we find suggestive evidence of increases in earnings among brick molders, whom other studies show are the workers most likely to have their own children working at kilns (Bhukuth 2005; Zakar et al. 2015).

More generally, our paper demonstrates that under some circumstances, better labor practices do not necessarily imply worse business outcomes. It also highlights the need for more research on strategies to reduce coercive labor and child labor in environments with weak regulatory enforcement and state capacity—environments in which regulatory interventions (such as child labor bans) are often ineffective (Basu and Van 1998; Bharadwaj, Lakdawala, and Li 2019; Costa et al. 2020).[39] We particularly note that unlike a growing body of empirical evidence on child labor, there is a paucity of direct evidence on human trafficking and coercive labor as an outcome. This is a critical area for new empirical research.

[39] Studying India's Child Labor Act of 1986, Bharadwaj, Lakdawala, and Li (2019) show that reductions in child wages can also perversely increase child labor, for example if families use child labor to reach subsistence constraints (Basu and Van 1998). Edmonds and Theoharides (2020) also show the importance of complementarity between productive assets and child labor.

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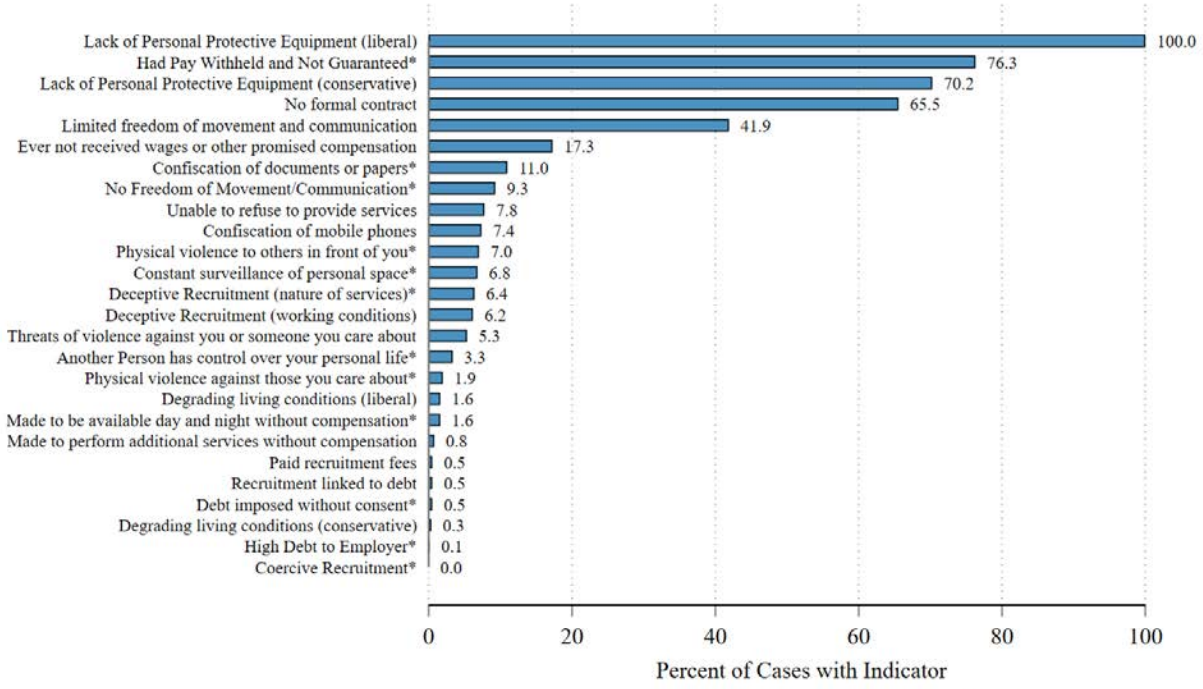
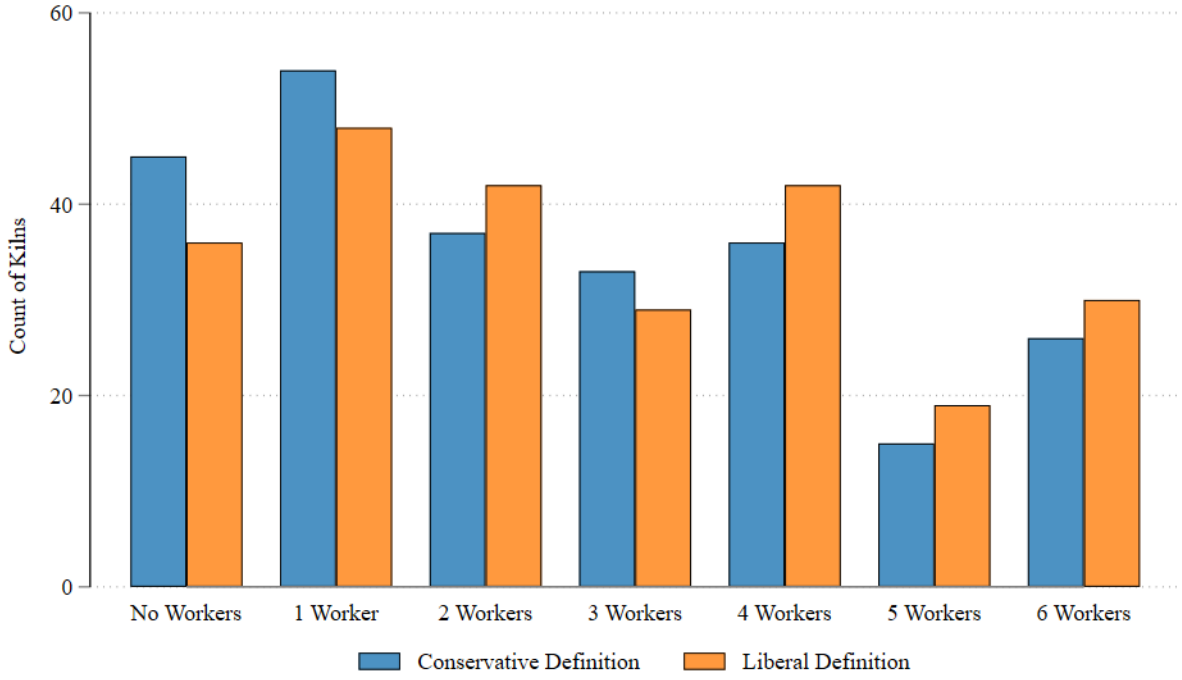
Figure 1: Prevalence of Labor Trafficking Indicators at Study Kilns



* = Strong Indicator. Sample includes data from 246 brick kilns, with a total of 1442 workers interviewed. All indicators come from Okech et al. (2020). Note that not all indicators mentioned in Okech et al. (2020) are included here, because our survey does not ask about sex trafficking or sexual violence. See Appendix Section A1 for more information on trafficking indicators.

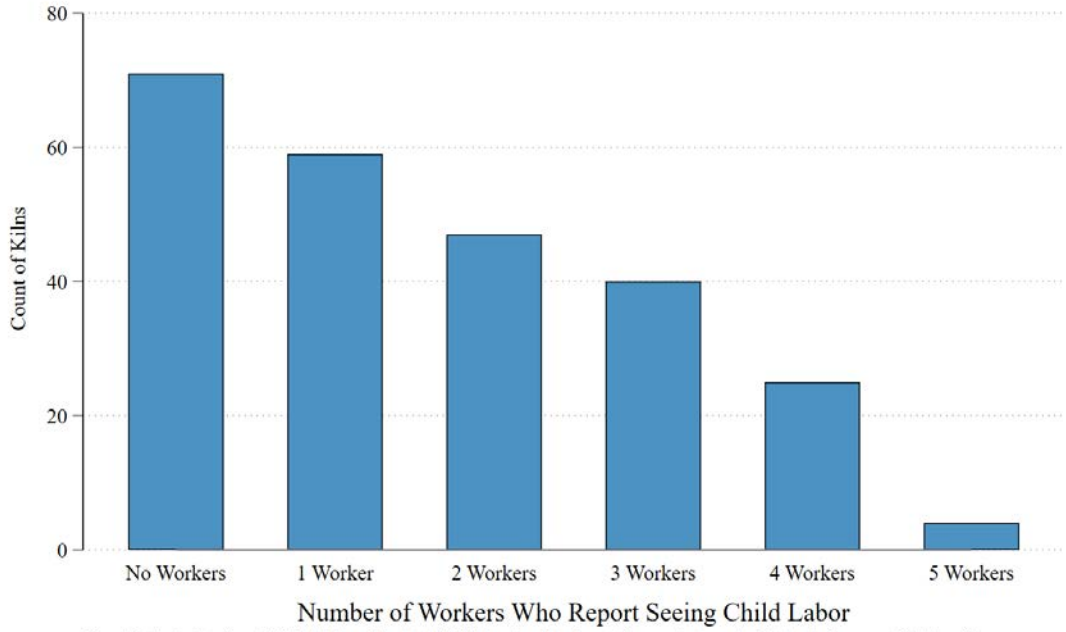
Figure 2: Count of Study Kilns by Number of Workers (Out of 6) Classified as Trafficked



Sample includes data from 246 brick kilns, with a total of 1442 workers interviewed. Trafficking classifications follow Okech et al. (2020). See Appendix Section A1 for more information on trafficking classifications. 'Conservative definition' places stricter requirements on indicators which have a degree of subjectivity, while 'liberal definition' places weaker requirements.

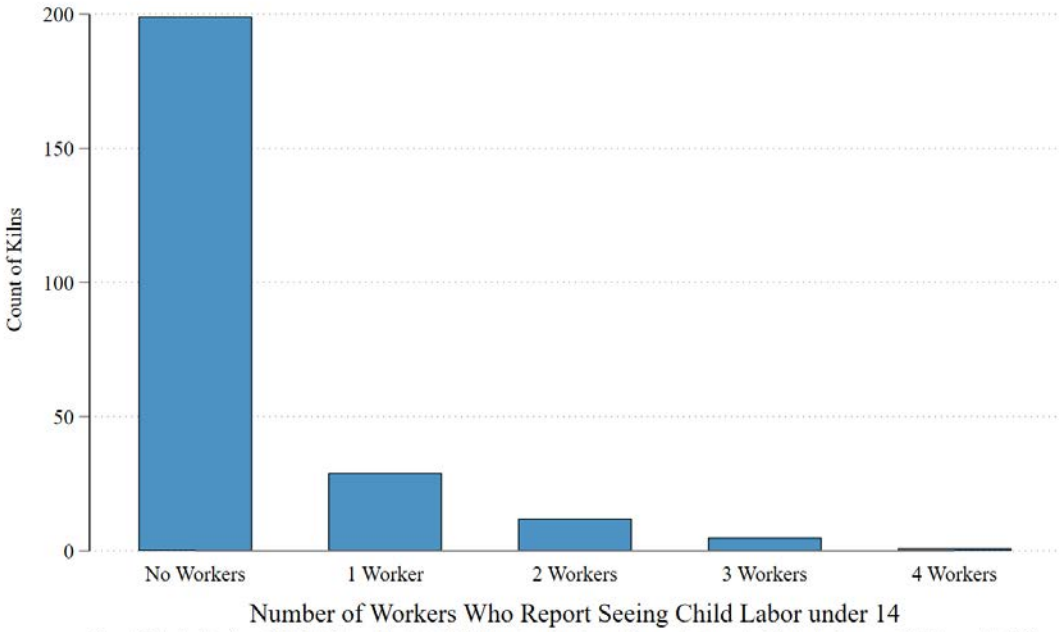
Figure 3: Count of Kilns by Number of Workers (Out of 6) Who Report Seeing Child Labor

(a) All Children (17 years old or younger)



Sample includes data from 246 brick kilns, with a total of 1442 workers interviewed. Respondents are classified as having seen child labor if they either have their own child (who is under 18) work at the kiln with them or if they report that at least one member of their team is under 18. Note that we were unable to directly interview children at study kilns.

(b) Children under 14



Sample includes data from 246 brick kilns, with a total of 1442 workers interviewed. Respondents are classified as having seen child labor under 14 if they either have their own child (who is under 14) work at the kiln with them or if they report that at least one member of their team is under 14. Note that we were unable to directly interview children at study kilns.

Table 1: Treatment Effect Estimates for Labor Trafficking Indicators

Treatment Arm		(1)	(2)	(3)	(4)	(5)	(6)
Technical Only	ITT	0.041	0.026	0.010	0.000	-0.046	-0.174
		(0.103)	(0.107)	(0.298)	(0.303)	(0.734)	(0.759)
	IV	0.018	-0.016	-0.574	-0.622	-1.090	-1.420
		(0.246)	(0.255)	(0.651)	(0.662)	(1.749)	(1.673)
Technical+Incentive	ITT	0.033	0.044	0.249	0.267	0.277	0.323
		(0.100)	(0.105)	(0.306)	(0.309)	(0.689)	(0.713)
	IV	-0.117	-0.107	0.370	0.419	-0.219	-0.167
		(0.258)	(0.270)	(0.807)	(0.815)	(1.818)	(1.882)
Control Mean		2.919	2.714	5.504	5.423	17.17	15.95
Conservative/Liberal		Liberal	Conservative	Liberal	Conservative	Liberal	Conservative
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln	Kiln	Kiln
Unique or Sum?		N/A	N/A	Unique	Unique	Sum	Sum
Observations		1442	1442	246	246	246	246

Standard errors in parentheses. All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. The dependent variable is a weighted count of the trafficking indicators observed; "medium" indicators receive 2/3rds the weight of "strong" indicators. ITT estimates are OLS estimates generated from regressing the weighted count of trafficking indicators on treatment arm dummy variables, with fixed effects for randomization strata and enumerator. See Appendix Tables A4-A6 for arm-specific ITT results. IV estimates are arm-specific LATE estimates relative to the control arm. See Appendix Section A1 for detailed description of differences between liberal and conservative definitions. Columns 1 and 2 show the regression results for individual-level weighted count of indicators with a liberal and conservative definition, respectively. Columns 3-6 show the results for kiln-level weighted counts. Because kilns can have multiple workers with the same indicator, columns 3 and 4 use weighted counts of unique indicators observed at the kiln, while columns 5 and 6 use weighted counts of all indicators.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Treatment Effect Estimates for Labor Trafficking Status

Treatment Arm		(1)	(2)	(3)	(4)
Technical Only	ITT	-0.013	-0.012	-0.054	-0.033
		(0.036)	(0.035)	(0.053)	(0.056)
	IV	-0.062	-0.067	-0.105	-0.133
		(0.084)	(0.085)	(0.132)	(0.127)
Technical+Incentive	ITT	0.006	0.002	-0.051	-0.056
		(0.034)	(0.036)	(0.052)	(0.056)
	IV	-0.069	-0.063	-0.262*	-0.209
		(0.092)	(0.085)	(0.156)	(0.146)
Control Mean		0.4571	0.4204	0.8916	0.8434
Conservative or Liberal Definition?		Liberal	Conservative	Liberal	Conservative
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln
Observations		1442	1442	246	246

Standard errors in parentheses. All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. ITT estimates are OLS estimates generated from regressing an indicator for trafficking on treatment arm dummy variables, with fixed effects for randomization strata and enumerator. See Appendix Tables A4-A6 for arm-specific ITT results. IV estimates are arm-specific LATE estimates relative to the control arm. See Appendix Section A1 for detailed description of differences between liberal and conservative definitions. To generate kiln-level data, we code kilns as having trafficking if any of the workers interviewed at that kiln met the definition for trafficking.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Treatment Effect Estimates for Child Labor

Treatment Arm		(1)	(2)	(3)	(4)
Technical Only	ITT	-0.027	-0.022	-0.196	-0.168
		(0.033)	(0.018)	(0.215)	(0.112)
		[1]		[1]	
	IV	-0.067	-0.063	-0.518	-0.412
		(0.076)	(0.041)	(0.510)	(0.264)
		[1]		[1]	
Technical+Incentive	ITT	-0.085***	-0.024	-0.471**	-0.150
		(0.031)	(0.017)	(0.207)	(0.111)
		[0.029]		[0.068]	
	IV	-0.194**	-0.060	-1.114*	-0.387
		(0.081)	(0.045)	(0.591)	(0.321)
		[0.079]		[0.51]	
Control Mean		0.3	0.067	1.77	0.402
All Child Labor or Under 14?		All	Under 14	All	Under 14
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln
Observations		1442	1442	246	246

Standard errors in parentheses. Multiple hypothesis adjusted p-values following Anderson (2008) shown in brackets. MHT corrections are performed following our pre-analysis plan (in conjunction with regressions of kiln level indicators for trafficking, weighted sum of trafficking indicators, and count of three main indicators targeted by intervention in technical+incentive arm). All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. ITT estimates are OLS estimates generated from regressing either an indicator for the existence of child labor (as in columns 1 and 2) or a count of cases of child labor at a kiln (as in columns 3 and 4) on treatment arm dummy variables, with fixed effects for randomization strata and enumerator. See Appendix Tables A4-A6 for arm-specific ITT results. IV estimates are arm-specific LATE estimates relative to the control arm. For a respondent to be classified as having seen child labor, they must either have their own child work at the kiln with them or they must report that at least one member of their team was under the age of 18. For a respondent to be classified as having seen children under the age of 14 working, they must either work with their child (who is under the age of 14) or they must report that at least one member of their team is under the age of 14. A test of equality between the estimates for ITT estimates in column 1 has a p-value of 0.076, while for column 3 ITT estimates the p-value is 0.205. For the IV estimates, we bootstrap the difference between the coefficients to test if this is significantly different from zero. Using 1000 replications, this yields p-values of 0.085 for column 1 and 0.702 for column 3.

$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Table 4: Treatment Effect Estimates for Wages by Type of Worker

Panel A: Worker-Reported Wage Effects of Intervention by Job

Job		Molders		Brick Loaders		Brick Unloaders		Firemen		Overall	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment Arm		T	T+I	T	T+I	T	T+I	T	T+I	T	T+I
Weekly Wages	ITT	-154.79	10.98	-51.30	-28.74	-151.45	-21.86	24.42	56.77	-59.90	-30.24
		(391.28)	(374.16)	(122.41)	(123.39)	(129.63)	(132.44)	(163.52)	(163.20)	(86.03)	(79.18)
	IV	-944.66	419.58	-218.44	-63.89	-496.63	289.82	42.89	234.15	-176.46	-40.01
		(2455.34)	(1350.73)	(542.55)	(512.21)	(463.46)	(703.20)	(683.70)	(983.68)	(354.35)	(360.39)
	N	108	108	466	466	339	339	285	285	1198	1198

Panel B: Owner-Reported Wage Effects of Intervention by Job

Job		Molders		Brick Loaders		Brick Unloaders		Firemen		Overall	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment Arm		T	I+T	T	I+T	T	I+T	T	I+T	T	I+T
Owner-Reported Wages	ITT	-7.95	15.62	6.34	6.93	3.02	6.71	9185.39	21697.34	N/A	N/A
		(19.26)	(19.26)	(6.00)	(6.78)	(5.62)	(5.10)	(22632.86)	(22931.51)	.	.
	IV	-60.08	65.22	9.61	20.04	7.14	14.25	11447.62	60742.44	N/A	N/A
		(48.86)	(50.07)	(15.07)	(18.55)	(14.22)	(12.23)	(58568.13)	(58544.27)	.	.
	N	219	219	236	236	230	230	229	229	.	.

Standard errors in parentheses. All standard errors are clustered at the kiln level in Panel A and heteroskedasticity robust in Panel B. Columns labelled "T" show results for technical only arm, while columns labelled "T+I" show the technical+incentive arm results. Panel A restricts to non-missing and non-zero wages reported by non-sardar workers. Panel B restricts to non-missing wages reported by owners. Workers are grouped by primary job. Owner-reported wage data (for which we have baseline and endline data) is used to estimate the impact of our intervention on wages paid. Regressions in Panel B regress endline wages on treatment arm dummy variables, baselines wages, as well as fixed effects for baseline and endline enumerator as well as randomization strata. ITT estimates are OLS estimates generated from regressing wages on treatment arm dummy variables, with fixed effects for randomization strata and enumerator. IV estimates are arm-specific LATE estimates relative to the control arm. Nearly all molders, brick loaders, and brick unloaders are paid a piece rate wage (usually per 1,000 bricks). Alternatively, firemen work on a seasonal contract. Owners were asked about piece rate wages when feasible, but for firemen were asked the cost of their firemen for a season (Panel B Columns 7 and 8). All estimates are in Bangladeshi Taka (BDT).

$^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Appendix: "A Business Case for Human Rights at Work? Experimental Evidence on Labor Trafficking and Child Labor at Brick Kilns in Bangladesh"

Figure A1: Map of Study Kiln Locations (Khulna Division)

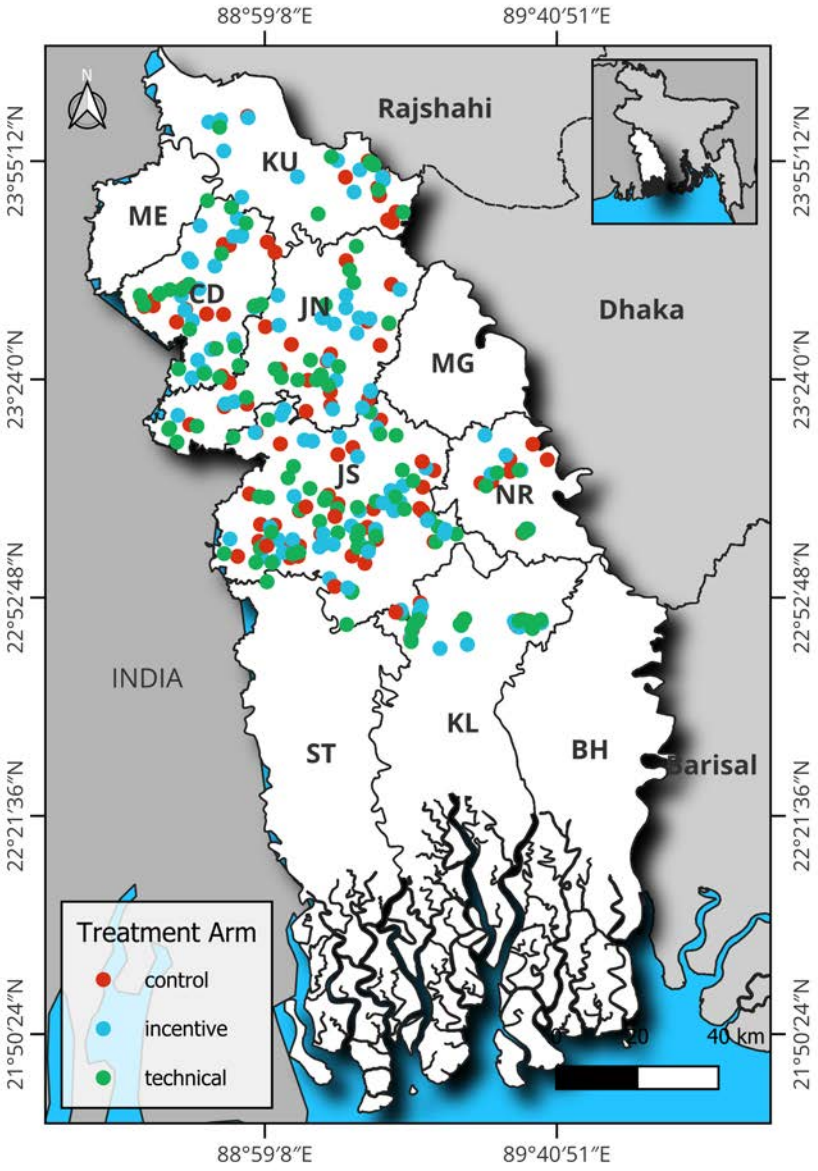


Figure A2: Sample Selection Flow Chart

Figure A3: Study Timeline

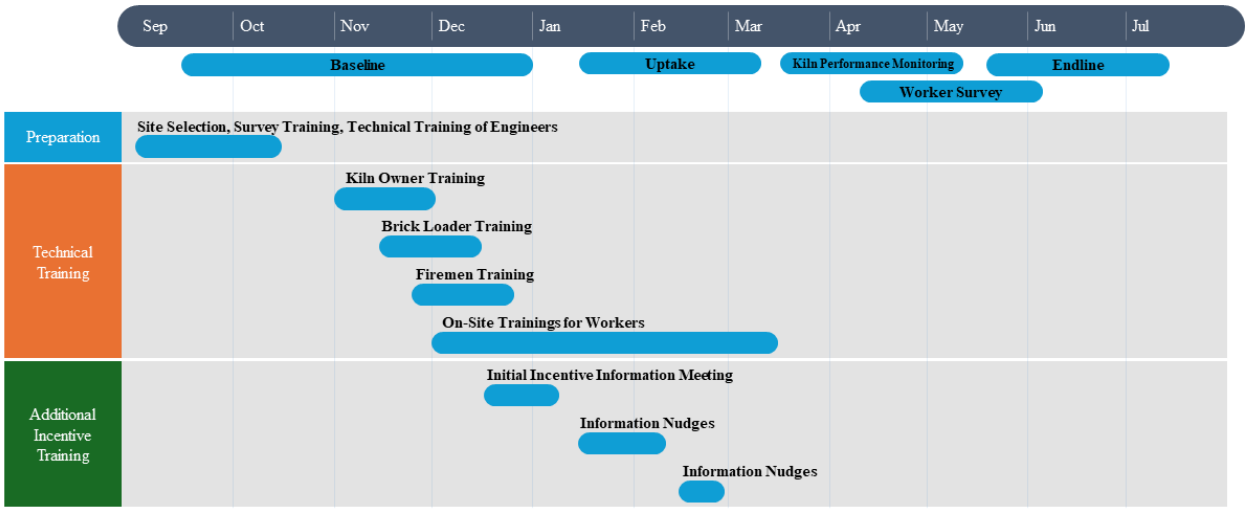
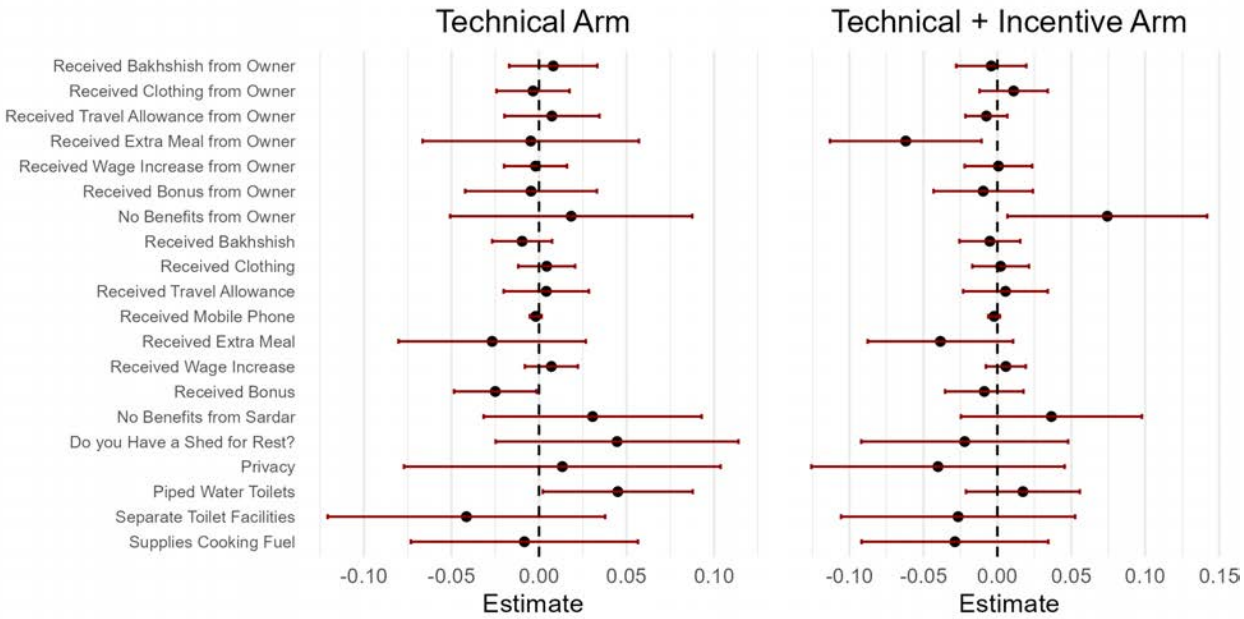
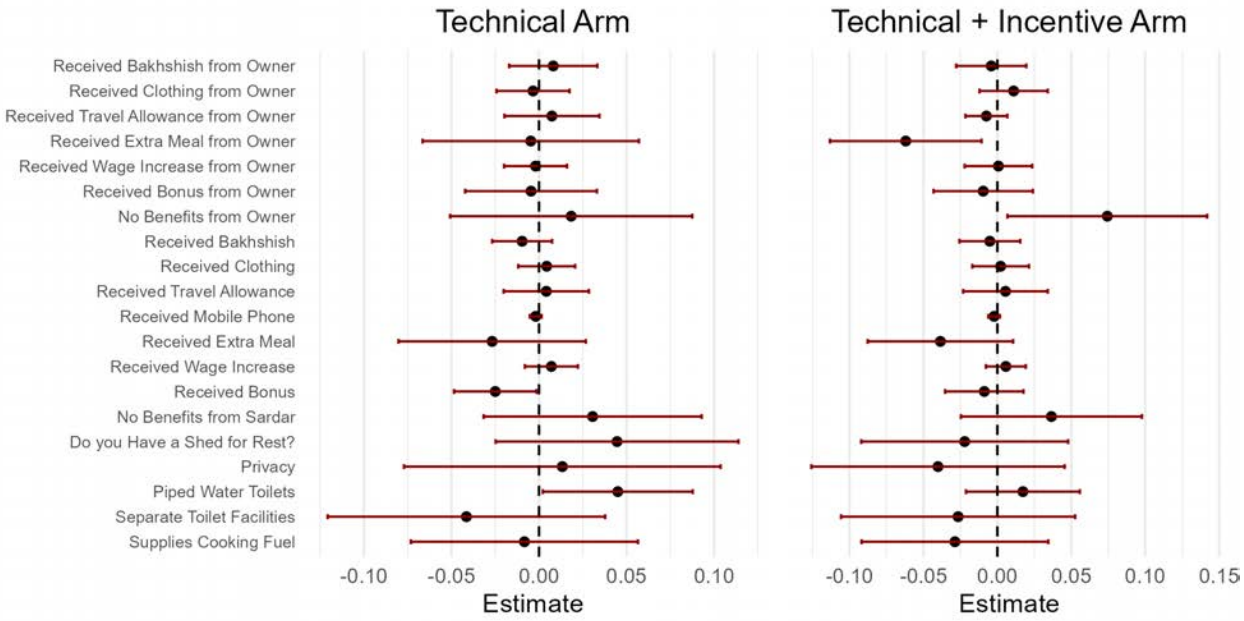


Figure A4: ITT Estimates for Individual Work Conditions



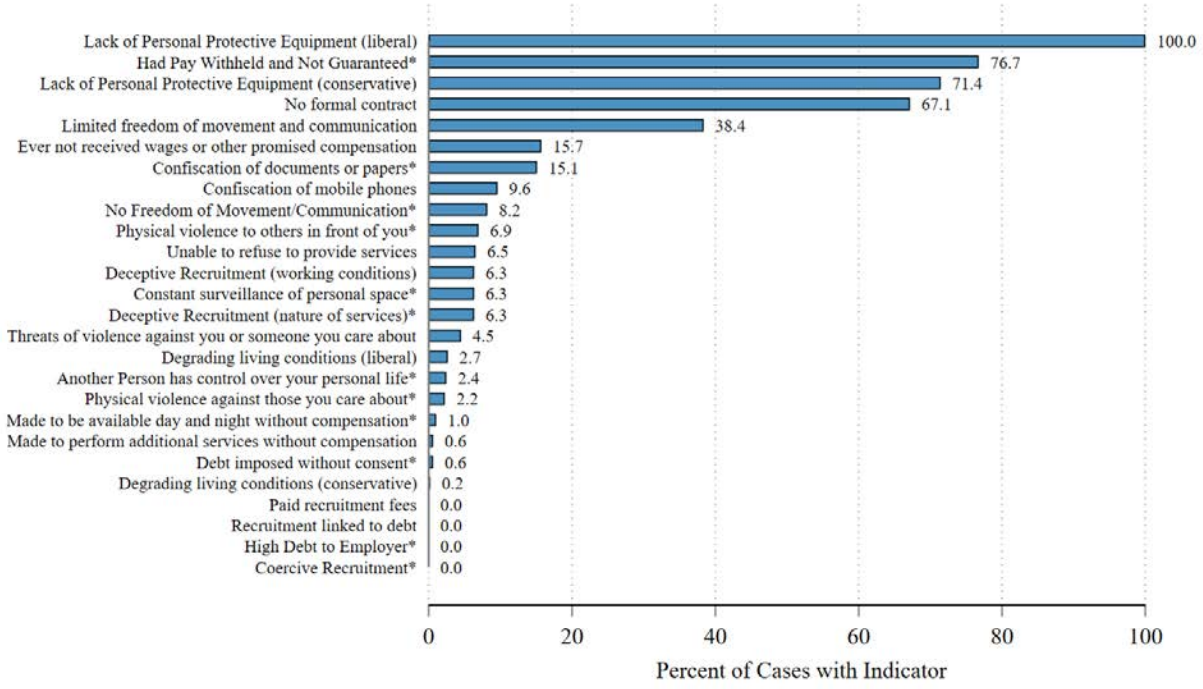
Sample: 246 kilns (1442 workers) surveyed in both the worker survey as well as kiln performance monitoring. Graphs show the OLS estimates and 95% confidence intervals generated from regressing an indicator for each amenity on treatment arm dummy variables with randomization strata and enumerator fixed effects. Bahkshish is a term often used in South Asia to describe small informal payments made to individuals (similar to a tip), while bonuses are typically more formal and given at the conclusion of a service. Bonuses often are predetermined, while bahkshish amounts may be declared at the time of giving.

Figure A5: IV Estimates for Individual Work Conditions



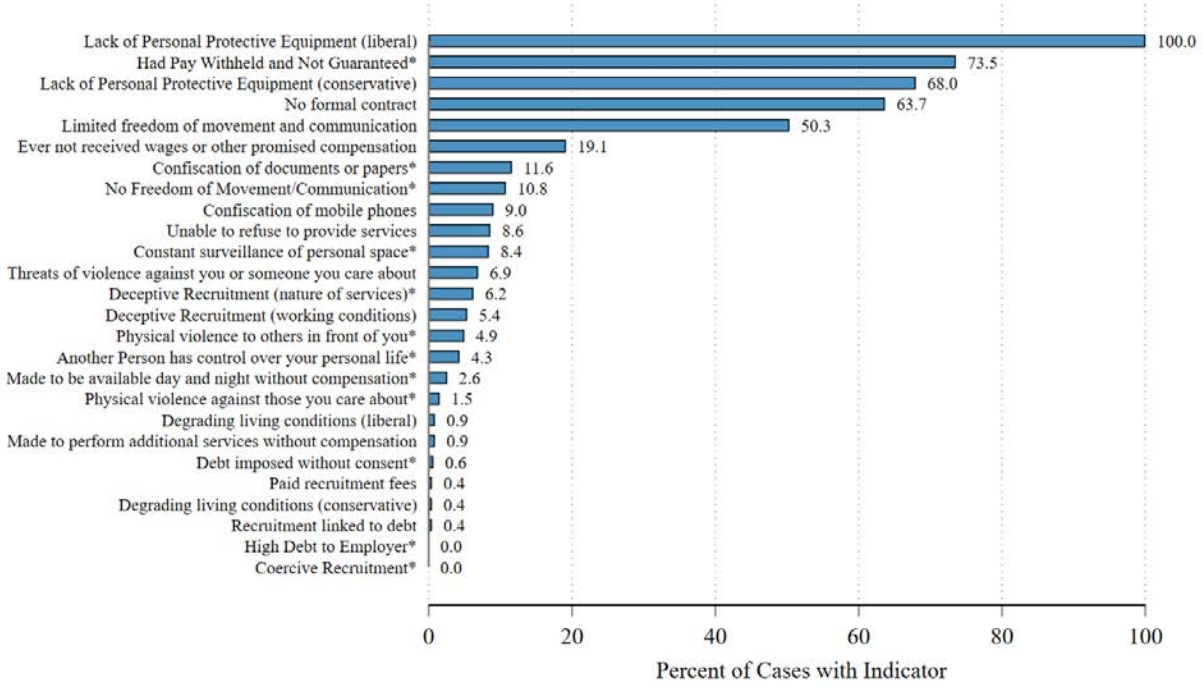
Sample: 246 kilns (1442 workers) surveyed in both the worker survey as well as kiln performance monitoring. Graphs show the OLS estimates and 95% confidence intervals generated from regressing an indicator for each amenity on treatment arm dummy variables with randomization strata and enumerator fixed effects. Bahkshish is a term often used in South Asia to describe small informal payments made to individuals (similar to a tip), while bonuses are typically more formal and given at the conclusion of a service. Bonuses often are predetermined, while bahkshish amounts may be declared at the time of giving.

Figure A6: Prevalence of Labor Trafficking Indicators at Control Arm Kilns



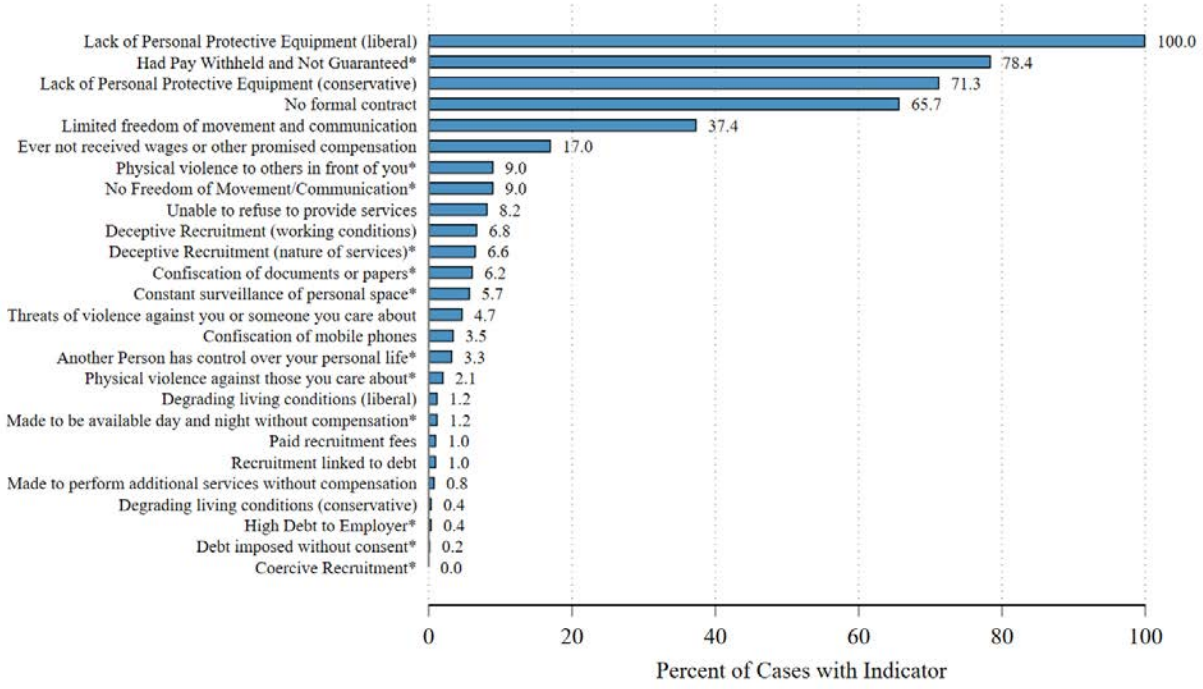
* = Strong Indicator. Control kiln sample includes data from 83 brick kilns, with a total of 490 workers interviewed. Note that not all indicators mentioned in Okech et al. (2020) are included here, because our survey does not ask about sex trafficking or sexual violence. See Appendix Section A1 for more information on trafficking indicators.

Figure A7: Prevalence of Labor Trafficking Indicators at Technical Arm Kilns



* = Strong Indicator. Technical kiln sample includes data from 81 brick kilns, with a total of 465 workers interviewed. Note that not all indicators mentioned in Okech et al. (2020) are included here, because our survey does not ask about sex trafficking or sexual violence. See Appendix Section A1 for more information on trafficking indicators.

Figure A8: Prevalence of Labor Trafficking Indicators at Technical+Incentive Arm Kilns



* = Strong Indicator. Technical+incentive kiln sample includes data from 82 brick kilns, with a total of 487 workers interviewed. Note that not all indicators mentioned in Okech et al. (2020) are included here, because our survey does not ask about sex trafficking or sexual violence. See Appendix Section A1 for more information on trafficking indicators.

Table A1: Balance Tests of Time-Invariant Kiln Characteristics

	Technical+Incentive Arm		Technical Arm		Control Arm		p-value for Test of Equality		
Balance Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	I vs. C	T vs. C	I vs. T
Owner Experience (Years)	15.602	8.625	17.062	10.247	15.169	9.910	0.849	0.308	0.354
Jashore Pilot Intervention Knowledge	0.361	0.484	0.355	0.482	0.358	0.483	0.825	0.973	0.810
Jashore Owner Interaction	0.455	0.510	0.545	0.510	0.458	0.509	0.798	0.333	0.526
Zigzag Year	2015	4	2014	4	2014	3	0.624	0.360	0.167
Water Adjacent	0.602	0.492	0.625	0.487	0.639	0.483	0.333	0.949	0.311
Bricks Fired (100,000s)	8.079	1.013	7.859	1.192	8.118	1.114	0.485	0.082	0.243
Circuits Completed	6.149	1.512	5.991	1.509	6.119	1.818	0.599	0.711	0.318
Class 1 Production Share (%)	65.193	11.496	67.312	8.380	65.880	10.543	0.946	0.110	0.191
Production Cost BDT (per 1K Bricks)	8868.554	941.250	8599.625	1313.840	8642.169	1064.834	0.077	0.960	0.128
Total Workers	110.133	28.621	111.938	32.697	110.940	35.788	0.903	0.571	0.655
Joint Ownership	0.313	0.467	0.325	0.471	0.398	0.492	0.262	0.264	0.994

All data collected through baseline owner survey. Sample includes 246 kilns with worker surveys and kiln performance monitoring. See Appendix Figure A2 for more details.

Table A2: Balance Tests of Pre-Existing Worker Characteristics

	Technical+Incentive Arm		Technical Arm		Control Arm		p-value for Test of Equality		
Balance Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	I vs. C	T vs. C	I vs. T
Age	34.651	9.675	34.594	10.066	34.237	9.951	0.677	0.705	0.978
Sex	0.910	0.287	0.929	0.257	0.906	0.292	0.920	0.346	0.410
Years of Education	4.538	3.627	4.697	3.514	4.649	3.446	0.892	0.664	0.772
Literacy	0.073	0.261	0.061	0.240	0.043	0.205	0.578	0.487	0.222
Job as Brick Loader	0.386	0.487	0.376	0.485	0.361	0.481	0.594	0.964	0.632
Job as Molder	0.094	0.293	0.105	0.307	0.096	0.295	0.979	0.491	0.514
Job as Fireman	0.226	0.419	0.262	0.440	0.276	0.447	0.195	0.815	0.134
Job as Brick Unloader	0.294	0.456	0.256	0.437	0.267	0.443	0.530	0.457	0.174
Worked at Same Kiln in Previous Season	0.742	0.438	0.706	0.456	0.682	0.466	0.105	0.545	0.315
Worked at Any Kiln in Previous Season	0.946	0.227	0.948	0.222	0.939	0.240	0.979	0.974	0.954
Worked with Same Owner in Previous Season	1.000	0.000	1.000	0.000	0.955	0.210	0.863	0.953	0.912
Worked with Same Sardar in Previous Season	0.746	0.436	0.678	0.468	0.629	0.484	0.088	0.394	0.396
Division of Residence (Khulna)	0.930	0.255	0.931	0.253	0.939	0.240	0.256	0.175	0.831
Division of Residence (Rajshahi)	0.049	0.217	0.060	0.238	0.053	0.224	0.752	0.185	0.321
Division of Residence (Rangpur)	0.000	0.000	0.004	0.066	0.002	0.045	0.266	0.513	0.155
Division of Residence (Dhaka)	0.008	0.090	0.002	0.046	0.002	0.045	0.205	0.966	0.217
Division of Residence (Barisal)	0.012	0.110	0.002	0.046	0.004	0.064	0.108	0.817	0.069
Traveled for Work?	0.464	0.499	0.501	0.501	0.508	0.500	0.997	0.531	0.525
Distance Traveled (km)	45.540	63.938	48.469	67.771	49.078	64.821	0.972	0.550	0.534

All data collected through worker survey. Sample includes 246 kilns with worker surveys and kiln performance monitoring. See Appendix Figure A2 for more details.

Table A3: Summary Statistics

	Mean	Standard Deviation	Minimum	Maximum
Trafficking Indicators				
Trafficked (Conservative Definition; Individual)	0.417	—	0	1
Trafficked (Liberal Definition; Individual)	0.459	—	0	1
Count of Trafficked Individuals (Conservative Definition; Kiln)	2.447	1.930	0	6
Count of Trafficked Individuals (Liberal Definition; Kiln)	2.691	1.940	0	6
Weighted Count of Indicators (Conservative Definition; Individual)	2.718	1.419	0	9.960
Weighted Count of Indicators (Liberal Definition; Individual)	2.923	1.388	0.660	9.980
Recruitment #3 (Deceptive Recruitment)	0.062	—	0	1
Recruitment #4 (Paid own recruitment fees)	0.005	—	0	1
Employment Practices #5 (Made to Perform Additional Tasks w/o compensation)	0.008	—	0	1
Employment Practices #6 (Ever had wages withheld)	0.173	—	0	1
Employment Practices #7 (Recruitment linked to debt)	0.005	—	0	1
Employment Practices #8 (No formal contract)	0.655	—	0	1
Personal Life #5 (Confiscation of Mobile Phone as a way of control)	0.074	—	0	1
Degrading Conditions #2 (Hazardous Tasks w/ Lack of Protective Gear) Liberal Definition	1	—	1	1
Degrading Conditions #2 (Hazardous Tasks w/ Lack of Protective Gear) Conservative Definition	0.702	—	0	1
Degrading Conditions #4 (Made to Live in Degrading Conditions) Liberal Definition	0.016	—	0	1
Degrading Conditions #4 (Made to Live in Degrading Conditions) Conservative Definition	0.003	—	0	1
Freedom of Movement #4 (Limited Freedom of Movement and Communication)	0.419	—	0	1
Debt or Dependency #4 (Unable to Refuse to Provide Services)	0.078	—	0	1
Violence #8 (Threats of Violence Against You or a Loved One)	0.053	—	0	1
Freedom of Movement #1 (Confiscation of Identification Papers)	0.225	—	0	1
Freedom of Movement #2 (Constant Surveillance)	0.068	—	0	1
Freedom of Movement #3 (No Freedom of Movement or Communication)	0.093	—	0	1
Violence #1 (Physical Violence Inflicted in Front of You on Other Individuals)	0.070	—	0	1
Violence #3 (Physical Violence Against You or Someone You Care Deeply About)	0.019	—	0	1
Recruitment #2 (Deceptive Recruitment Regarding Nature of Services or Responsibilites Required)	0.064	—	0	1
Employment Practices #1 (Had your wages withheld and if you leave you will not get them)	0.763	—	0	1
Personal Life #1 (Another Person Has Control over Your Personal Life)	0.033	—	0	1
Debt or Dependency #1 (Debt Imposed on You Without Your Consent)	0.005	—	0	1
Degrading Conditions #1 (Made to Work Day and Night Without Compensation)	0.016	—	0	1
Child Labor				
Child Labor Exists	0.273	—	0	1
Count of Workers Seeing Child Labor at Kiln	1.626	1.397	0	5
Child Labor Exists for Children Under 14	0.050	—	0	1
Count of Workers Seeing Children Under 14 Working	0.293	0.691	0	4
Amenities to Worker				
Cooking Fuel Supplied?	0.607	—	0	1
Is a Separate Toilet Supplied for Men and Women?	0.162	—	0	1
Is the Toilet Piped?	0.047	—	0	1
Do You Have Privacy in Your Dwelling?	0.501	—	0	1
Do You Have a Shed to Rest During Work?	0.477	—	0	1
No Benefits	0.613	—	0	1
Received a Bonus	0.036	—	0	1
Received a Wage Increase	0.010	—	0	1
Received Extra Meals	0.147	—	0	1
Received a Mobile Phone	0.001	—	0	1
Received a Travel Allowance	0.022	—	0	1
Received Clothing	0.012	—	0	1
Received a Bahkshish	0.019	—	0	1
Wages and Other Transfers				
Wages Earned (Worker-level)	3783.947	1110.229	0	9100
Wages Earned from Extra Hours (Worker-level)	10.142	112.796	0	3000
Value of Extra Meals Offered by Owner (Worker-level)	10.936	109.183	0	3500
Value of Transportation Offered by Owner (Worker-level)	0.718	14.341	0	300
Total Value of Transfers from Owner (Worker-level)	3805.743	1114.212	150	9100
Wages Earned by Family	3791.213	2415.646	0	14000
Wages Earned by Family from Extra Hours	25.105	236.833	0	3000
Value of Extra Meals Offered by Owner to Family	3.536	24.092	0	200
Total Value of Transfers from Owner to Family	3846.160	2388.651	0	14000
Size of Bonus to Worker	728.378	1307.167	100	8000
Size of Bakhsish to Worker	1326.037	1832.861	3	9000
Number of Meals Offered to Workers	6.736	5.635	1	20
Kiln Worker Counts				
Workers at Kiln	111.0	32.375	45	253
Sardars at Kiln	3.485	1.072	1	8
Molders at Kiln	66.72	19.23	1	180
Brick Loaders at Kiln	21.9	5.548	0	45
Brick Unloaders at Kiln	14.74	2.258	8	23
Firemen at Kiln	10.46	0.708	8	12
N: 1442 individuals; 246 kilns				

Table A4: Treatment Effect Estimates for Labor Trafficking Indicators (No Enumerator Fixed Effects)

Treatment Arm		(1)	(2)	(3)	(4)	(5)	(6)
Technical Only	ITT	0.082	0.065	0.151	0.155	0.245	0.177
		(0.139)	(0.145)	(0.346)	(0.350)	(0.876)	(0.908)
	IV	0.191	0.152	0.089	0.107	0.251	0.077
		(0.331)	(0.347)	(0.863)	(0.872)	(2.18)	(2.27)
Technical+Incentive	ITT	0.011	0.012	0.230	0.253	0.171	0.203
		(0.126)	(0.130)	(0.370)	(0.372)	(0.815)	(0.837)
	IV	-0.100	-0.106	0.295	0.350	-0.515	-0.457
		(0.323)	(0.334)	(1.02)	(1.02)	(2.18)	(2.24)
Control Mean		2.919	2.714	5.504	5.423	17.17	15.95
Conservative/Liberal		Liberal	Conservative	Liberal	Conservative	Liberal	Conservative
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln	Kiln	Kiln
Unique or Sum?		N/A	N/A	Unique	Unique	Sum	Sum
Observations		1442	1442	246	246	246	246

Standard errors in parentheses. All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. The dependent variable is a weighted count of the trafficking indicators observed; "medium" indicators receive 2/3rds the weight of "strong" indicators. ITT estimates are OLS estimates generated from regressing the weighted count of trafficking indicators on treatment arm dummy variables, with fixed effects for randomization strata. IV estimates are arm-specific LATE estimates relative to the control arm. See Appendix Section A1 for detailed description of differences between liberal and conservative definitions. Columns 1 and 2 show the regression results for individual-level weighted count of indicators with a liberal and conservative definition, respectively. Columns 3-6 show the results for kiln-level weighted counts. Because kilns can have multiple workers with the same indicator, columns 3 and 4 use weighted counts of unique indicators observed at the kiln, while columns 5 and 6 use weighted counts of all indicators.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A5: Treatment Effect Estimates for Labor Trafficking Status (No Enumerator Fixed Effects)

Treatment Arm		(1)	(2)	(3)	(4)
Technical Only	ITT	0.015	0.005	-0.052	-0.027
		(0.045)	(0.046)	(0.052)	(0.056)
	IV	0.031	0.009	-0.132	-0.083
		(0.110)	(0.111)	(0.132)	(0.141)
Technical+Incentive	ITT	0.006	0.001	-0.047	-0.056
		(0.044)	(0.045)	(0.052)	(0.059)
	IV	-0.013	-0.023	-0.170	-0.194
		(0.112)	(0.116)	(0.145)	(0.161)
Control Mean		0.4571	0.4204	0.8916	0.8434
Conservative or Liberal Definition?		Liberal	Conservative	Liberal	Conservative
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln
Observations		1442	1442	246	246

Standard errors in parentheses. All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. ITT estimates are OLS estimates generated from regressing an indicator for trafficking on treatment arm dummy variables, with fixed effects for randomization strata. IV estimates are arm-specific LATE estimates relative to the control arm. See Appendix Section A1 for detailed description of differences between liberal and conservative definitions. To generate kiln-level data, we code kilns as having trafficking if any of the workers interviewed at that kiln met the definition for trafficking.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A6: Treatment Effect Estimates for Child Labor (No Enumerator Fixed Effects)

Treatment Arm		(1)	(2)	(3)	(4)
Technical Only	ITT	-0.010	-0.023	-0.081	-0.140
		(0.034)	(0.019)	(0.212)	(0.114)
		[1]		[1]	
	IV	-0.026	-0.056	-0.234	-0.344
		(0.083)	(0.046)	(0.532)	(0.290)
		[1]		[1]	
Technical+Incentive	ITT	-0.066**	-0.023	-0.349*	-0.137
		(0.033)	(0.017)	(0.205)	(0.106)
		[0.219]		[0.666]	
	IV	-0.178**	-0.062	-1.037*	-0.382
		(0.088)	(0.044)	(0.575)	(0.287)
		[0.219]		[0.416]	
Control Mean		0.3	0.067	1.77	0.402
All Child Labor or Under 14?		All	Under 14	All	Under 14
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln
Observations		1442	1442	246	246

Standard errors in parentheses. Multiple hypothesis adjusted p-values following Anderson (2008) shown in brackets. MHT corrections are performed following our pre-analysis plan (in conjunction with regressions of kiln level indicators for trafficking, weighted sum of trafficking indicators, and count of three main indicators targeted by intervention in technical+incentive arm). All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. ITT estimates are OLS estimates generated from regressing either an indicator for the existence of child labor (as in columns 1 and 2) or a count of cases of child labor at a kiln (as in columns 3 and 4) on treatment arm dummy variables, with fixed effects for randomization strata. IV estimates are arm-specific LATE estimates relative to the control arm. For a respondent to be classified as having seen child labor, they must either have their own child work at the kiln with them or they must report that at least one member of their team was under the age of 18. For a respondent to be classified as having seen children under the age of 14 working, they must either work with their child (who is under the age of 14) or they must report that at least one member of their team is under the age of 14. A test of equality between the estimates for ITT estimates in column 1 has a p-value of 0.105, while for column 3 ITT estimates the p-value is 0.194. For the IV estimates, we bootstrap the difference between the coefficients to test if this is significantly different from zero. Using 1000 replications, this yields p-values of 0.030 for column 1 and 0.166 for column 3.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A7: Treatment Effect Estimates for Wages by Type of Worker (No Enumerator Fixed Effects)

Panel A: Worker-Reported Wage Effects of Intervention by Job

Job		Molders		Brick Loaders		Brick Unloaders		Firemen		Overall	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment Arm		T	T+I	T	T+I	T	T+I	T	T+I	T	T+I
Weekly Wages	ITT	18.66	-190.14	13.98	-36.00	-123.72	-2.91	63.29	138.58	-29.99	-26.64
		(348.02)	(359.72)	(131.12)	(130.00)	(131.61)	(124.97)	(176.49)	(170.42)	(88.60)	(85.75)
	IV	1645.37	-637.22	97.55	-177.57	-328.18	279.89	-8.88	646.22	-49.89	-66.22
		(3474.73)	(1119.11)	(525.18)	(541.36)	(420.78)	(642.00)	(705.87)	(996.70)	(354.35)	(376.67)
	N	108	108	466	466	339	339	285	285	1198	1198

Panel B: Owner-Reported Wage Effects of Intervention by Job

Job		Molders		Brick Loaders		Brick Unloaders		Firemen		Overall	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment Arm		T	I+T	T	I+T	T	I+T	T	I+T	T	I+T
Owner-Reported Wages	ITT	3.55	0.10	8.49	7.01	1.32	6.45	4652.42	20621.24	N/A	N/A
		(20.35)	(20.05)	(6.03)	(6.65)	(5.20)	(5.00)	(22290.31)	(23225.03)	.	.
	IV	1.94	12.81	17.78	19.37	3.02	14.97	10630.03	65763.22	N/A	N/A
		(53.87)	(53.70)	(14.94)	(17.76)	(12.25)	(13.14)	(56336.12)	(59058.11)	.	.
	N	219	219	236	236	230	230	229	229	.	.

Standard errors in parentheses. All standard errors are clustered at the kiln level in Panel A and heteroskedasticity robust in Panel B. Columns labelled "T" show results for technical only arm, while columns labelled "T+I" show the technical+incentive arm results. Panel A restricts to non-missing and non-zero wages reported by non-sardar workers. Panel B restricts to non-missing wages reported by owners. Workers are grouped by primary job. Owner-reported wage data (for which we have baseline and endline data) is used to estimate the impact of our intervention on wages paid. Regressions in Panel B regress endline wages on treatment arm dummy variables, baselines wages, as well as fixed effects for randomization strata. ITT estimates are OLS estimates generated from regressing wages on treatment arm dummy variables, with fixed effects for randomization strata. IV estimates are arm-specific LATE estimates relative to the control arm. Nearly all molders, brick loaders, and brick unloaders are paid a piece rate wage (usually per 1,000 bricks). Alternatively, firemen work on a seasonal contract. Owners were asked about piece rate wages when feasible, but for firemen were asked the cost of their firemen for a season (Panel B Columns 7 and 8). All estimates are in Bangladeshi Taka (BDT).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Treatment Effect Estimates for Labor Trafficking Indicators (ITT Effects Estimated Separately)

Treatment Arm		(1)	(2)	(3)	(4)	(5)	(6)
Technical Only	ITT	0.018	0.004	-0.177	-0.196	-0.347	-0.492
		(0.105)	(0.109)	(0.292)	(0.297)	(0.732)	(0.758)
	IV	0.018	-0.016	-0.574	-0.622	-1.090	-1.420
		(0.246)	(0.255)	(0.651)	(0.662)	(1.749)	(1.673)
Technical+Incentive	ITT	-0.012	-0.009	0.292	0.304	0.304	0.308
		(0.100)	(0.105)	(0.311)	(0.314)	(0.672)	(0.697)
	IV	-0.117	-0.107	0.370	0.419	-0.219	-0.167
		(0.258)	(0.270)	(0.807)	(0.815)	(1.818)	(1.882)
Control Mean		2.919	2.714	5.504	5.423	17.17	15.95
Conservative/Liberal		Liberal	Conservative	Liberal	Conservative	Liberal	Conservative
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln	Kiln	Kiln
Unique or Sum?		N/A	N/A	Unique	Unique	Sum	Sum
Observations		1442	1442	246	246	246	246

Standard errors in parentheses. All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. The dependent variable is a weighted count of the trafficking indicators observed; "medium" indicators receive 2/3rds the weight of "strong" indicators. ITT estimates are arm-specific OLS estimates generated from regressing the weighted count of trafficking indicators on treatment arm dummy variables, with fixed effects for randomization strata and enumerator. IV estimates are arm-specific LATE estimates relative to the control arm. See Appendix Section A1 for detailed description of differences between liberal and conservative definitions. Columns 1 and 2 show the regression results for individual-level weighted count of indicators with a liberal and conservative definition, respectively. Columns 3-6 show the results for kiln-level weighted counts. Because kilns can have multiple workers with the same indicator, columns 3 and 4 use weighted counts of unique indicators observed at the kiln, while columns 5 and 6 use weighted counts of all indicators.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A9: Treatment Effect Estimates for Labor Trafficking Status
(ITT Effects Estimated Separately)

Treatment Arm		(1)	(2)	(3)	(4)
Technical Only	ITT	-0.018	-0.017	-0.053	-0.041
		(0.037)	(0.036)	(0.054)	(0.058)
	IV	-0.062	-0.067	-0.105	-0.133
		(0.084)	(0.085)	(0.132)	(0.127)
Technical+Incentive	ITT	-0.014	-0.021	-0.077	-0.092
		(0.033)	(0.034)	(0.052)	(0.056)
	IV	-0.069	-0.063	-0.262*	-0.209
		(0.092)	(0.085)	(0.156)	(0.146)
Control Mean		0.4571	0.4204	0.8916	0.8434
Conservative or Liberal Definition?		Liberal	Conservative	Liberal	Conservative
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln
Observations		1442	1442	246	246

Standard errors in parentheses. All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. ITT estimates are arm-specific OLS estimates generated from regressing an indicator for trafficking on treatment arm dummy variables, with fixed effects for randomization strata and enumerator. IV estimates are arm-specific LATE estimates relative to the control arm. See Appendix Section A1 for detailed description of differences between liberal and conservative definitions. To generate kiln-level data, we code kilns as having trafficking if any of the workers interviewed at that kiln met the definition for trafficking.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A10: Treatment Effect Estimates for Child Labor (ITT Effects Estimated Separately)

Treatment Arm		(1)	(2)	(3)	(4)
Technical Only	ITT	-0.023	-0.025	-0.217	-0.193*
		(0.032)	(0.018)	(0.221)	(0.112)
		[1]		[1]	
	IV	-0.067	-0.063	-0.518	-0.412
		(0.076)	(0.041)	(0.510)	(0.264)
		[1]		[1]	
Technical+Incentive	ITT	-0.074**	-0.023	-0.392*	-0.134
		(0.031)	(0.017)	(0.214)	(0.119)
		[0.074]		[0.308]	
	IV	-0.194**	-0.060	-1.114*	-0.387
		(0.081)	(0.045)	(0.591)	(0.321)
		[0.079]		[0.51]	
Control Mean		0.3	0.067	1.77	0.402
All Child Labor or Under 14?		All	Under 14	All	Under 14
Kiln or Individual Level?		Individual	Individual	Kiln	Kiln
Observations		1442	1442	246	246

Standard errors in parentheses. Multiple hypothesis adjusted p-values following Anderson (2008) shown in brackets. MHT corrections are performed following our pre-analysis plan (in conjunction with regressions of kiln level indicators for trafficking, weighted sum of trafficking indicators, and count of three main indicators targeted by intervention in technical+incentive arm). All standard errors are clustered at the kiln level for individual level analyses and are heteroskedasticity-robust for kiln level analyses. ITT estimates are arm-specific OLS estimates generated from regressing either an indicator for the existence of child labor (as in columns 1 and 2) or a count of cases of child labor at a kiln (as in columns 3 and 4) on treatment arm dummy variables, with fixed effects for randomization strata and enumerator. IV estimates are arm-specific LATE estimates relative to the control arm. For a respondent to be classified as having seen child labor, they must either have their own child work at the kiln with them or they must report that at least one member of their team was under the age of 18. For a respondent to be classified as having seen children under the age of 14 working, they must either work with their child (who is under the age of 14) or they must report that at least one member of their team is under the age of 14.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Section A.1: Trafficking Classification (Okech, Aletraris, and Schroeder 2020)

- Threshold 1
  - Worker subject to any ONE of the following conditions:
    - No freedom of movement or communication (Freedom of Movement Indicator 3)
    - Made to work in commercial sex to repay debt or wage advance (Personal Life and Properties Indicator 3)
    - Ever been sold for labor or commercial sex work (Violence and Threats of Violence Indicator 2)
    - Tradition or birth into slavery or bondage (Debt or Dependency Indicator 2)
- Threshold 2
  - Worker subject to any TWO of the following conditions:
    - Coercive or deceptive recruitment regarding nature of services (Recruitment Indicator 1 and 2)
    - Had pay withheld and if worker quits they will not receive wages, or had high debt related to employment – including falsified accounts, inflated prices, undercounted production (Employment Practices and Penalties Indicator 1 and 2)
    - Employer has control over or transferred control over a meaningful part of worker's personal life (Personal Life and Properties Indicator 1 and 2)
    - Made to engage in illicit activities (Degrading Conditions Indicator 3)
    - Made to be available day and night without adequate compensation (Degrading Conditions Indicator 1)
    - Constant surveillance of personal space (Freedom of Movement Indicator 2)
    - Confiscation of or loss of access to documents or identification papers (Freedom of Movement Indicator 1)
    - Had debt imposed on worker without their consent (Debt or Dependency Indicator 1)
    - Physical or sexual violence against you or someone you care deeply about (Violence and Threats of Violence Indicators 3 and 4)
    - Witness physical violence against another (Violence and Threats of Violence Indicators 1)
- Threshold 3
  - Worker subject to any ONE of the following:
    - Coercive or deceptive recruitment regarding nature of services (Recruitment Indicator 1 and 2)
    - Had pay withheld and if worker quits they will not receive wages, or had high debt related to employment – including falsified accounts, inflated prices, undercounted production (Employment Practices and Penalties Indicator 1 and 2)

    - Employer has control over or transferred control over a meaningful part of workers personal life (Personal Life and Properties Indicator 1 and 2)
    - Made to engage in illicit activities (Degrading Conditions Indicator 3)
    - Made to be available day and night without adequate compensation (Degrading Conditions Indicator 1)
    - Constant surveillance of personal space (Freedom of Movement Indicator 2)
    - Confiscation of or loss of access to documents or identification papers (Freedom of Movement Indicator 1)
    - Had debt imposed on worker without their consent (Debt or Dependency Indicator 1)
    - Physical or sexual violence against you or someone you care deeply about (Violence and Threats of Violence Indicators 3 and 4)
    - Witness physical violence against another (Violence and Threats of Violence Indicators 1)

AND

- Worker subject to any THREE of the following conditions:
    - Recruiter deceptive about living or working conditions (Recruitment Indicator 3)
    - Paid recruitment fees (Recruitment Indicator 4)
    - High or increasing debt from recruitment (Employment Practices and Penalties Indicator 3)
    - Made to work overtime beyond legal limits (Employment Practices and Penalties Indicator 4)
    - Absence of a formal contract (Employment Practices and Penalties Indicator 8)
    - Ever not received wages or had wages withheld (Employment Practices and Penalties Indicator 6)
    - Made to perform additional services outside contract or work overtime beyond legal limits (Employment Practices and Penalties Indicator 5)
    - Made to engage in illicit activities (Degrading Conditions Indicator 3)
    - Confiscation of mobile phones as a means of control (Personal Life and Properties Indicator 5)
    - Hazardous labor without protective equipment (Degrading Conditions Indicator 2)
        - Conservative Definition: No PPE provided and respondent said thatthey were exposed to dangerous work
        - Liberal Definition: Respondent stated they did not receive PPE, or did not receive gloves, safety shoes, and googles (the three most important PPE items for work at brick kilns)
    - Made to live in degrading or inhumane conditions (Degrading Conditions Indicator 4)
        - Conservative Definition: Housing does not have toilet, electricity, or privacy, and the respondent is forced to live in employer-supplied housing

    - Liberal Definition: Housing does not have toilet, electricity, or privacy
* Limited freedom of movement or communication (Freedom of Movement Indicator 4)
* Constant surveillance at work (Freedom of Movement Indicator 5)
* Unable to refuse to provide services (Debt or Dependency Indicator 4)
* Threat of reporting to authorities or reputational harm (Violence or Threats of Violence Indicator 7)
* Emotional or psychological abuse (Violence or Threats of Violence Indicator 6)
* Threat of violence against you or someone you care deeply about (Violence or Threats of Violence Indicator 8)

Section A.2: Worker Sample Replacement

In our study protocol, we planned to randomly sample and survey six workers at each kiln (one sardar, one firemen, one brick molder, two brick loaders, and one brick unloader). However, given differences in their responsibilities, different types of workers at kilns are present at different times during the brick production process. At the time of our survey, some brick molders (the most common job in brick kilns, and generally the first to finish their work during a season) had already left kilns for the season. Additionally, some kilns closed early due to the timing of the end of Ramadan and the celebration of Eid al-Fitr. We therefore developed a replacement protocol for sampling workers when it was not possible to follow our original protocol. Specifically, if the planned number of brick molders, loaders, or unloaders could not be surveyed, we instructed enumerators to replace them with a different type of worker (excluding firemen) under a different sardar. Alternatively, if the planned number of firemen could not be surveyed, we instructed enumerators to replace them with any other type of worker.

Section A.3: Technical Intervention Details

Less dense brick stacking with multiple (two or three) zigzag air paths
The technical intervention introduced less dense brick stacking with multiple zigzag air paths, where existing practice was to densely pack bricks with only a single zigzag path for air to travel. This change allows for better distribution of air flow, leading to uniform distribution of heat and combustion of coal, therefore decreasing pollutant emissions from coal combustion. Additionally, this change also better maintains pressure, meaning that less energy is required to operate the fan blowing air through the kiln.

Single fireman continuous fuel feeding
In brick kilns, coal is fed through feed holes on the kiln's roof by firemen. The prevailing method of coal feeding is for three to four firemen to feed the kiln at intermittent intervals (feeding interval of 10-15 minutes, followed by a non-feeding interval of 15-20 minutes). This method leads to accumulation of fuel in the kiln, hampering complete combustion of the coal. In addition to incomplete combustion, accumulation of coal also leads to higher particulate emissions.

The technical intervention changes this method so that a single fireman continuously feeds the kiln for 30 minutes, after which the fireman stops and switches with his partner. With this method, fuel is fed in smaller quantities, allowing for adequate air and complete combustion. This allows for less wasted fuel and lower pollutant emissions. It also causes more uniform heat distribution across the kiln (and more consistent brick quality).

These first two interventions are the most important for improving operation of a kiln. Kilns observed adopting both practices were coded as adopters of the technical intervention.

Thicker ash layer on the kiln top
The layer of ash on the top of the kiln serves as a roof, providing insulation against heat loss. The prevailing practice is to have this 6-inch ash layers, but the technical intervention advocated increase the thickness ash layers to 9 inches or more. This improvement in insulation reduces the fuel needed to fire bricks and increases the temperature among bricks on the top layer, increasing the share of Class-1 bricks (i.e., the best quality bricks).

Closing kiln entry gates with an ash-filled cavity wall
Kiln gates allow workers to enter the kiln to stack "green bricks" and remove fired ones. When the bricks are being fired, these gates are closed and sealed, and the prevailing practice is to build a temporary wall one brick thick (roughly 10 inches). The intervention encouraged kilns to increase the thickness of this wall to 30 inches, including an inner wall of 15 inches, a 5-inchlayer of ash for insulation, and an outer wall 10 inches thick. This new method increases insulation, decreases fuel requirements, and allows bricks stacked near kiln gates to reach high temperatures, increasing the share of Class-1 bricks.

Use of powdered biomass fuel in the newly inducted chamber in the fuel-feeding zone
In a zigzag kiln, fire moves through the kiln's firing chamber. As the fire moves, a new chamber enters the fuel-feeding zone every 8-12 hours. The temperature of a newly-inducted chamber is initially lower ($<500^{\circ}$C). By prevailing practice, coal is fed into the newly-inducted chamber, but because the newly-inducted chamber has a low temperature, this coal does not burn completely, increasing pollutant emissions. The intervention encouraged kilns to feed sawdust and other powdery biomass with high concentrations of volatile matter and low ignition temperatures into the newly-inducted chamber. Because these fuels burn completely at lower temperatures, they increase a new chamber's temperature until it reaches 700°C, when coal is added.

Section A.4: Incentive Information Given to Kiln Owners

Kilns that were randomized into the technical+incentive arm received a detailed information session along with the hands-on training provided with the technical intervention. In these information sessions, our team described how our pilot work increased brick quality while decreasing fuel use, and that achieving these benefits depends on the ability to align worker incentives with the new production method, providing evidence that pilot firms that improved work conditions (either through higher wages or bonuses, or in-kind transfers) experienced greater benefits. The complete script is as follows:

[Begin Script]

I'm here to talk to you about how you can get more profit in this year's brick production. We are glad you are working with us to implement the new practices, but their success depends on every worker on your kiln. Our team is here to help with technical training and assistance to make sure your workers have the proper skills to implement everything correctly. **If everyone on your kiln works together and follows the instructions, you will use less coal and increase your production of Class-1 bricks. As a result, these new practices will increase your profit and your kiln will be more successful.**

How do we know this?

Our team worked with similar brick kilns in Jashore, and a 14% increase in the percentage of Class-1 bricks and a 20% reduction in coal spending per brick in kilns that successfully followed the recommended practices of single fireman continuous coal feeding and double zigzag brick setting owners saw, compared to kilns using traditional methods.

What's more interesting is that the owners from Jashore that provided more incentives and benefits to their workers had even higher Class-1 bricks (on average, 5 percentage points higher) and lower coal spending (on average, 0.42 Taka less per brick) compared to kilns that did not offer additional incentives.

How can you reap the same benefits?

The workers on your kiln are crucial for the success of this new practice. They have to learn the new practices and at first they may not want to change from the old way of doing things. If your workers invest the time to master the new skills it will lead to huge benefits for you . Now, you can imagine when they are learning the new practices they might more slowly which might reduce their pay. If they do not feel motivated to adopt the new practices, they may take shortcuts or not learn it properly unless you find a way to include them in the success you will have from these new practices.

You may also consider the time and effort you are putting in to having your workers trained on these new practices. They are learning many new skills which will make your kiln successful. You will benefit if you can use the same workers next season, because they will already have the experience and training on these new practices. If you can encourage workers to return, it will be very beneficial to your kiln operation and production.

Because all workers on your kiln must be successfully adopt these practices and work together to increase your production and profit, we recommend any incentives or extra bonus be offered to all workers.

We have some suggestions that other kiln owners like you have used and found to be successful at increasing their kiln performance, getting better performance from workers, and commitments from workers to return to the same kiln:

1. Providing some extra monetary incentives to the workers to motivate them to follow this new practice properly. This will be easily covered by your increased profit /production soon. Because all workers on your kiln must be successfully adopt these practices and work together to increase your production and profit, we recommend incentives be offered to all workers. Successful kiln owners have used incentives differently for different categories of workers, for example, firing workers are given lump sum bonuses after a circuit, whereas unloaders and loaders are given bonuses in terms of 1000 bricks.

2. There are easy improvements you can make for your workers to make them happier and healthier to motivate them be more productive. If your kiln gets a reputation for being a good place to work, where workers are well-taken care of, your workers are more likely to return next season and more workers will want to work for you.

How can you make incentives and benefits work for you?

When offering these incentives, it is very important that the workers themselves receive the benefit. Otherwise, they will not be motivated to adopt the new practices, trust will be lost, and your kiln will not benefit. You may encourage the Sardars to provide these benefits to workers so that the workers will adopt the practices. Some owners provide benefits directly to the workers to make sure they receive them. A common practice of successful owners is to announce a particular day and time and request all workers and sardars be present, then owners hand over bonuses/bakhshish by themselves. This practice is successful because everyone will give credit to the owner for the extra benefits.

It is also important that you provide the incentives and benefits in a timely manner and early in the season. If it is too late, the workers may not be encouraged to follow the new practices and you will not see the benefit in time.

[Ask: Any questions on what we have talked about so far?]

What are examples of monetary incentives and good working conditions that you can provide?

We have put together a list of suggestions from successful kiln owners for you to think about:

Monetary incentives:

1. You may offer a 'Bakhshish' from the higher earnings that you will get by adopting our suggested practices. For example, you can offer a Bakhshish to your workers such as 5-10%, which can be shared across all the workers. One successful kiln owner has provided 10000 Tk to the loading Sardar for adopting the new system and he committed to providing it subsequently in the next rounds of brick stacking. If you inform them at the beginning of each circuit about the Bakhshish and the importance of following the new practices to achieve a higher amount, it will motivate their performance during the circuit.

2. You may offer a bonus (onudan) to the workers if your kiln achieves a certain level of class-1 bricks in each circuit. We have provided a guideline for the bonuses depending on the share of class-1 bricks. For example, you may offer BDT 5000 if your kiln achieves 80-85% class-1 bricks in a cycle, BDT 6000 if you achieve 85-90% class-1 bricks, and BDT 7000 if you achieve $>$90% class-1 bricks. You can adjust the schedule given your kiln's performance. We suggest you inform workers at the beginning of the circuit about the bonus to motivate their performance and deliver the payment at the end of the circuit once the brick quality has been assessed.

3. You can also provide 'Bakhshish' of extra Taka 50 per 1000 bricks if your kiln achieves 80-85% class-1 bricks, extra Taka 100 per 1000 bricks if your kiln achieves 85-90% class-1 bricks, or extra Taka 150 per 1000 bricks if your kiln achieves $>$90% class-1 bricks.

4. Some of the recommended practices will require more time involvement for the workers. For example, in the new method, workers need to increase the ash layers by 9-12 inches from the previous setting. In the new method, fire travels faster and more loading of bricks

is necessary to keep up the fire travel in a circuit. In both cases, you can consider increasing the wages of the workers by Taka 10-50 per 1000 bricks to account for the changes.

5. You may offer a return bonus if workers return to your kiln the next season. Inform them of the bonus offer before the end of the current season, so that it can encourage them to return the next year. For example, some kiln owners have offered a bonus equal to 20% of the workers current wages if they return the following season, which will be paid only after they return.

6. You might see that some of your workers want to leave for other working options during the firing season, especially on agricultural fields. To prevent workers who have been trained on these new and improved practices from leaving in the middle of an active season, kiln owners have provided instant bonuses in cash. By making your kiln a more desirable and better paying place to work, the workers will not want to leave for other options.

7. Many kiln owners have successfully retained a higher presence of workers by offering 'attendance bonuses.' You can offer some bonuses for the top 5 workers who are most regular in your kilns to motivate all the workers to avoid shirking.

Working conditions:

You will know best what type of working conditions are the most important for your workers, but we have put together a list of suggestions from successful kiln owners for you to think about:

1. You can provide shaded/resting areas for your workers. If workers rest in their free time, this can improve their productivity during the rest of the day.

2. You can provide accommodation for your workers. As you know, many of your workers have migrated from other places to work here. Providing accommodation facilities (spacious room, individual beds, windows, ventilation, hygienic toilets, electricity, and cooling/ceiling fan) would benefit the workers and increase their productivity.

3. Successful kiln owners in Jashore have offered improved meals like chicken or beef to their workers if they achieve good performance of class-1 bricks or without any condition.

4. Some kiln owners provide new clothing to their workers during religious festivals like Eid or Pahela Baisakh or during the winter season.

5. Workers' health is one of the most important aspects of worker productivity and success that you can improve as a motivated kiln owner. Workers especially firemen may be provided with saline to help them from dehydration. You can help workers to go to the nearest community clinics, and union and upazila health complexes if they have any medical needs.

6. To help prevent against injuries and accidents that will harm your workers and your production, it is important that workers have proper protective equipment. We suggest heat protective boots, masks, gloves and if possible, movable shed for firemen, masks and customized helmet for unloaders, masks for the brick loaders and ash layer providers. Providing such protective equipment will make workers feel protected and cared for and will motivate their production.

7. Workers may be concerned about their children's schooling while the kiln season is in progress. Bangladesh government has made primary schooling free to access. You can encourage and help workers to get their children admitted to the nearest government school. Also, if NGO schools (i.e. BRAC) are nearby, you can also encourage workers to send their kids to those schools.

8. Bangladesh government has recently reduced the price of the LPG cylinder gas. If your kiln does not have a pipeline gas connection, then you can provide LPG cylinder gas to the workers to facilitate cooking.

9. As many workers, especially firemen come from an outside district and they stay at the kiln throughout the season apart from their families. Offering a monthly/quarterly leave to these workers can be helpful to meet with their families for refreshment and they will return to your kiln happy and motivated.

Which one of these do you think is feasible for you to do?
[Ask: owners to raise hands for different options and note their answers]
How can we help you think through it?

Closing pitch: Remember, by adopting these new practices your kiln will use less coal and produce more class 1 bricks, but their success depends on every worker on your kiln. By offering extra incentives or improved working conditions to your workers will encourage quicker learning and successful adoption of the new practices. This will not only increase your profit this season, but it may also help you retain your experienced workers for next year. For the incentives to successfully motivate workers and improve their performance, it is very important that you provide them to all workers and you offer them in a timely manner. If they follow the new practices, it means more profit for you, and everyone will benefit.

[End Script]

Section A.5: Responsibilities of Workers By Type

A.5.1: Brick Molder

Brick molders main job is to shape clay into the molds of bricks, termed "green bricks." Due to the limited skill requirements, as well as lower levels of risk, this is the job most commonly held by women and children in the kilns. Additionally, the molder's role is mainly done at the beginning of the season, after which many will return home. They are also the majority of workers at a kiln (see Table A3).

A.5.2: Brick Loaders

Once molding is completed, the next task is to load the "green bricks" into the kiln. The brick loaders take the "green bricks" from the field and then load them into the kilns in a specific pattern. In our intervention, loaders played an important role as they had to follow a double/triple zig-zag structure to load the bricks. After brick molders, brick loaders constitute the highest number of workers in the kiln.

A.5.3: Firemen

Firemen are the workers with the most technical skills in a brick kiln. They normally get paid the highest (after sardars). Typically there are ten firemen in a kiln and they are always men. Firemen are responsible for feeding coals into the kiln system. This process is critical as the quality of the bricks mostly depends on how the fire is traveling in a kiln and how the temperature is distributed. In our intervention, one major component was to use single-fireman continuous feeding. The success of our technical intervention in part depended on the efficiency of the firemen's work.

A.5.4: Brick Unloaders

Once the bricks baking is done, a group of workers known as brick unloaders take the bricks out of the kiln and put them in a separate place to cool down. This process requires intense physical labor to carry heavy bricks out of the kiln. Brick unloading is mostly done at the end of every production cycle. Unloading is important to maintain the quality of the bricks as sometimes while unloading many of the bricks lose their intended shapes, lessening their value.

A.5.5: Managers

Managers are the most powerful individuals at the kiln after the owner. They oversee the entire production process, but do not engage in any labor with any particular team. They work directly with the owners and in the absence of the owners, they make executive decisions. The owners pay them either monthly or by the season. Typically there would be at least one manager, but it could go up to four or five in different kilns.

A.5.6: Sardars

Sardars are team leaders for each of the main teams at a kiln (i.e., Brick Loaders, Brick Unloaders, Firemen, and Molders). They help the team work efficiently and distribute payments from the owner to workers.

A.5.7: Other Jobs at the Kiln

Although the aforementioned jobs are the most common at kilns, there are many additional jobs that workers can also perform at the kiln. These include coal crushers, electricians, carpenters, and night guards. Kilns will also often have 10-12 daily laborers. These workers have a very loosely defined job, often including cleaning, meal preparation, and covering any needs in the production process.