Improved brick kilns are crucial for a just transition in Bangladesh

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- Air pollution is a serious public health concern in Bangladesh. Traditional brick kilns are among the most important sources of air pollution.
- The overall objective of this study is to understand the social and economic wellbeing of brick kiln workers in the wake of the recent push to transition to improved brick kiln technologies in Bangladesh.
- Findings from this case-control study show that there has been a steady shift from traditional Fixed Chimney Kilns (FCKs) towards improved and low-smoke options like Zig-Zag Kilns (ZZKs) and Vertical Shaft Brick Kilns (VSBKs).
- Workers in improved brick kilns have better quality of life, living conditions, and working conditions than their counterparts in traditional fixed chimney kilns.
- Across both types of kilns, workers report long hours – an average of eleven hours per day – and most days involve early morning or late night work. Most workers report that women and men are not paid the same amount, and our findings confirm that women in our sample are paid less on average.
- In general, workers in brick kilns, regardless of the type of kiln, live in precarious conditions, marked by unsteady income and poor living conditions relative to the conditions they might enjoy in their home villages.

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Air pollution in Dhaka

Bangladesh has one of the highest levels of outdoor Ambient Particulate Matter (PM 2.5) of any country worldwide, ranking first among 134 countries and territories in the 2023 World Air Quality Report with an annual average PM2.5 concentration of 79.9 µg/m³ (IQAir, 2023). In Dhaka, estimates suggest that around half of all ambient air pollution is caused by brick kilns (Begum et al., 2018; Begum et al., 2019; Rahman et al., 2019), but these kilns are critical to meet the construction demands associated with a country experiencing rapid population growth and urbanisation. More than 7,000 documented brick kilns and scores of undocumented kilns across the country employ about a million people and churn out approximately 23 million bricks yearly (Lee et al., 2021). Due to the environmental, health, and social costs of brick manufacturing, the Bangladesh government is pushing to phase out pollution-intensive technologies like Fixed Chimney Kilns (FCKs) in favour of improved technologies like Zig-Zag Kilns (ZZKs) and Vertical Shaft Brick Kilns (VSBKs).

While these improved brick kilns are expected to improve air quality, their impact on the socioeconomic wellbeing of the largely non-literate brick workers remains under-explored. For a '"Just Transition" to succeed, the benefits and costs of transitioning to a green economy must be equitable (Pai et al., 2020). This policy brief, informed by our exploratory study, provides a preliminary look at the labour conditions, health, and financial wellbeing of brick labourers in the greater Dhaka region. We assess differential outcomes between labourers employed at traditional, more pollution-intensive FCKs and labourers employed at improved ZZKs.

Methodology

Our study employs a cross-sectional, case-control design to examine differential outcomes for labourers at traditional and improved brick kilns. In doing so, we present systematic evidence for the need to shift the brick industry of Bangladesh towards improved, low-emissions technologies. At the same time, our study also surfaces the problems inherent to the brick industry, which preclude the realisation of a truly just transition. These problems are rooted in the socioeconomic realities of Bangladesh, and failure to address them threatens the viability of the country's climate adaptation strategies.

Our study sample comprises individuals who work at improved kilns (ZZK), and controls are individuals who work at traditional kilns (FCK). Data was collected at a single point using in-person interviews, allowing for comparisons between the two groups. In doing so, we partnered with ARCED Foundation, a well-known research agency in Bangladesh. We studied 25 randomly selected brick

kilns (16 ZZKs and 9 FCKs). We ensured a proportional representation of the kilns included in the study in terms of geographical location in the Greater Dhaka region. We randomly selected 20 workers from each participating kiln, leading to a total sample size of 512 study respondents.

Key Findings

- Our study found that quality of life was significantly associated with kiln type, with ZZK workers scoring higher than FCK workers. ZZK workers also scored higher for the combined overall quality of life measure. On average, ZZK workers worked more hours per day than workers from FCKs.
- The workers in ZZKs had marginally higher incomes and higher pay per day and reported fewer days when they had to work early morning or late night shifts. They also reported significantly lower odds of suffering from workplace injuries.
- Across the board, most workers' environmental quality of life was low, regardless of kiln type. Most participants (57.6%) stated that their physical environment is "not at all" healthy, and nearly 40% stated they do "not at all" feel safe in their daily lives. Combined with the high rates of slum housing and the very high rates of housing material deprivation, this indicates that brick labourers often live in precarious circumstances.
- Given that our sample consists almost entirely of migrant labourers who moved to Dhaka from various villages (97%), it is helpful to view these results in relation to the conditions prevailing in their home villages. In our sample, migrants report, on average, that their water and sanitation facilities are better off in Dhaka than in their previous residence and that they are less vulnerable to natural disasters.
- Most migrants (77%) strongly or somewhat agree that their health was better before moving to Dhaka, and most (69%) strongly agree that their social status was better before moving to Dhaka. Amongst all participants, the average score for how much they enjoy life is low, with 34% responding "not at all."
- ZZK workers generally reported higher physical quality of life, indicating better health and mobility and less pain or reliance on medical treatments for daily functioning. They also had higher overall quality of life when observing all dimensions together.
- More ZZK workers had housing, and while the entire sample from both kiln types categorised their housing as 'slum,' ZZK workers were less likely to live in materially deprived housing.

- At the kilns, ZZK workers make more money per hour and are likelier to have received a wage increase over the past 3 seasons. Despite working more hours overall, ZZK workers are less likely to work early morning hours or late at night. Furthermore, ZZK workers see fewer injuries at their kilns.
- Our data strongly suggests that differences in working conditions - better wages, fewer irregular hours, and fewer injuries - are directly tied to the characteristics of improved brick kiln operations. The intensive hours involved also suggest that brick workers' quality of life is largely shaped by their experiences at the kiln.
- While future research is needed to verify this, one interpretation of these results is that a just transition is being achieved to some degree: improved technology zig-zag kilns provide workers better pay, safer conditions, and better housing, which results in improved quality of life compared with traditional fixed-chimney kilns.

Policy Recommendations

> **This study demonstrates that in addition to reducing air pollution, improved brick kilns such as ZZKs and VSBKs can significantly improve the overall quality of life of the workers therein. Further, these kilns have been shown to provide workers with better working conditions than traditional kilns.**

While acknowledging the limited scale of this study, we make the following recommendations:

- There is a clear case for accelerating the transition from FCKs to low-emissions options like ZZKs and VSBKs. These kilns help reduce air pollution and improve workers' overall quality of life.
- Alongside focusing on air quality and emissions reductions, it is important to emphasise working conditions. Our study finds that brick workers have poor working conditions and quality of life, irrespective of the nature of the kiln. This is in large part due to the fact that many of the workers, who are rural-to-urban migrants, live in urban slums with limited access to the basics of life, including clean water and decent housing. It is important to focus on these issues to make the transition to clean brick kilns more just.
- Policymakers must also plan to secure the rights of the workers employed in the brick kilns as they affect a change in the brick industry. Brick workers, in general, suffer from untimely wages, unsafe working conditions, and long working hours. These conditions likely prevail because much of the brick industry operates illegally. Documenting the brick kilns and bringing them under greater government oversight could be the first step in improving the conditions for brick workers.

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