Policy memo

Cities policy roundtable on Friday, 23 September | 15:00-16:30

Bangladesh: What behavioural interventions may reduce the cost of municipal solid waste (MSW) in cities?

Bangladesh: What are the environmental and health costs of brick kilns?

Mozambique: What is the impact of information on the resilience of households to disaster shocks in urban areas?

Sierra Leone: Can policymakers promote the relocation of climate migrants from dangerous informal settlements in cities?

What behavioural interventions may reduce the cost of municipal solid waste (MSW) in cities?

Policy challenge

Rapid increases in urban population in the last two decades has made Municipal Solid Waste (MSW) management a policy priority in Bangladesh. However, waste management options are limited, and most are prohibitively resource consuming. Citizen participation is necessary to solve this problem.

MSW management policies currently rely on landfilling. This method creates consequential environmental pollution in typically land-scarce, high-density Bangladeshi cities, making this unsustainable. Externalities of the local pollution include unbearable odour and leachate pollution. The Local Government Division and all twelve city corporations under their supervision deem MSW a major urban challenge. Given the enthusiasm for waste to energy (WtE) projects, the Bangladesh Power Development Board (BPDB) is a major stakeholder in energy generated from waste. BPDB will buy energy generated from the WtE plants at a cost higher than that of traditional fuels and renewable energy. Therefore, BPDB is interested in programmes to the cost of MSW in Bangladeshi cities.

Current research

WtE projects in western countries are well studied and typically seen as success after imposing strict pollution standards. However, the waste management experience of India can provide better guidance to Bangladesh due to comparable food habits and lifestyle – the low calorific and heterogeneous nature of waste in India means WtE projects are not as successful as expected. Therefore, more research to identify effective policies is needed.

Recent literature suggests waste segregation in households is a necessary step towards sustainable waste management. IGC Bangladesh is working on behavioural interventions to encourage household-level waste segregation. The idea is to identify if provision of information and waste bins can encourage people to segregate waste in Mymensingh, a small Bangladeshi city. If citizens separate household waste as a first step in waste management, we anticipate a reduction in the burden of post-collection segregation and more adequate treatment of different kinds of waste. We have not seen the results of this study yet.

Policy interventions

The National 3R Strategy was formulated in 2010 to address urban waste management. Most recently, the Bangladesh government is betting on incineration-based WtE projects to address the MSW problem. Last year, BPDB signed a contract with China Machinery Engineering Corporation to build a 42.5 MW waste to energy plant. The electricity generated from this plant will be expensive (US21.78 cents/kwh), but policymakers signed the contract with much enthusiasm and expectation despite lack of support for the economics behind it. Similar plants are under consideration in Dhaka South and smaller cities like Narayanganj and Mymensingh. The efficacy of eliminating urban waste by these plants is not yet studied.

Data availability

Relevant data sources for waste are scarce, but the following are mentionable:

- Waste Database 2014: A report from Waste Concern with data on waste volume, waste composition, landfill requirements and trend analysis
- Urban Waste Management 2021: A report on current data on waste volume and landfill

What is the impact of information on the resilience of households to disaster shocks in urban areas?

Policy challenge

Mozambique has experienced a rapid growing of urban population (3.3% per year) which has led to the growth of informal settlements (approximately 80% of the urban population), namely in flood prone areas. These types of settlements are particularly vulnerable to increased natural disasters due to their socioeconomic conditions.

Considering the rapid urbanisation in Mozambique, city governments need to address how natural disasters and other climate-change related impact will affect the capacity of urban areas. Top-down policies should be complemented with bottom-up and community-level interventions such as early warning systems and disaster risk information campaigns. Municipalities, including the Municipality of Quelimane, are concerned with how to improve individual and community resilience to disasters in a context of high vulnerability to natural disasters and climate change in cities.

Current research

There is a large and diverse literature on information provision interventions. The reported effectiveness of risk communication in recent studies is mixed. Several studies find positive effects on stated risk perceptions and intentions to prepare as well as an increase in demand for flood insurance.

On the other hand, some research has concluded risk communication has at most limited effects on risk perception and actual behaviour. In the case of the 2019 Cyclones Idai and Kenneth in Mozambique, even with accurate forecasts and warnings, many did not expect a storm of such magnitude. To address this, early warning systems in Mozambique can be strengthened by proving contextualised, actionable warnings (Norton et al., 2020). Additionally, it is critical to be aware of how access and use of information is affected by gender and other characteristics (e.g., age, educational status) that may preclude its inclusiveness.

Policy Interventions

There are some unstructured and isolated action taken by national and local government such as evacuation plans and shelters, but these policies require local involvement and understanding, especially in the context of informal settlements. Therefore, top-down policies should be complemented with bottom-up and community-level interventions such as early warning systems and disaster risk information campaigns.

Data availability

Data availability is limited. However, it is possible to get data from the Ministry of Land and Environment and full engagement of the municipality in accessing and collecting relevant data.

Can policymakers promote the relocation of climate migrants from dangerous informal settlements in cities?

Policy challenge

Like several other cities in sub-Saharan Africa, Freetown went through a rapid expansion. Unlike other cities, however, the sudden spike in population in the city was driven by people fleeing rural areas to escape the rebels during conflict. The sudden influx of people from all over the country made it impossible to undergo a proper planning exercise and resulted in the establishment of several informal settlements. Several of these settlements were built in parts of the city not suitable for construction as they are more exposed and vulnerable to climatic events, such as heavy rains.

This vulnerability translates into higher hazard – one example being the tragic mud slide in Sugar Loaf. The increasingly extreme weather events increase the risks for people living in these settlements. Yet, people are reluctant to relocate because i) they are financially constraint and cannot afford the cost of moving to a new accommodation, and ii) because there might be limited economic opportunities in the areas where they can afford housing, which would result into high commuting costs to places where economic activities can be profitable. Given these circumstances, policymakers need to reduce the number of migrants living in vulnerable informal settlements.

Current research

Current research on this topic is limited to urban literature on the vulnerability of climate migrants and the vulnerabilities to climatic events of those in more insecure housing. Specific research on the context of Sierra Leone is needed. Additionally, even less research exists on the creation of job programming or training for climate refugees in urban areas. No examples were found at this time.

Policy interventions

A standard policy response under consideration by Sierra Leone is the provision of affordable housing. Conversations by policymakers have not yet considered the need to also provide livelihood opportunities located near the affordable housing.

Also, the types of livelihood opportunities need to be examined. Overall, the financing and the coordination between central government and local councils remains a challenge for policymakers in developing affordable housing and job programming. Successful interventions should be considering all factors that are limiting the relocation from dangerous informal settlements to safer areas.

Data availability

The development of in-country datasets for this question was not identified. The IGC is currently working in Sierra Leone to assemble primary data that are needed for high quality economic analysis.

What are the environmental and health costs of brick kilns?

Policy challenge

Brick kilns are a major source of air pollution in Bangladeshi cities. For example, 58% of fine particles in Dhaka city air are from brick kilns. With an annual growth rate of 5-6%, brick manufacturing industry continue to pollute the environment and jeopardize human health.

But economic growth is a positive impact from brick kiln use. In 2013, the number of brick production facilities or brick kilns was around 5,000. The facilities grew to 8,000 by 2018, a 60% growth in five years. Brick kilns have negative environmental and health impact from particulate releases due to dated technology and proximity of kilns to major cities in Bangladesh. Policymakers need to know if there are opportunities to enable or incentivise regulation of the brick kiln industry, and if the associated pollution and health impacts are significant enough to encourage this regulation. The Department of Environment (DoE) is a key stakeholder in this regard.

Current research

The World Bank and DoE published a paper on their efforts to curb air pollution in Bangladesh. This paper has data on brick kilns by district and thana level from 2018. In 2021, researchers from Stanford University and the International Centre for Diarrhoeal Disease Research in Bangladesh utilised a scalable, deep-learning pipeline to locate brick kilns in Bangladesh. Methods utilised in this paper are highly valuable because of its scalability – brick kilns maps need to be updated frequently, perhaps once every season (November-April). One drawback of this approach is that even though it achieved high-accuracy in brick-kiln identification, kiln type identification – Fixed Chimney Kilns (FCK) and Improved Zigzag Kilns (IZKs) – suffered from high error rate.

Limited manpower, lack of capability, and absence of incentives make enforcing regulations very difficult in such spatially discrete industries. Future research should aim to scale machine learning models enabling quick-time identification of illegal brick kilns. This reduces the resource demand for identifying kilns and enforcing regulation. Further research could gather evidence on adequate incentive mechanisms for regulators. The cost of the environmental pollution and resulting health hazard needs to be modelled to garner further attention to this issue.

Policy interventions

The Brick Manufacturing and Kiln Establishment (control) Act-2013 (revised in 2018, bill passed in 2019) encouraged shifting to less environmentally harmful technologies for brick manufacturing. An initiative-campaign under UNDP for popularising Hybrid Hoffman Kiln (HHK) was launched but the responses were slow for HHK being the most capital intensive and expensive technology. Later, The World Bank and DoE worked with Hanoi University to develop a cheap method to convert traditional Fixed Chimney Kilns (FCK) to Improved Zigzag Kilns (IZKs).

Data availability

In 2018, the World Bank and DoE partnered with Jahangirnagar University in Bangladesh to create a GIS-based inventory of all brick kilns of the country. This project identified almost 8,000 brick kilns throughout the country. A group of researchers built a machine learning model to identify kiln from satellite image. Replication data for their work is available here.