



(RE) THINKING THE OFF- GRID CITY: COMMUNITY DIAGNOSTIC STUDY

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The UKRI-GCRF (Re)Thinking the Off-Grid City (referred to as the ‘Off- Grid City’ project hereon) is an ESRC funded research project, with the Institute of Development Studies, as the Lead University and partner institutions across Asia and Africa. As a part of this research project, the partner institutions are undertaking research across sites in Ghana (Tamale), South Africa (Mossel Bay), Zimbabwe (Epworth), Sri Lanka (Colombo) and India (Bengaluru). The Indian Institute for Human Settlements (IIHS) as one of the partner institutions in this research consortium, is undertaking the research in Bengaluru, India.

Introduction to the Off- Grid City Project

The aim of the Off- Grid City research project is to reframe infrastructure planning, governance and participation in various city contexts to better support the lives of their most marginalised residents. In particular research will reimagine what infrastructure means in such contexts, where it is rarely experienced in the way envisaged by planners as the progressive realisation of access to a formal, city-wide 'grid' (Pieterse et al., 2018). Focus in particular will be on infrastructure 'assemblages', i.e. the multiple arrangement of infrastructure access determined not only by physical infrastructure, but the social, ecological and political relationships, and ideologies operating and influencing access at multiple city scales. Research will examine the interactions between five types of infrastructure assemblage: energy, water, sanitation, transport and communication. Whilst these infrastructures can be planned in silos, marginalised people's daily experience across these infrastructures needs to be researched together. In this research the focus is to understand how infrastructure constraints can combine to add to the vulnerability of the most marginalized to longer-term shocks and stresses and exacerbate their inability to meet basic needs. We will concentrate on food and nutrition security as one set of basic needs, which is significantly dependent on these infrastructures. Charting infrastructure interactions as they relate to food outcomes at multiple scales (city, neighbourhood, household) offers an innovative conceptual and methodological approach to unpack such interactions, and better understand the everyday means of coping, gaps and governance implications they entail.

This will enable a deliberate typology of cities and a range of different grid access - from being completely 'off-grid' to encompassing several hybrid types of formal and informal service delivery. The settings are well known to the research partnership and the methodology will pinpoint sites in which marginality and infrastructure poverty combine, so as to allow charting the time and cost burdens to residents and their vulnerability to political, social and environmental disruptions which exist in such neighbourhoods.

Selection of Site

We selected the study site, [redacted], as our primary field site. This ward was selected for four reasons:

- **Neighbourhood typology**: As mentioned in the city level analysis report, we have developed GIS- based methods to classify neighbourhood typologies in Bengaluru. Neighbourhood typologies consider parameters such as street widths, street mophology, built-up footprints and land cover (Tripathy, Balakrishnan & Malladi, forthcoming). A major part of the selected ward features as neighbourhood type-3, which refers to dense neighbourhoods with small plot sizes, high-street densities, unplanned and unorganised street layouts, minimal vegetation, and high built-up density. Eventually, the aim is to understand the relationship between neighbourhood typologies and the socio- economic profile of these neighbourhoods.

- **Socio- economic profile of the ward**: According to Census 2011, the ward has one of the lowest sex ratio in Bengaluru. The literacy rate of the ward is also one of the lowest in the city. A significant population of the ward belongs to Scheduled Caste and Scheduled Tribe. Further, very few households live in 'good condition' houses in the ward. The BBMP Solid Waste Management (SWM) Micro Plan made in January 2017 also tags a majority of the households in the ward as low income households.

- **Intra- ward variations**: The selected ward offers a range of variations in terms of accessibility of infrastructure as we move from the western to the eastern periphery of the ward. There are also variations while moving from the northern to the southern part of the ward. While the northern end has more Muslim households, the central part of the ward has Hindu Tamil immigrants, as well as a slum resettlment colony. Christian households are also present in the ward. The southern part of the ward is a relatively affluent neighbourhood and has not been included in our study. There are upto seven languages that we have encountered on the site so far, including – Hindi, Dakhni, Urdu, Kannnada, Tamil, Telugu and Malayalam.

- **Exisiting institutional relationships**: This site was selected keeping in mind localities where we had existing associations with other research organisations and/ or community members through previous research undertaken at IIHS. The previous research and locations, which offer key (but not representative at the city- scale) insights on the intersections between food and infrastructure for populations that may be categorised as marginalised in terms of socio- economic, housing and infrastructure criteria, based on the city- level analysis at the previous stage.

Demographic and socio- economic profile of selected ward[1]

Demographic profile

According to the Census (2011), the ward is one of the largest wards by population. It has one of the lowest sex-ratio in Bengaluru. There is also a significant proportion of the population that belongs to the Scheduled Castes (SC) and Scheduled Tribes (ST).

The ward also has comparatively much lower literacy. It has the one of the lowest male literacy rates in all of Bengaluru. The female literacy rate of the ward is better than ~25% of Bengaluru's wards.

The population in the ward follows Islam, Hinduism and Christianity. A majority of the population in the ward is below the age of 37.

Socio- economic profile

The ward has a working population of approximately 16,000 persons, of which more than 90% are main workers i.e. employed for more than 6 months in a year while less than 10% workers are marginal workers (less than 6 months). The ward has the one of the lowest female working population in comparison to other Bengaluru wards. A majority of the marginal workers in the ward work between 3-6 months while a small percentage of workers work for less than 3 months. A majority of the population is involved in manual and semi-skilled labour, small businesses and factory jobs with a very low monthly per capita income (Bhojani, 2016).

Almost all of the households in the ward live in permanent houses. However, only about 60% of the households live in 'good condition' houses (Census 2011). This puts the ward in the bottom 10% of wards in terms of housing quality in Bengaluru. Most households live in 1-2 room houses. The proportion of ownership to rental housing in the ward is similar to the city average. About half of the households have 4-5 members and about one-fourth of the households have more than 6 members living together as per Census (2011).

The ward has low asset ownership (which is a proxy for household income) with very few households owning all census listed assets consisting of TV, computer/laptop, telephone/mobile and scooter/car which is significantly lower than the city average of 25.9% households.

Infrastructure

[1] This is an overview of the secondary data available for the ward

Most households in the ward have access to treated tap-water as a part of the city- grid for drinking. However, the number of households who have access to drinking water within their house is lower than the city average of 80.9%. The other two major sources for drinking water include untreated tap water and tubewell/ borehole water. A few households are also dependent on covered and uncovered wells for their drinking water (Census, 2011).

As per Census 2011, approximately 60% of households used LPG/ PNG for cooking fuel, which puts this ward amongst the one of the lowest ranked wards across Bengaluru. The LPG/ PNG coverage in the ward is lower than the city's average of 78.2% households. Households also depend on kerosene and fire-wood for cooking.

Almost all households have electricity connections. A small percentage of households use solar and/or kerosene for lighting. Most households have toilet facilities within their premises, connected to piped sewer systems. Some are connected to septic tank facilities and a few households use pit latrines. Only about 1% of the households have no toilet facilities and use public toilets or defecate in the open (Census, 2011). As per BBMP, there is 1 public toilet in the ward within the area with the EWS (Economically Weaker Section) housing. There is also one public toilet located in the neighbouring ward which is less than 300m from the southern ward boundary, maintained by Jana Kalyana foundation (Janaagraha, 2016). As per Census (2011), most households have access to closed drainage connection while a small percentage either have open drainage or no drainage connection.

The solid waste management in the neighbourhood is managed by a set of pushcart handlers, sweepers, auto tippers and their helpers, which undertake primary waste collection. Two 10-ton compactors are used for secondary waste collection. There are approximately 900 commercial establishments in the ward. Most are small shops & clinics, with a few larger retail units, offices and educational units. The ward has 27 markets/ temples and 207 vegetable vendors as per the plan (BBMP, 2017).





Picture 1: Main East- West street view
Picture 2: North – South cross- road street view
Picture 3: Narrow internal street view
Picture 4: Resettlement colony interior road

Community- level Diagnostics Study

This report presents findings from the Community Diagnostics study undertaken in Bengaluru over November 2021 to March 2022. The diagnostics study includes three areas of enquiry as detailed below:

a. **Part A: Neighbourhood- level Infrastructure Assessment**- One of the key research interests of this study is to understand infrastructure assemblages being organised at the NH scale to facilitate the coping strategies of marginalised households that do not have uninterrupted grid based infrastructure supply, but are situated on a spectrum of access in terms of infrastructure 'griddedness'. The objective is to understand the dynamics of these assemblages, and qualitatively enrich our conceptual understanding of infrastructure 'griddedness' spectrum in relation to food. The infrastructure systems we consider include- water, drainage, sewerage, electricity, cooking fuel, transportation, and communication. We focus on understanding how assemblages around these infrastructure systems shape and change provisioning. We also note the risk and resilience aspects that interviewees self- identify, with regard to the food- infrastructure nexus at the NH scale.

b. **Part B: Household- level Assessments of Infrastructure and Food:** The second component of the study examines the nexus of infrastructure and food choices/ consumption at the household level, within the neighbourhood. In the present diagnostic stage of the study, the focus has been on understanding infrastructure usage, infrastructure constraints, infrastructure disruptions and repair/ redressal mechanisms at the household level. Assessment of how infrastructure is linked to food preparation, cooking and food- related health issues has been explored only at a preliminary level, at this stage. It will be studied in depth at the next stage of the study. Discussing family food habits is typically treated as a personal conversation, because of links between food and socio- economic, religious, regional and caste identity. Food habits are often wielded as a social marker to group people and justify social hierarchies. Keeping this in mind, our aim at this stage was to develop relationships with the households, before we delve into this aspect more deeply in the next phase.

c. **Part C: Retailer- based Neighbourhood- level Food Provisioning Study-** Another area of research interest is to understand how food provisioning, comprising of outlets/ vendors, is being affected by infrastructure at the NH scale. Previous studies in Bengaluru and India highlight that the NH is an important scale to study food provisioning, since a significant proportion of food purchases are made at the NH scale, making it the significant last- mile of the urban food system. Our research enquiry examines the types of infrastructure assemblages supporting and shaping the functioning of food provisioning outlets/ vendors at the NH scale and how these outlets/ vendors/ establishments in turn are influencing and shaping infrastructure access and infrastructure assemblages at the NH scale. In this study we are

also including public provisioning of food through Public Distribution Shops (PDS), which sells raw 'rations' and the Indira Canteens, which sells subsidised cooked meals, thrice a day.

This report is based on primary fieldwork. The aim is to present a landscape of infrastructure assemblages on-site and understand preliminary connections to food. The diagnostic brief will help to sharpen our enquiry for Year 2 of research. The final section of this report summarises the risk and resilience landscape of the site based on the Community Diagnostics fieldwork.

Methodology of the Community Diagnostics Study

Our approach to the primary research has been qualitative rather than quantitative. The team conducted structured field observations, transect- walks and semi-structured key- person interviews. Fieldwork was undertaken between November 2021 and February 2022.

The team conducted semi- structured interviews with key- persons, including local social and political representatives, local government officials and a cross-section of older/ influential residents/ business owners in the area. A snowball sampling was used to identify local representatives and key residents/ business owners. Key government departments, in the area, were identified from the literature review of infrastructure provisioning in Bengaluru (undertaken at the previous stage) and officials from all the relevant departments, responsible for local provisioning, were interviewed for the Community Diagnostic study, subject to their availability. Further, the team interviewed the neighbourhood- level ground staff, such as the 'valve-men' (responsible for turning the water supply on and off in the neighbourhood), the solid-waste collection staff and the retail-shop owners of the local 'ration' shops, i.e. the Public Distribution System (PDS) shops. The interviews were structured to understand the timeline of various assemblages of infrastructure along with the nature of the assemblages in terms of its human and non-human components. Overall, we conducted 37 key person interviews; including 7 local social/ political representatives, 15 households and 15 retailers. Each interview session was approximately an hour long (or more in some cases) and several people were interviewed over more than one session.

15 households were interviewed taking into account the socio-economic and spatial diversity of the ward and to ensure that the sample included a diversity of households. We interviewed three households from the western part of the ward, where residents are relatively better-off in terms of their socio-economic profile and also enjoy infrastructure benefits by being located on higher ground. The resettlement colony is located further east and is a notified slum. It houses many inter and intra state migrants. Six interviews were conducted in the resettlement colony. The rest of the interviews were conducted with households residing in the low-lying areas of the ward. Urban studies literature highlight intra- city socio-economic segregation relationally between neighbourhoods. However, our empirical research sheds light on intra-neighbourhood segregation, as well.

We also interviewed 15 retailers to understand the neighbourhood- level food system. Retailers were selected along one of the east- west transversal roads in the ward with mixed use and along the Main Road, which acts as the western edge of the ward, and is a city- scale arterial road, with many large-scale wholesale & retail outlets and restaurants. The selected east- west transversal road is the neighborhood's main internal market area with mixed-use built-up consisting of retails and restaurants on the ground floor and some residential

above them. Many of the shops located here buy raw materials and ingredients from shops located on the Main road. Since, most of the shops located on the arterial road were large and formalised, we decided to over-sample the ones on the internal main road where more small shops were located. We included 3 restaurants, 2 bakeries, 2 mobile vegetable vendors, 1 vegetable shop, 1 meat shop and 1egg shop on the internal road. Similarly, we included 1 poultry shop and 2 mobile vendors (one vegetable and one fish) on the arterial road. We also covered two government institutions: one PDS shop on the internal road and one Indira canteen on the arterial road.

Part A: Neighbourhood level infrastructure assessment

The neighbourhood level infrastructure assessment section outlines findings from the Community Diagnostics stage primary research findings about the human/ non- human history of infrastructure assemblages in the neighbourhood. This section is organized along the infrastructure verticals of (1) water, (2) drainage & sewerage, (3) solid waste management, (5) electricity, (6) cooking fuel, and (7) communications. Each sub- section delineates the assemblage co- functioning in the neighbourhood, along each of these verticals. Each assemblage type is discussed through a historical overview of its emergence, the geographies of difference being experienced across the neighbourhood, and the materialities that constitute the particular assemblage. Across each, the human/ non- human co-functioning that has emerged over time, and which continues to ensure upkeep and repair, is highlighted.

Water

The ward has access to two grid- based water provisioning arrangements – the first is the (parastatal) Bengaluru Water Supply and Sewerage Board (BWSSB)'s city- wide underground grid with treated water (also called *Kaveri* water, as the water is pumped from the *Kavery* river- basin, located 86 kms, south of the city[2]), while the second is the (municipal) Bruhat Bengaluru Mahangara Palike (BBMP)'s neighbourhood scale underground grid that pumps untreated ground water, from local borewells and supplies to private and public taps through pipes. In addition there are three off- grid water arrangements, including Water ATMs for drinking water, water tankers (both public and private tankers that supply both treated and untreated water) and a few wells.



Picture 6: Underground grids for Kaveri water supply and borewell water supply
Picture 7: Water ATM
Picture 8: Water tanker
Picture 9: Well

[2] https://bwssb.karnataka.gov.in/info-1/About+BWSSB/en

Both grid- based systems have evolved incrementally, over time, through the participation of residents, local leaders, as well as government officials. According to a BWSSB official, the first water pipeline in the ward, was laid in the 1970s. Local leaders recall that household tap connections came about four decades later, following long- drawn protests and interventions by local leaders. Officially, the grid covers 100% of the ward now, but some pockets still do not get BWSSB supply. The 'release' of water into the grid is a manual process, controlled via a lock and key arrangement by 'valve- men'. Kaveri water is supplied twice a week in the ward, but with different schedules in different pockets. The valve-men are appointed by the BWSSB via contractual employment, but are deeply embedded in the community. The actual release of water (timing, quantity, etc.) continues to be a point of dispute between residents and the officials that manage the manual controls. For example, residents in particular sections of the neighbourhood complained about reduced access to Kaveri water, as the valves in their area is switched on only late at night. In urban studies literature, this is described as the presence of infrastructure and absence of service delivery.



Picture 10: Valve- man opening valves
Picture 11: Close- up of the valve lock and key arrangement

The residents that are unable to 'catch' Kaveri water are dependent on borewell connections. Even in areas, which receive Kaveri water supply, borewell connections are used to supplement water requirements. The borewell- based system was first installed in the year 2000 by BBMP. The work was initiated by the elected representative. The borewell- grid is connected to public taps across the neighbourhood. Our interviewees highlighted that public taps connected to both the Kaveri and borewell systems existed before individual household connections were provided. Each 'colony' within the ward has access to one tap and residents fill water from this designated tap only. In times of water distress, the local leaders call for private water tankers. The tankers are paid out- of-pocket, as there is no official budget to cover these costs.

People narrated that before the ward had a grid- based Kaveri and bore- well systems, most households travelled to areas 1-2 kilometers away to fill water. They also used wells located in the ward. An older resident mentioned a lake in the area, but did not elaborate on whether the lake water was ever used. Now, the lake is fully filled up and built- over, as is the case with many lakes in Bengaluru.

The neighbourhood has significant spatial variations in water infrastructure. Kaveri- water pipelines are laid along the main roads. Variations in the Kaveri water supply results in different types of water storage systems; sumps are common on the western side, while there are more plastic water drums towards the eastern end of the ward. Borewell water is supplied on all days of the week, and does not have a set pipeline pattern like the Kaveri grid. However, they are more common on the narrower cross- roads and in the lower-lying area of the ward, highlighting the households' greater dependence on borewell water in these areas. The slum resettlement colony is connected to the Kaveri grid, but with tap outlets only in public places via public standposts. The colony is also connected to the local borewell grid, which is attached to sumps, which in turn connects to taps inside each house.





Picture 12: Kaveri pipeline connections to the house
Picture 13: Public borewell standpost on road
Picture 14: Underground sump for borewell water at the resettlement colony with pump to take water to the overhead tanks

Off- grid supplemental systems like water tankers and the water ATMS are also affected by spatial variations. Respondents from the narrow lanes in the ward highlighted that water tankers are unable to come into their streets, and they have to walk to the main road to fill water from the tankers. Mosques and Water ATMs also act as supplemental sources of water for households and commercial establishments, located nearby but residents in the eastern side of the ward have to walk farther to access the water ATMs.

Kaveri system assemblage:

BWSSB officials elaborated that Kaveri water is pumped from a nearby Ground Level Reservoir (GLR). The Kaveri grid supplies directly to private and public taps in the ward. According to a BWSSB official, the ward accounts for significant 'loss' in terms of non-revenue water in the city of Bengaluru. Most connections in the ward are unmetered.

The valve-men mentioned there are three types of pipes in the area- the main trunk line connects the GLR to the main pipes in the ward, which connect to the consumer distribution lines, which is either domestic or non-domestic, with a difference in pricing. The higher diameter pipeline is connected to the pumping station and has good water pressure whereas the narrower pipelines work on the principle of gravity. The residents meanwhile mentioned only two types of pipes. They mentioned that BWSSB officials do not 'release water' (पानी नही छोड़ते) into the higher diameter pipeline and the pressure in the narrow pipeline is low. As such, most households use motors to get water. The water board officials often collaborate with the electricity board officials to shut off electricity during the supply hours of Kaveri to reduce the use of motors. The valve-men also keep up a constant vigil to ensure that households are not using motors. However, given the embeddedness of the valve-men in the community, the transparency of this reporting is ambiguous.

Getting a new metered connection requires a number of property documents and permissions. BWSSB inspects the documents and sanctions a registered plumber to provide the connection. For repairs, a formal complaint needs to be registered with the BWSSB so registered plumbers can be allotted to fix the issue. However, as per our conversations with BWSSB officials, most residents reach out to local plumbers/ contractors for new connections and repairs. Officials complained that the quality of work by local plumbers affects the quality of water. Residents in the ward also complained about the quality of water, including repeated recurrence of sewage pipe water mixing with drinking water. This highlights the tension between the formal solution (more long-term, but not prompt) and informal solutions, which are temporary and not perfect, but faster and often cheaper.





Picture 15: Kaveri water tap connection inside the house
Picture 16: Kaveri water meter

Borewell system assemblage:
Some people have paid to get borewell connections, with untreated ground water. The supply is for about 2 – 3 hours a day for 6 days a week. The system has a life-cycle of 20-22 years. People connect pipes from the borewell standposts to sumps or plastic drums. The electricity bills for running the borewell motors are paid by the BBMP. The valves for the borewell grid are operated by valve-men, similar to the Kaveri system. The bore valve-men are however not employed by the BBMP, and not provided with any official water-release (supply) timings/ schedule but recognized by both by the BBMP and the residents.





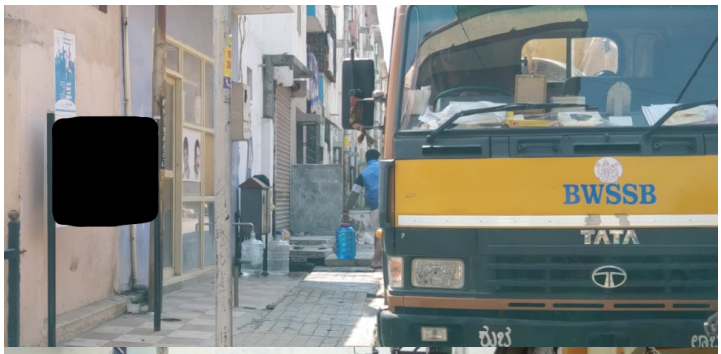
Picture 19: Borewell valve man switching on bore motors
Picture 20: Public bore connection being used to fill storage tanks inside house

Off grid assemblages:

The ward has Water ATMs, run by the BBMP with the support of trusts and other social organizations. The maintenance of the Water ATMs is mostly with the BBMP. The ATMs supply treated borewell water at INR 5 per 20 liters and act as a supplemental off- grid source of drinking water in the ward. However, some residents complained that the quality of water supplied from the Water ATM was not good.

Water tankers from BWSSB, BBMP, as well as private tankers are other supplemental off- grid sources of water in the ward, when grid- based supply is affected. Local residents are often not required to pay for the BBMP and BWSSB water tankers, but getting the tankers requires effort.

Wells were also observed as part of field observations. One of the wells was maintained by a charitable trust while the others were mostly private wells.





Picture 21: Water cans being filled at the Water ATM
Picture 22: Private water tanker

Drainage & Sewerage

The whole area is connected to a gridded sewerage and drainage network, however, the history of the drainage and sewerage systems in the area is complex. Work was halted on laying the grid- based sewerage system and needed a push from the local leaders to be completed. The residents had to pay when the sewerage system was installed. Repair is needed frequently and the process of repair is cumbersome. There are also problems with rats, which becomes an issue because the sewerage grid includes PVC pipes. The drainage network in the area is a mix of closed, semi- open and open. Some areas have no drains (where the water drains along the road itself). According to respondents, the condition of drains and sewers in the ward have improved significantly, though repairs are still required quite frequently, which means further costs to the households. Repairs and upgradation of the systems are difficult as the roads have to be dug up. The assemblage of actors and systems that have to come together for the repair of sewerage lines and drainage channels differ for different parts of the study area.





Picture 23: Pipes being repaired to prevent mixing of water and sewerage, with road excavation
Picture 24: Sewerage pipes in the resettlement colony





Picture 25: Closed drains
Picture 26: Semi- open drains
Picture 27: Open drains
Picture28: No drains





Picture 29: Drains blocked to prevent rats from coming out into the roads
Picture 30: Sewerage cleaning truck
Picture 31: Manual sewerage system cleaning
Picture 32: Pipes connected to machines to clean blocked sewerage pipes

Solid Waste Management

The Bruhat Bengaluru Mahanagara Palike (BBMP) is vested with the responsibility to collect and dispose off solid waste in the ward, with Pourakarmikas (PK), under contract, with external contractors, undertaking sweeping and collection. In response to exploitative practices by the contractors, over time, the PKs now get their salaries directly from the BBMP. The solid waste system includes the use of trucks, autos and hand- carts.

Wet waste assemblage: Wet waste collection is through a supply contract arrangement with the BBMP. This is an all- encompassing contract wherein the contractors are accountable for service delivery in SWM rather than the supply of manpower and infrastructure in the ward. Both collection and segregation systems have issues on- ground. Residents and local leaders supplement the official system, particularly when it comes to any repairs.

Dry waste assemblage*:* Dry waste is collected by NGOs, and waste picker organizations. There are 121 dry waste collection centres across Bengaluru. As per the overall guiding principle of BBMP dry waste is to be collected at least twice a week. Dry waste uses larger vehicles because dry waste does not need a tipping mechanism. BBMP has given the directions to households to segregate the waste as dry waste and wet waste, but in practice this often does not happen. Meat shops and other waste- generating shops, in the area, make their own arrangements, as the waste has to be disposed off daily and cannot depend on the BBMP weekly system. People on narrow streets, experience problems with their solid waste, which are too narrow for auto tuppers. Here people dump their waste either on the roads or at the dump yard themselves.





Picture 33: Undesignated waste dumping in the neigbourhood
Picture 34: Designated waste dumping in the neigbourhood
Picture 35: Hand cart to collect solid waste
Picture 36: Pourakarmika

Electricity

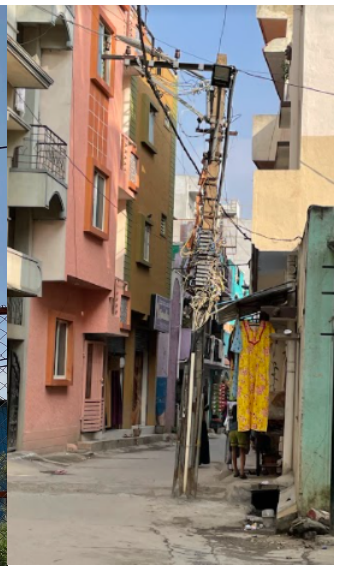
The ward is connected to the city- grid, operated by BESCOM. Interviews with local residents, officials from the BESCOM substation and officials from the BESCOM O & M (Operations and Maintenance) department highlighted that the area has improved in terms of level of supply, spread of supply and technology for metering and monitoring. The substation has increased number of transformers to avoid power cuts, but the area still experiences many power cuts, especially in summer.

There are no significant spatial variations in the electricity grid per se, but there are significant differences in the assemblage patterns and electricity usage patterns across the ward. The more well-to-do households have refrigerators, washing machines, and private water motor but in other areas like the resettlement colony, households had connections primarily for lights and fans.

BESCOM officials, highlighted there are different types of connections based on use i.e. residential, commercial, construction, etc., with different procedures and charges involved. Connections are given based on address proofs. New connections or disconnections of non-paying households are done by linemen. Meter readers are employed to manage electricity bills and verify if there are pending payments.

All households and retail shops do not have metered electricity connections. Unofficial connections use a direct line connection from the power source without any meter or insulation. Many households may share a single main connection and therefore must bear the brunt of disconnections due to bills not being paid by any of the sharing households. To resolve this, many households contribute to a common fund and pay bills in order to continue their access to electricity. Small commercial outlets, without significant electricity usage, also often draw their connection from neighbouring households.







Picture 37: Electric substation
Picture 38: Electricity pole with formal and informal connections
Picture 39: Electricity pole
Picture 40: Electricity meter

Liquefied Petroleum Gas (LPG)- Cooking Fuel

Most households use a standard sized LPG cylinder (about 14 kgs) to cook their food. There is more than one LPG distributor that service the neighborhood. LPG cylinder delivery requires identity proof, and an address proof, specifically an Aadhaar card (the National Identity card linked to personal biometrics). Only one Aadhar card is allowed per connection, and it is not possible to give somebody a connection in Bengaluru if their Aadhaar card is already linked to a connection in another city. This is a problem for migrant families in the ward, who may also have Aadhar cards with non- local addresses. Small 5kg gas cylinders, which are more expensive (at a per unit level), can be bought at neighborhood shops. These are not linked to the formalized distributor system. No documentation is required to buy the small cylinder and we found poorer migrant households often use smaller cylinders.




Picture 41: Large LPG cylinders being delivered to houses
Picture 42: Small LPG cylinder being used for cooking

Transport

The ward is connected to the city via the main road, which is also an upcoming metro rail corridor and future site of a metro station. There is a public bus stop along this road where BMTC bus services can be accessed. Bus stop infrastructure includes seating facility for 6-8 people, with an asbestos roof. While the road is comparable to arterial roads in other parts of the city, the upcoming metro project and high rate of commercial activity often makes it congested leading to traffic problems.

The internal road network in the ward has both tar and cement roads. These roads are much narrower and of poorer quality. Entry of goods carrier heavy vehicles and three wheelers onto these narrow roads, often creates traffic congestions. A significant number of two wheelers are used both for personal transport and transportation of goods and services. For example, gas cylinder delivery to households in this neighbourhood is typically done using two wheelers with a metal frame attached that helps carry four cylinders one time. We also observed traditional modes of transport such as tongas and bullock carts.

Mobility apps such as Uber, Ola and Rapido are available in the area. However, self-drive mobility apps such as Yulu, Bounce etc. do not seem to be present.

Communication

The focus of the communications assessment is focused on systems used by residents for infrastructure redressal and by retailers for pricing and supply coordination.

Communication of grievances by residents to responsible authorities primarily takes place through mobile phones. The increasing use of social media was also

observed. The local Member of the Legislative Assembly (MLA) often takes to social media to communicate and publicise his interventions. The BWSSB authorities use whatsapp groups as a means of communication, to share geotagged pictures to identify and address grievances in the neighborhood, and to communicate status of resolution. Some communication systems have become obsolete with time, but are still in use in the area, including two old-style PCO booths. These booths are used regularly. Even individuals that own mobile phones otherwise were observed using these phones. The Public Distribution System (PDS) regional center in the neighbourhood communicates with the Department of Food and Server Distribution via the internet. PDS shop owners complained of frequent problems due to technical issues with the server and the need to depend on mobile hotspots to access the internet. Newspapers are also an important means of communication. The everyday price of chicken and eggs is determined based on a common pricing practice across the state of Karnataka - these rates are communicated by the daily newspapers and practiced as a “paper rate”. These “paper rates” are also sent to retailers via a phone-based app, as shown in the picture below.



Picture 43: PCO Booth outside a retail shop
Picture 44: Citizen service center offering multiple digital services
Picture 45: Paper rate for eggs sent via SMS

Part B: Household- level Assessments of Infrastructure and Food

We also interviewed households regarding infrastructure and food and discovered similar patterns that were identified through the neighbourhood level assessments. The focus in this section is on patterns of household usage of infrastructure and associated problems, rather than the system itself. There is also a short section on the preliminary findings about the infrastructure- food nexus at the household level.

15 households were interviewed taking into account the socio-economic and spatial diversity of the ward and to ensure that the sample included a diversity of households. We interviewed three households from the western part of the ward, where residents are relatively better-off in terms of their socio-economic profile and also enjoy infrastructure benefits by being located on higher ground. The resettlement colony is located further east and is a notified slum in the ward. It houses many inter and intra state migrants. Six interviews were conducted in the resettlement colony. The rest of the interviews were conducted with households residing in the low-lying areas of the ward. Spatialising infrastructure accessibility across the ward highlights an uneven terrain, which parallels the socio-economic differences amongst residents. Urban studies literature highlight intra- city socio-economic segregation relationally between neighbourhoods. However, our empirical research sheds light on intra-neighbourhood segregation, as well.

Water infrastructure and Provisioning

Responses from the HHs in the western part of the ward highlighted that they have had adequate Kaveri supply over the past two decades. They get the supply twice a week on Monday and Thursday between 1 PM to 6 PM. They use only Kaveri water for all their needs, including washing clothes, washing utensils, other daily household chores, drinking and cooking. They mentioned that disruption in the Kaveri supply is rare and they have enough storage capacities to handle supply disruptions for a couple of weeks. These HHs do not use borewell water, like many of their neighbours, even though they have access to the borewell supply, but do use the Water ATM, when required. All the HH mentioned that water tankers are hired when supply is disrupted.

The respondents from the resettlement colony depend on both the city- grid Kaveri system and the micro- grid groundwater system. Water- supply is not provided directly to their taps inside the house. Residents depend on community water- taps, a system of underground water tanks, overhead water tanks and privately- run motors to get water- supply inside the house. Kaveri water is used for drinking and cooking, while borewell water is used for washing clothes, utensils and bathing. Residents use the nearby Water ATM when there is a disruption in the water supply. However, some respondents mentioned that the RO water causes health problems involving the throat and skin.

In low-lying parts of the ward, Kaveri supply has been available only for the last decade, and has been built out incrementally. Before that, residents used bicycles and motorcycles to transport multiple containers of water from nearby locations. Numerous local protests played an instrumental role in getting them Kaveri water supply. Kaveri supply is still available only once a week. Residents use borewell water for cleaning, washing clothes and utensils etc. Kaveri water is used for cooking and drinking. Water ATMs are used for drinking water, when Kaveri supply is disrupted. Several respondents highlighted that their Kaveri water often gets mixed with sewerage water. When this happens, residents depend on Water ATMs and borewell supply.

Drainage and Sewerage

In the western part of the ward, responses concerning sewerage and drainage facilities were positive overall. HHs mentioned spending their own money to improve their household sewerage and drainage systems. The HHs here said they can afford to pay, if needed, to solve their problems. In contrast the eastern part of the ward had problems of water and sewerage mixing. Here respondents mentioned that they can identify dirty water by the smell, and do not collect it, on the day, if it is smelly. The respondents mentioned that during rainy seasons the drains overflow and water ends up stagnating on the road. In the resettlement colony, residents highlighted frequent need for repairs in their sewerage system and long delays in getting a response from the government. Their paying capacity is low and these frequent repairs is a cost burden to them.

Electricity

Electricity supply in the western part of the ward is ensured/ accessed by residents without frequent disruptions on a *daily basis*. Residents mentioned that power cuts are rare. As one moves to the resettlement colony, access to electricity becomes more complicated. Due to miscommunication between different government departments, this area has electricity connections but no meters. Power- lines are frequently cut because of issues with billing arrears and non- payment.

Liquefied Petroleum Gas- Cooking Fuel (LPG)

The standard price of buying a large cylinder has gone up from INR 700 to INR 950- 1000, which includes the delivery charge. In several interviews, respondents highlighted the steep price increase. Despite the hike, they are still using LPG cylinders, as they need to, but trying to minimize their use, as much as possible. Most households are using one cylinder for one to two months. A cylinder delivery person in the neighborhood, we interviewed, emphasized that with the price hike people try to delay getting the next cylinder. People who have faced some sort of employment crisis in the past year or were poorer, use the small cylinder.

Food

The preliminary findings about food from the household study highlighted some key points. The neighbourhood scale is important for most residents in the area for their food purchases. The food items purchased within the neighbourhood include fruits, vegetables, groceries, freshly milled flour, and grains (PDS). Meat is only category of food that shows a different purchasing pattern. Every household, we interviewed, consumed some kind of meat. Richer households bought goat meat from as far as Hoskote and Hennur and chicken meat from HBR Layout, from premium shops like Suguna Chicken. These respondents highlighted a desire to see the meat “cut right in front of your eyes” to trust their purchase. Lower- income households bought their meat from within the neighborhood. Respondent highlighted that they used to consume beef and fish before COVID. But post- COVID, they have stopped eating these items because there were rumours and messages that said eating beef and fish would cause diseases.

In most households, women are responsible for buying fruits and vegetables and cooking. However, the husbands are usually responsible for buying the meat, especially if it involves going outside the neighborhood, often on a two wheeler. Most respondents prefer to use Kaveri water for drinking and cooking. Sometimes they use water from the “water ATMs.” However, respondents noted that rice cooked with the water from the “water ATM”, sometimes came out yellow.

Part C: Retailer- based Neighbourhood- level Food Provisioning Study

We interviewed 15 retailers to understand the neighbourhood- level food system. Retailers were selected along one of the main transversal roads in the ward with mixed use and along the Main Road, which acts as the edge of the ward, as well being a city- scale arterial road, with many large-scale wholesale & retail outlets and restaurants. The main road is the neighborhood's internal market area with mixed-use built-up consisting of retails and restaurants on the ground floor and some residential above them. Many of the shops located on this road buy raw materials and ingredients from shops located on the main road. Since, most of the shops located on the arterial road were large and formalised, we decided to over-sample the ones on the internal main road where more small shops were located. We included 3 restaurants, 2 bakeries, 2 mobile vegetable vendors, 1 vegetable shop, 1 meat shop and 1egg shop on the internal road. Similarly, we included 1 poultry shop and 2 mobile vendors (one vegetable and one fish) on the arterial road. We also covered two government institutions: one PDS shop on the internal road and one Indira canteen on the arterial road.

Indira Canteen

Indira Canteens are a chain of government sponsored eateries in Karnataka, set up in lower-income or working-class neighborhoods, offering subsidized meals. There are two Indira canteens in close proximity of the study- site. We surveyed one of these. The location, construction of buildings and provision of the Indira Canteen infrastructure is undertaken by BBMP.

Food System:
The Indira canteens are run by external Catering Service Providers (CSPs). They have been selected by the BBMP, through an experience-based tendering process. At present, there are 3 CSPs that operate 198 Indira canteens across Bengaluru. The CSPs are responsible for the operation, maintenance and all transportation/ distribution of food. All costs are to be covered at the price of INR 60 for 3 meals (breakfast, lunch and dinner) per person.

Infrastructure dependency and accessibility:
The Indira canteen we visited uses water cans from the water ATM, which is located close to the canteen. While BBMP has provided a water filter and cooler for the canteen, they don't use it. Similarly, while electric heating equipment was provided to the canteen, they were not being used by the contractors to cut down on costs. The canteen does not use any cooking fuel as the cooking happens offsite. One of the main reasons cited for this was the impact in footfall due to COVID. Before COVID, the canteen used to serve 1,000-1,200 plates daily which has reduced to 700-800 plates post-COVID affecting the daily turnover.



Picture 46: Indira Canteen

Egg, Meat and Poultry Shops

There are multiple meat and egg shops located in the ward. Most meat shops in the area sell chicken or beef while some shops also sell mutton (goat). We interviewed two meat shops: one beef shop and one poultry shop We also interviewed an egg shop owner. Amongst the three, we observed very different built form and infrastructural needs.

Food System:
The egg shop is a wholesale egg supplier for the area who sources his eggs from a farm outside Bengaluru. The price of egg varies from day to day and is decided based on the "paper rate". Paper rate is the price published in the daily newspaper and decided by National Egg Coordination Committee (NECC). The egg shop gets the update on these daily paper rates by SMS and can place an order with the farm based on these prices. This regulation of prices accounts for a 35-40% difference between the farmer's selling price and the consumer's buying price, which is the lowest in the world (NECC, n.d.). The shop sells around 1,500-2,000 eggs daily, mostly to local bakeries.

The beef shop owner we spoke to has been in the location for more than 10 years. The rent is significantly higher than general rents in neighbourhood for the beef shop. They buy their meat from outside the ward and get it delivered to their shop. The shop owner also mentioned their business has been heavily affected by COVID and their sales have dropped by half. This has been mainly because many migrant workers from Uttar Pradesh and Bihar who used to work in the area have moved out.

The poultry shop we spoke to is located on the main road and is a very large establishment. They operate in a built-up structure with more employees and advanced equipment than most other meat shops. The shop sources the chicken from a farm at a price below the paper rate and provides it to retail chicken shops within and outside the neighbourhood. Most of their sales are from live chicken as many local chicken shops buy from them and then sell at a higher

margin. They also sell whole skinned and unskinned chickens to many restaurants. Many local residents also buy from them in retail, as it is cheaper then the retail chicken shops in the area. According, to the shop owner there is only one other such shop in the area, which also at times buys chickens from them. They used to sell eggs in the past but stopped because of lower margins.

Infrastructure dependency and accessibility:
The egg shop had very little dependency on any kind of infrastructure provision and only uses electricity for light and fans. They do not have any water, sewerage or drainage connections. They use their own van for transportation and distribution of eggs in the area.
The beef shop only had an electricity connection, which powered the light and a freezer for storing meat. The freezer could stay cold for 8-10 hours without electricity, which is really useful when the area experiences frequent power cuts. While the store had a need for water for cleaning, they do not have a connection as the landlord has never got one installed.

Compared to other meat/poultry shops in the area, the chicken shop we spoke to has very high dependency on infrastructure. They mainly use electricity for two feathering machines and are severely affected to meet orders on time if power cuts happen. As such they have an Uninterrupted Power Supply (UPS) device, which can support the machines for 2-3 hours if no other device needs power. The shop uses a well, which is located within the establishment to clean the chickens. The well was dug a long time ago, when the shop was used for furniture manufacturing which also has a high-water demand. They do not use Kavery water for washing chickens, as they claim it changes the colour of the chicken and people do not want to buy. The chicken shop produces approximately 150-200kg of waste daily and gives it away to fish growers for free, who use it for feeding fishes. They are also dependent on transportation infrastructure, as many trucks come by for supply and delivery through the day. As such, they operate mainly between 4am-9am to avoid traffic jams and electric power cuts, which typically occur during the day. Their business has also been affected by the dust from the metro construction and they have had to take extra precautions to avoid getting chickens getting contaminated by the dust.

Licensing:
The meat shop has a butcher's license from the FSSAI, for which they pay an annual renewal fee, which is approximately equivalent to one month's income from the shop. However, he pointed out that it is much harder to get a new license, which can cost upwards of INR 1,00,000. The chicken shop also has relevant licensing and permits. However, the person we spoke to could not give us any information about the application process.

PDS shops

Public Distribution System (PDS) is a government run scheme for provisioning of food grains to HHs that are below poverty level through fair price shops. The government authorizes wholesale dealers to purchase food grains and the fair price shops that distribute them. The ward has 4-5 fair price shops, located on the main roads.

Food System:
The fair price shop dealer dealer we interviewed explained that he procures food grains from the government godown, located on the main road. The dealer has to arrange transportation from the godown to his shop, which is a distance of less than a kilometer. The government pays INR 30 per quintal of grain for transportation from the godown and loading and unloading costs.

The dealer distributes ration to about 500 beneficiaries (a total of about 110 quintals every month) in the ward and most of the beneficiaries are residents of the ward. The dealer is required to cover all operational expenses such as rent of the shop, transport of food grains, electricity and internet charges. The government then pays a commission for every quintal that is sold through the fair price shop to the dealer.

During our field visits, we observed significant number of people at each of the fair price shops. The role played by these shops in distribution of ration during the pandemic was also highlighted by the residents. The importance of these shops in the food provisioning story of the ward is particularly critical.

Infrastructure dependency and accessibility:
The shop provides only dry ration such as rice, wheat and sugar. There is no specific storage infrastructure, and jute bags are used to store the grains. The dealer said they do not have an issue with rodents. The shop has an electricity connection, which is used for lighting and powering of an electronic weighing scale and a laptop. Electricity outrages are not a major challenge. However, the dealer relies on battery back-ups for operating his weighing scale and laptop, in case of power-cuts. The shop also needs an active internet connection for authorizing the biometric identification of the beneficiaries. There is no wi-fi in the shop, and mobile hotspots are used for internet connectivity. There are frequent issues with the main servers in addition to the limited internet connectivity.



Picture 47: PDS shop

Restaurants and Eateries

We interviewed three of the restaurants/ eateries in the ward. They are located across one of the main roads in the ward. The road was divided into three sections and one restaurant/ eatery was selected in each section to understand how location affected each.

Food System:
The restaurants/ eateries source almost all their raw material locally. In our interviews, it was evident that the restaurant owners are very familiar with local suppliers and sourced their materials on a daily or weekly basis. The items have short shelf- lives, between 1-4 days. The daily sales have reduced after the pandemic. The restaurants attract customers from the ward itself. Orders are also received for weddings and other ceremonies, however these are very infrequent.

Infrastructure dependency and accessibility:
The restaurants do not have a city- grid water connections within their rented premises and use water storage tanks for their cooking needs. For all other purposes, such as washing hands and utensils, borewell water is used. All the restaurants rely on their landlord for the provisioning of borewell water. Most restaurants use LPG cylinders. Some restaurants use coal from a local shop to make 'biryani', for better flavour. Actual cooking at the restaurants is limited, since the restaurant operators prepare and cook food, at their own residence. This is feasible as they live very close to their shops. The shop is primarily using for heating and frying purposes. Most restaurants do not have a toilet facility. The waste from mid-sized restaurants is typically collected by the municipality. Small restaurants either take the waste back to their residences or dispose it off at public dustbins. Electricity is required for lighting and for appliances such as a mixer. The restaurants do not have refrigerators.

Licensing:
Most restaurants either have a FSSAI license (which is a food safety license issued by the government) or a vending license. These licenses are usually not

checked by authorities but the shopkeepers ensure that they are periodically reviewed. Our field interviews indicated very limited awareness about the registration under Shops & Establishment Act.



Picture 48: Small eatery
Picture 49: Menu of local restaurant displayed on the wall
Picture 50: Restaurant kitchen with food prep, cleaning and storage areas

Bakeries

Many bakeries are located in the ward and have been around for the past 30- 35 years. They focus on either cakes or biscuits. However, the bakeries are typically not attached to living spaces/ residential buildings, as the residents avoid them for their smell of eggs. Most of the bakery operators are from Tamil Nadu (Chennai), and the laborers working at the shop are from north India, mainly Bihar. During the Covid 19 pandemic and lockdown many laborers went back to their villages. Some of these laborers have been working here for twenty years. Typically, a bakery requires eight to ten laborers. The key ingredients are sourced locally.

Infrastructure dependency and accessibility:
Bakeries use water storage drums to store Kaveri /borewell water within the premises for drinking, washing hands and other purposes. The bakeries use electricity to run their equipment. Power backup is rare, and self- provided, so most bakeries stop when there are power outages. LPG cylinders or electricity is used for cooking (oven). Larger bakeries create a significant amount of waste, which is collected by the municipality. Bakeries supply to nearby wholesalers, using two-wheelers, through a disaggregated system of people who have contacts with different bakeries.





Picture 51: Bakery/ factory
Picture 52: Biscuit distribution using a two- wheeler

Mobile Vendors (vegetables):

Street vendors and small shops are the dominant form of retail in the area. The ward has many small shops (often extensions of houses) and mobile vendors selling green vegetables, tomatoes, onions, fish, fruits, etc. Mobile vendors are usually not local and often buy their fruits, vegetables, fish etc. on a daily basis at the larger city markets. The vendors are conscious of the affordability levels of their customers and change quantities and choices of fruits and vegetables they sell depending on their understanding of the demand from their customers. Vendors often use rental carts and have little/ no access to infrastructure. They face challenges of storing their goods overnight, so they prefer to sell all their goods daily.



Picture 53: Mobile vegetable vendor's cart on an internal road
Picture 54: Mobile cart provided as a part of a government youth employment scheme
Picture 55: Mobile onion vendor's cart on the main road
Picture 56: Storage used by the mobile onion vendor

Part D: Summary of Risk & Resilience from the Community Diagnostic Study

To explore the relationship between 'everyday' vulnerability in the study area, we have looked at the findings of the Diagnostics Study from the perspective of vulnerabilities.

The geographical variations in the neighborhood make certain areas more vulnerable than others. Low lying areas have a high density of households from poorer socio- economic backgrounds and accommodate more migrants. Common washrooms, etc. are more common in these areas. They face higher water- logging and risks of homes getting flooded in the rainy seasons. Drains are also more prone to overflowing and these areas also experience a mixing of sewerage and water, which residents identify by smell. Access to untreated borewell water is also impacted by low pressure in certain parts of the ward. Moreover, the borewater is subject to the discretion of the valve- men, who take decisions to cut off supply to certain areas and houses, when the residents are perceived to be wasting water. Thus, residents in the low- lying areas experience multiple layers of vulnerability- including lack of water supply, poor quality of supply, and financial burden despite poor/ no supply.

Waste dumping and collection another source of infrastructure- related vulnerability in the ward, with residents in areas where waste collection carts cannot reach or which are close to designated and undesignated dumping sites highlighting that they are both socially and health- wise compromised by the solid waste management conditions.

Community organisations, like the local mosques/ temples, play an important role in infrastructure provision, especially for water and toilets, for both households and vendors. They also serve as important social networks for surrounding houses and businesses.

COVID has exacerbated social vulnerabilities of residents in the ward. Some residents spoke of consuming only ganji (a soup-like consistency created mainly with Ragi) and pickles during the lockdown. Their livelihoods (auto drivers, garment workers, domestic workers, and so forth) were severely impacted, and food rations were difficult to obtain. The respondents' savings were also depleted during the lockdown, and many were forced to borrow money from money lenders, and are presently in debt. Another responder stated that his shop went out of business as a result of the lockdown, and that he was unable to pay his rent, which had increased significantly during COVID. As a result of his situation, he had to close his store and work as a labourer.

Annexures

Diagnostic study questionnaires

Annexure: Diagnostic study questionnaires

KPI with local political representatives, government officials

1. Water
   - What is the primary source of water in the ward? Can you give us details about it in terms of quality, frequency of water supply, coverage and pricing?
   - What are other sources of water in the ward (borewell / water ATM/ tanker)? Can you give us details about those in terms of quality, frequency of water supply, coverage and pricing?
   - Can you explain how access to water has changed over time in the ward?
   - Who are the major political (state and non-state) and non-political actors who were involved in provisioning of water for the ward?
   - What is the process of getting a municipal connection? What are the documents required?
   - What are the major issues that the government faces for provisioning of water in the ward ?
   - What is the process of getting a municipal water connection or a borewell connection?
   - Who is the primary point of contact for water related issues in the ward?
   - How and where do people store water (any community storage tanks) ?
   - Has there been a shift from grid dependency to off-grid arrangements? If yes, why ?
   - Is there a difference in the process of getting a connection for household versus business / shop / factories connections?
   - Do people have private connections or shared connections in the ward? If shared, how does the bill get generated?
   - Do people use motors to get water - If yes, which area within the ward more particularly?

2. Sewerage
   - Is there an underground sewerage network in the ward? Can you give us details about the grid in terms of coverage, timeline, price of getting a connection to the sewerage and components of the system?
   - Can you explain how access to the sewerage system has changed over time in the ward?
   - Who are the major political (state and non-state) and non-political actors who were involved in provisioning of sewerage for the ward?
   - Who are the political and non-political actors involved in maintaining the sewerage system?
   - What is the process of getting a municipal connection? (what documents are required, how many days are needed)

- Who is the primary POC for grievance redressal for the public? What are the key issues that are faced by people?
- What are the major issues that the government faces in provisioning of services in the ward?
- Are there any off-grid sewerage arrangements in the ward? (septic tanks, pit latrine (single pit/double pit), cesspool)?
- How have sanitation facilities changed over the years?
- What is the process of building a new sanitation facility? Who provides these services? (private contractors, masons, self)?
- What kind of sanitation systems do businesses use? (community / shared toilets)
- Is there any difference in the process of getting connections for household versus business?

3. Drainage
   - What is the status of drains in the ward, approximately how much area is covered with underground drains, on-road drains and no drains?
   - Have there been any recent upgrades in the drainage? If yes, under what scheme, how was this funded and who all were involved?
   - Who are the political (state and non-state) and non-political actors involved in maintaining the drainage?
   - Who is the primary POC for grievance redressal for the public? What are the major types of grievances?
   - What are the major issues that the government faces in provisioning of drainage services in the ward?

4. Solid Waste Management
   - What is the waste management process in the ward?
   - How much waste is collected and treated from the ward? Is there a separate dry waste collection centre?
   - Who are the political (state and non-state) and non-political actors involved in maintaining waste management for the ward?
   - Who is the primary POC for grievance redressal for people? What are the major types of grievances?
   - What are the major issues that the government faces in provisioning of services in the ward?
   - Are there any private contractors who are involved in waste management?

5. Electricity:
   - What is the primary source of power in the ward? Can you give us more details in terms of timeline, coverage, power cuts, metering status, pricing - commercial / non commercial?

- What are different types of electricity connections in the ward?
- Who are the political (state and non-state) and non-political actors involved in provisioning of electricity in the ward?
- What is the organizational structure of BESCOM? Who does what? (contractors and other people involved in the grid maintenance, repair, new connections, bill collections, etc.)
- Are there any private contractors who are involved with BESCOM?
- Have there been any recent upgrades in the grid? If yes, how was this funded, who all were involved?
- What is the process of getting an electricity connection? (what documents are required, how many days does it take - difference for commercial / non commercial)
- What are other sources of electricity in the neighbourhood ? (generators, solar)
- Are there any government schemes that people apply for accessing alternate sources of energy?
- How do people file for grievances or complaints?
- Who is the primary POC for grievance redressal for the public? How long does it take for resolution? What kind of problems take longer to resolve and why?
- What are the major issues that the government faces in provisioning of services in the ward ? (non-payment of bills, illegal connections.)
- What are the pros and cons with Overhead vs Underground connections? What are the challenges associated with different connections?
- How has billing period delay impacted the operations of the substation?

6. LPG & Cooking Fuel (To Agencies/Delivery people)

- Which agencies are responsible for provisioning of LPG (state / non state)?
- What is the process of getting a gas connection? (what documents are required, how many days are needed)? What do you do if someone has an existing connection in Bengaluru/Karnataka/Other states? Can they transfer a connection if the agency is the same?
- How do you track if people have multiple connections in one household?
- Have you seen a shift in demand with rising prices? Reduced frequencies / deactivation / longer period between two orders?
- What is the process to get more than one cylinder?
- How many retail places/ restaurants/ cold storage take gas from you? What is the frequency of their order and how much does it cost them?
- Are there any government subsidies / schemes available for cooking fuel ? Do you know how many people use these schemes in the neighbourhood?
- How do you deliver LPG cylinders?

- Who owns the tempo and motorcycles used for delivery?
- How do cylinders come to the local distribution/storage center?
- What is the delivery schedule that is followed ? Do you deliver at specific times? How does the vehicle of delivery, roads and traffic affect your delivery?
- What were your key distribution issues during Covid?

7. Indira Canteen:
   - What is the role of Indira Canteens? Can you tell us where cooking takes place and how distribution is managed?
   - What kind of infrastructure connections (in terms of heating cooking systems, drinking water, etc) are required by the canteen?
   - Who are the political (state and non-state) and non-political actors involved for provisioning of food through Indira Canteens?

KPI with households

- How long have you been living in this neighbourhood? Who are the other persons living in the house?
- Where have you been residing before moving to this neighbourhood?
- What are various provisions of water services you access?
- What are the timings of water provision? (Both Kauveri and Borewell)
- For which activities do you use Kaveri and borewell water? (Specific)
- Given your experience in the neighbourhood, can you explain to us how access to water has changed over time?
- Was there any movement (social/ political) in the neighbourhood for provision of water services?
- Can you talk about the bore well water facility? When did you get it and do you access it?
- How do you store Kaveri water, given there is only twice its provision in a week?
- Do you store borewell water and where?
- Do you have a water meter? And what are the charges?
- Do you treat Kaveri/ borewell water before using it? Such as boiling, use of aqua guard etc?
- If you do not use borewell water is it because of any specific concern?
- How do you try and resolve when there is a water problem? Whom do you approach and what are the alternatives you make (BWSSB Tanks/ BBMP Tanks/ Private Tanks)?
- How much do you pay valve man? (Kaveri and Borewell)
- Do you also contact BWSSB directly or just keep in touch with valve man?

- Who do you approach when you have a problem with electricity? What do you use electricity for?
- Do you have any power cut problems? Do you use alternatives during power cuts (DG sets, Kerosne lamps, Solar lamps etc)
- What type of water (Kaveri/ borewell) for cooking?
- When there is a problem with Kaveri water supply- then what alternative arrangements do you make?
- Do you use the water ATM in the neighbourhood and for what activities?
- Do you use bottled water and for what purpose?
- What appliances do you use for cooking? LPG, Electric etc (Size of LPG)
- Where do you purchase your cylinder and do you have a rent agreement for it?
- How many cylinders does your family consume per month?
- Did the recent price hike of LPG cylinder have an impact on you and how much do you generally pay for one cylinder?
- Can you tell us a little bit about drainage facilities in the area? Do you have problems and how frequent are they? Who repairs in cases of problems and who do you approach?
- Do the authorities respond when there is a problem?
- Where do you purchase vegetables/ fruits, milk and grocery? And who consumes what? (For example: Is milk consumed by everyone or only children?)
- What do you think of the quality of vegetables/ fruits that you buy from here?
- Where do you buy your meat/ eggs and who consumes (everyone?)?
- Do you purchase readymade food? If so, from where? Why? How often? And who consumes readymade food?
- Do you have a refrigerator and separate cooking area or a shred one?
- What about the sanitation collection in the neighbourhood? What are the practices that are followed and do you pay any charges for waste collection?
- What kind of sewerage facilities are available? Septic tanks/ Pipes? Any problems such as cleaning/ blockage etc? Who attends these problems and who do you approach and how is the response? Are there any health problems that are reported?
- Procedures followed to access electricity, water and gas connections? What documents are required and how does the process take place?

KPI with retailers

- What type of business do you run?

- What is the materiality of the shop [OBSERVATION] - kuccha/ pucca/ vendor cart
- Do you live in this area? If yes, for how long have you been in this area?
- How long have you been operating your business here?
- How did you set up this business? Who helped you?
- Was there a specific reason to set up the shop in this area?
- Do you have any license for this business? If yes, what was the process to get this license?
- Do you own or rent this shop?
- What are some of your primary infrastructure requirements? How do you access the infrastructure?
- Do you have any arrangements with your landlord for infrastructure accessibility?
- What is the procedure for getting a connection? What kind of documents do you need for a connection (for water/cooking fuel/electricity/sewerage/waste collection)?
- How has infrastructure changed over time? What sort of infrastructure arrangement did you have before?
- Who do you reach out to resolve infrastructure related problems?
- What are some of the alternatives that you use ?
- What alternative arrangements do you have with other actors outside the state to manage infrastructure needs in the absence of an official connection?
- What kind of raw materials do you need and where do you source them? How do you place an order? How does it get delivered?
- Who are your primary customers and where are they located?
- Can you explain to us the supply chain of your business?

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KPIs: Risk and Resilience

- Does this area experience waterlogging?
- How often does waterlogging occur?
- How was your livelihood affected by the pandemic and consequent lockdown?
- During the pandemic did you receive ration?
- Were your savings affected due to the pandemic?
- How did you cope with challenges induced due to the pandemic? (Prompt: coping strategies for monetary loss)
- Do you face any health related issues because of infrastructure- water/ sewerage/ open drains/ solid waste, etc.