COLOMBO URBAN LAB

TOOLS AND FRAMEWORKS

Methodology for Mapping Urban Food Environments

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1. Introduction

Fruit and Vegetables for Sustainable Healthy Diets (FRESH) is a CGIAR[1] multi-partner research initiative. The aim of this initiative is to improve diet quality, nutrition and health while also improving livelihoods, empowering women and youth and mitigating negative environmental impacts.

The Institute of Development Studies and Colombo Urban Lab led part of FRESH in Sri Lanka and sought to understand how working class communities in two areas of the capital city of Colombo experience their food environment.

The study took an integrated approach of mapping food vendors, conducting semi-structured interviews with households and vendors across the two sites, stakeholder consultations, and participatory photography workshops using the photovoice methodology.

This document provides a comprehensive overview of the methodology used to conduct the vendor mapping in two urban sites and describes how and why this methodology was developed. It also offers insights into the practicalities of implementing field-based vendor mapping, including limitations and lessons learned from fieldwork.

There is a dearth of studies on food environments in lower and middle income countries (LMIC), particularly in South Asia, and methodologies emerging from Global North contexts are often ill-suited to such contexts where there is little digitised data and the retail environment is primarily informal.

The aim of this document is to provide a starting point for other projects seeking ways to understand and study food environments in the cities of the Global South.

2. Mapping Food Environments

Most rapid urbanisation is taking place in the cities of the Global South. The adoption of urban lifestyles has implications for health and nutrition, and urbanisation has been associated with changes in diet and time allocation that have led to an increase in non-communicable diseases (NCDs) and obesity (Mendez and Popkin, 2004).

Food environment refers to the physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food [2]. Specific features of the food environment include food availability – types of food physically available within a community, food accessibility – the ease of accessing available food when required, food affordability - pricing of food items relative to available financial resources, food accommodation - efficiency by which food sources adapt to individual and community needs, and food acceptability - personal views and opinions on food products available in their environment (Muzenda et al., 2022).

[1] CGIAR is a global research partnership for a food-secure future dedicated to transforming food, land, and water systems in a climate crisis

[2] Definition as per High Level Panel of Experts (HLPE) of Food and Agriculture Organization

Geographical methods such as global positioning systems (GPS) and geographical information systems (GIS) are commonly used to measure availability and accessibility of food. A systematic review of food and physical environments notes mapping can be used to understand the exposure of individuals and households to obesogenic environments, particularly when integrated with mixed-methods survey data on food consumption (Muzenda et al., 2022).

2.1 FRESH Vendor Mapping

The vendor mapping was one part of a mixed methods approach to better understand how working class urban communities access fresh fruit and vegetables. Sequencing of different parts of the study was essential. Semi-structured interviews with households were first conducted to understand the food environment as respondents perceived it. The mapping of vendors was vital to capturing all aspects of the food environment and informed the sample frame for semi-structured interviews with vendors selling fresh fruit and vegetables.

In-person field audits using GPS or community aerial imaging have been put forward as alternatives for mapping dynamic LMIC urban environments, particularly because some features of lived food environments might be unknown and overlooked by researchers, such as home-cooked meals prepared for resale, mobile vendors, alleys that provide shortcuts for pedestrians (Muzenda et al., 2022). As such, we decided to conduct our mapping through in-person field audits of the two sites that respondents resided in.

The vendor mapping was extended to all food types in a given neighbourhood, to get a holistic understanding of the food environment beyond fresh fruit and vegetables. The mapping was conducted in two sites (A and B). Each site consisted of a watte (neighbourhood) and a high-rise complex for working class families relocated under the Urban Regeneration Programme [3].

2.2 Units of Analysis

The unit of analysis for the vendor mapping was the immediate neighbourhood of the respondents in the two sites. We defined the boundaries of the watte as they were understood by respondents [4]. A buffer of 75 metres was added from the digitised polygons of the watte and high-rise complex, forming the study area in each site.

A majority of respondents reported that they purchased food from within the neighbourhood. By analysing the immediate neighbourhoods we were able to get a sense of what options and resources were available to individuals. The chosen buffer is also much smaller than those used in other studies. For example, Muzenda et al., note that buffers are anywhere between 400m-1.6km, and a study of restaurants in New Delhi uses a buffer of 1 km (Patel et al., 2018). The smaller buffer reflects the fact that Colombo is a much smaller city, but it was also chosen because it accurately represented the food environment of the respondents.

Limitations of this approach are that lived experiences may be excluded from the mapping (Muzenda et al., 2022), as it does not reflect individuals purchasing food outside the workplace or travelling to a distant market.

[3] See UDA website for more information : https://www.uda.gov.lk/urban-regeneration-programme.html

[4] Some studies geocode respondents' household location and use this to create a polygon for the survey. This may be useful in contexts where there is no predefined or agreed boundary of neighbourhood. See Patel et al., 2018

2.3 Survey Design

The research team conducted scoping visits to each of the sites. During these visits we took photos of vendors to represent different typologies. In addition, we made a note of what fresh produce was available. We also used this as an opportunity to get a sense of the time it would take to cover a transect to plan the logistics of the survey.

The research team then held discussions to determine what data would be collected and how different fields would be categorised. This was particularly important for collecting information on typology. These discussions revealed how much subjectivity influences our perception of the built environment and also how diverse and varied the physical arrangements of vendors are. It was crucial that all members of the research team, including enumerators, were present at these discussions so that they understood the logic and empiricism behind the typology classification. Replication of this study may be harder if enumerators are given a typology they do not understand or feel is relevant.

As this was to be a comprehensive mapping of vendors we sought to limit the number of attributes. As we did not plan on interviewing vendors, the data collected was also based on observable characteristics. We also added more values for certain attributes such as goods sold in order to have more granularity with limited questions.
The following attributes were selected:
1.Gender
2.Typology
3.Goods sold
4.Variety of fruit/veg

In addition there were fields for additional notes, timestamps and photos. The project was prepared on QGIS and data collection occurred on smart phones using the QField app. This enabled data to be instantly uploaded into the project.

Enumerators were divided into teams of two, with one person entering data. The boundaries of the site were demarcated and divided into zones for each team to map, with easily identifiable landmarks such as trees/statues/roads, to prevent double counting by teams.

Mapping was conducted on multiple days in the morning at around 8.30-10.00am and again between 3.00-5.00pm

2.4 Description of attributes

A. Gender : Gender was recorded in order to ascertain whether men and women were limited to different typologies and goods and whether the spatial distribution of vendors was gendered. We also hoped this would help inform the sample frame and the extent to which we factored gender balance in the selection of vendors for interviews. In some instances it was not possible to record the gender of the vendor - for example where a vendor had vacated the stall temporarily or when there were multiple vendors in one stall or business.

B. Variety of fruit/vegetables: If a shop had fresh produce we ranked its diversity as per four intervals: 0-5 varieties, 5-10, 10-15 and over 15 varieties. This helped reflect diversity of produce sold and proved to not be too onerous for enumerators in the field.

C. Goods Sold: Annotating data points for greater detail: These categories were based on observations made in the field and reflect the food landscape in the sites. In many cases it proved important to add notes for broader categories such as snacks, particularly when we wanted to highlight a connection to fresh produce such as fruit pickles or fruit juices, challenging the implication that all snacks are unhealthy.

Subcategories for granularity for fruit and vegetables: We made detailed subcategories for fruit and vegetables to understand the different configurations in which fresh produce was sold. For example vegetable mix captured vendors selling vegetables along with a non-fresh produce category such as groceries. We also wanted more granular information on leafy green vegetables which are often sold separately.

Hence this was included as a separate category.

Category of goods sold	**Examples**
Cooked food	Rice and curry, string hoppers, thosai, pittu, rotti,
Snacks	Fried snacks, sweets and chocolates, peanuts, vadai, short eats such as samosas, patties, rolls, pickles, fruit juice, boiled chickpeas
Bakery	Bread, buns, sandwiches, baked goods
Groceries	Rice, dhal, pulses, onions, potatoes, non-perishables such as biscuits, milk powder
Fish	Fresh fish, dried fish
Meat	Meat
Veg only	Only vegetables are available. No leafy greens.
Fruit only	Only fruit available

Category of goods sold	Examples
Fruit and veg mix	Both fruit and vegetables are available
LGV	Only leafy greens available eg. water spinach, gotukola (Asiatic Pennywort), spinach, mukunuwenna (Sessile joyweed)
Veg LGV	Both vegetables and leafy greens are available.
Veg mix	Vegetables are sold alongside other goods. Eg. a grocery shop with vegetables
Fruit mix	Fruits are sold alongside other goods eg. a grocery shop with fruit, coconut oil and king coconut
Condiments	Onions, potatoes, chillies, spices, oil, coconut, tomatoes and lime

This led to some interesting observations eg. leafy greens are frequently sold by women in more temporary typologies such as ground/stands.

Reflecting local diets and understandings of fresh produce: We have made our own subjective assessment of what constitutes a fruit or vegetable as informed by respondents views and cooking practices. Condiments became an important category that included cooking oil and spices, but also onions, garlic, potatoes, tomatoes, chillies and limes. While these are fruits and vegetables in their own right and contribute to diet diversity and nutrition, they are primarily seen as aromatics and condiments for food. This was again to ensure that there was not a false idea of what was available. Similarly, coconuts are classified as condiments because that is how they are used, while king coconut - which is consumed as a drink, was classified as a fruit. These are based on subjective judgements and help contextualise the mapping exercise.

D. Typology: Typology was mapped to get an understanding of the physical structures or arrangements of the vendors. As with many urban contexts in the global South, the food environment is characterised by diverse informal vending practices. The typology was an attempt to better understand these practices. We created a typology based on pilot visits but also it was informed by prior knowledge of the field. For example, we were aware that livelihoods were commonly conducted from inside people's homes and wanted the survey to account for that. Even if capturing typology results in some generalisations and flattening of difference, these categories can still be useful depending on the research objectives. For instance we were interested in infrastructure provisioning and how that determines accessibility of fresh produce. Moreover, typology often determines state engagement with vendors, and thus policy recommendations can be better tailored and targeted if typology is studied.

This typology draws inspiration from a study of food environments in Tanzania (Ambikapathi et al., 2021) which defined vendors by (1) physical infrastructure, and (2) consistent daily location. Our typology is informed by 1) permanency - does the structure change or move overnight, 2) physical infrastructure and protection - what level of protection is available to the vendor and can the stall be closed or locked up at night.

Values for Typology

1. Permanent Shop

This refers to a permanent immobile structure that can be locked/closed at night. These shops are often built with brick/concrete and have iron sheets or tiled roofs. Even when shops are dilapidated or in a state of disrepair, they are still considered permanent shops

2. Home-business

This refers to a vendor that is conducting business from within their domestic residence. These are important features of the food environment and complicate the neat divide between retailer and consumer. Differentiating between a permanent shop and a home-business was difficult. We used indicators such as the presence of signboards advertising food outside a house or other visual evidence that a shop was also part of a residence.

3. Market Stalls

This refers to stalls inside a public market under the Colombo Municipal Council. As these are all of one typology it makes sense to place them together. The market outside the high-rise apartments along the road has a diversity of stall arrangements and as such does not come under the typology of market stall even though it is a “market” as understood by residents.

4. Stand

This is the category that has the greatest diversity of structures. It refers to any vendor selling goods on a raised counter, with or without roof in the form of an umbrella, tarp or wooden ceiling. The structure is immobile and does not move around throughout the day. The structure cannot be locked or closed at night. The structure does not have permanent walls. Even if it has a roof, the structure is also smaller than a permanent shop. The stall may or may not be dismantled at night, and some stands may require being dismantled with the vendor having to take the material back home or store it nearby. Such stands also then require an understanding that another vendor will not take their location. When conducting the mapping there may be instances of vendors selling and displaying produce outside their permanent shop for ease of visibility. It is important not to classify these as stands unless they are a different type of good and different vendor entirely

5. Selling from the ground

This describes situations where the vendor has little to no shelter and infrastructure and is selling produce from the ground. This could be selling produce on a gunny sack or wooden box while seated or standing on the ground. In some instances the vendor may have an umbrella but still be selling from the ground. Distinguishing between stand vendors and ground vendors may be difficult, especially when stand vendors have no shelter and ground vendors have some. The reason that an umbrella is considered also selling from the ground is because these vendors have no infrastructure and little protection, they cannot close their shop and there is no permanency at all, they are dismantled everyday. .

6. Carts

These refer to any mobile container that is pushed by the vendor. These may or may not have shelter or covering. Carts can be stationary or mobile and if a cart is being pushed it should be recorded at the place it was sighted (Ambikapathi et al., 2021). It is important that the enumerators do not double count carts that may be in different places at different times - and familiarisation with the field will prevent this from happening.

7. Other

This is a catch-all for any typologies that do not fit into the above categories. This is unavoidable as the field is constantly changing. Examples that we came across included stationary bread vans, vendors on bicycles and vendors selling fruit out of parked trucks. It is important to take descriptive notes on these data points

3. Other Challenges

Mapping of municipal market structure: One of the sites had a municipal market complex building. Because it was difficult to get exact points inside the building, we opted to draw out the stalls on paper in a rough schematic. These were then digitised onto Google maps imagery. While there might be some accuracy issues, what was prioritised was the rough location and order of stalls.

Temporality: It is hard to capture all the temporal variations of vendors, and some studies explicitly avoid collecting data on street food vendors because of their temporal variations (Patel et al., 2018). For example, women selling leafy greens early morning outside closed grocery shops left after the shops opened around 10.00am. We aimed to map the site at different times in the morning and evening to capture different types of vendors. We didn't record whether shops open in the morning were closed in the evening. We were also not able to record any information on the nighttime economies and food environments.

Capturing vegetable and fruit diversity is also subject to the time of day as quantities are constantly fluctuating as they are sold and vendors may stock up throughout the day.

Seasonality and long term time scales: The mapping could not account for fluctuating nature of goods sold due to seasonality eg. selling fruit alongside the main product because it is in season. Moreover, businesses may change their stock of produce and abandon items like vegetables if they are not profitable. We were able to see these changes because we interviewed vendors. Individuals from outside the neighbourhood set up on the pavement and sell seasonal surplus produce from their gardens and the extent to which these could be considered regular features of the food environment is questionable.

Rain had a huge impact on the mapping, particularly when mapping site B during October 2023. This reduced the number of vendors selling from the ground and stands, typologies more subject to the elements. Rain and clouds also affected the accuracy of GPS

Mapping shops inside high-rise complexes:
Our sites also included high-rises buildings and we mapped shops inside them. Due to time constraints we mapped shops we came across while conducting household interviews. We made a note of the floor they were on and whether it was from an apartment or not.

4. Lessons Learned

There are benefits to conducting the mapping exercise in a site that is familiar. Initial field visit and pilot survey are extremely important in determining attributes/fields that are relevant and contextualised. Photo surveys are also valuable.

- When determining the scale of a buffer when the neighbourhood is the scale of analysis, consider where the studied community sources food and what they consider to be the natural boundaries of the neighbourhood.

- Experiment with different mapping applications during the pilot. For example, Kobotoolbox is easy to use but the enumerator can only collect location data based on their current GPS location and coordinates cannot be adjusted after entry. Qfield requires a prior knowledge of QGIS and more effort in setting up the project for data collection. However, the enumerator can add data and place points in locations that aren't physically present, and can adjust coordinates on the base map after entry which increases accuracy. This was particularly useful in crowded markets where vendors are very close together, and also because the purpose of data collection is to understand spatial relationships of vendors - eg. a vendor selling vegetables outside the storefront of a bakery. Thus inaccurate coordinates can give the wrong impression of these spatial relationships

- Assessments of typology are subjective, and often exist on a spectrum rather than in neat categories.

- Limited attributes that can be observed easily enable the survey to be scaled up and conducted quickly.

- Conduct the mapping at different times of day and if possible different seasons.

- Consider how vendors view themselves and divide themselves up eg. a vendor society with tiered rates depending on type of shop. These can validate typologies or other categorisations.

- Consider how the data can be interpreted by those who don't have a contextual understanding of the place when they view the map.

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