Participatory mapping for transformation: multiple visual representation of foodscapes and environment in informal settlements in Nairobi

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Summary

Although branded as 'obstructionists' and major agents of 'disease and filth' by city authorities, food vendors remain the pivotal node in the local food system in most informal settlements; therefore, their interaction with the environment and infrastructure services, and challenges they face to keep the food safe to eat, requires further grounded exploration. Food vendors from informal settlements in Nairobi, Kenya, who are acting as mappers and change agents, are building multi-layered views of places through the deliberative process of knowledge coproduction by participatory sensing, which lead to opportunities and challenges to improve those places.

KEYWORDS: Volunteered Geographic Information, food vending, Nairobi, participatory mapping, participatory sensing

1. Background

The households of the urban poor often rely on the food resources that are generated within the informal sector typical of many African urban centres, including Nairobi, Kenya (Tacoli, 2013). Yet these seemingly small-scale but significant numbers of vendors are not considered the ideal fit to modernist and elitist centred nature of planning and management of many cities in the Global South. They are, thus, often considered by the local authorities as- the 'obstructionists' as their stalls increase congestion in the very limited public spaces of the settlements; - and major agents of 'disease and filth' for demonstrating inadequate food safety measures, including poor storage facilities, often contaminated from road dirt, nearby waste dumps and open sewers. These vendors often suffer removal or forced closure by city authorities during disease outbreaks which not only put their livelihoods at risks but also affect access to food for the poorest residents of low-income settlements, who tend to be most dependent on street vendors (Keck & Etzold, 2013; Tacoli et al, 2013). Despite all these adversities, food vendors continue to be the pivotal node in the local food in most informal settlements (Tacoli et al, 2013); therefore, their interaction with the environment and infrastructure services, and challenges they face to keep the food safe to eat, requires further grounded exploration. Hence, we engage with food vendors in a few informal settlements in Nairobi, recognising their role as a major entry point for increasing urban food security and safety. Since vendors can both affect, and be affected by urban spatial structure/form, land-use and how infrastructure and services are provided, a crucial first step is to understand the physical constraints in the space within which street vendors operate. Thus the local communities have started conversation with us to explore how food-scapes (i.e. all types of food they eat) is connected with places where they live, work and walk within the settlements. To put it in another way, *how participatory mapping as a process and product, involving local participants, can contribute to and- from situated knowledge co-production when positioned to explore the environment-human-*

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food nexus? This had opened up the need for multiple layers of data that are required for positioning 'multiple ways of knowing' the community food-scapes and their relation with the environment; on one hand, to capture the differential conditions within the settlements where people live, buy their food, and eat the food while walking ('snack foods') is very much part of their main meal as put by one of the participants-

> "The way we eat in informal settlements has changed over time; this is because we lack adequate cooking spaces in our shanties and more so we are prone to fire outbreaks. This is why we prefer ready cooked food."

-and on the other, to capture social construct and narratives around food-scapes that are unique to these informal settlements. The community realised that they need access to more innovative tools to be included to the existing repertoire of mapping and knowledge producing tools.

2.   Bridging citizen science and Participatory GIS: multi-layered visual representation practices

Use of GIS for data creation, analysis and dissemination of information has becoming ubiquitous across various disciplines because of its ability to bring more life to data by embedding it to a location/place/space, which also allow wider flexibility of visualisation in the policy making areas for multiple disciplines (Sieber, 2006). But since its journey in the 1980s , it primarily stayed as a tool for surveillance, control and authority – an expert power in the hands of a few advantaged- a very elitist and positivist tool and technique critiqued by many in the 1990s (Sieber, 2006; Cope and Elwood, 2009). To make the spatial platform more open to public, Public Participation GIS (PPGIS) evolved in the North primarily, which in the late-1990s transformed to give voice to marginalised communities in the Global South and evolved as Participatory GIS (PGIS) – a merger between participatory Learning and Action (PLA) and GIS, alternatively put 'community GIS/mapping' or 'GIS-in-practice' (Corbett et al, 2006).

Participatory GIS (PGIS) involves a collaborative process of using geospatial technologies in collecting and storing spatial data to have diverse perceptions and realities of space and place which includes collaborative collection of 'field data' that includes spatial data, and non-spatial qualitative data – e.g. community narratives representing local knowledge that is initiated and directed by the participants in the participatory development process of the Global South (Rambaldi, 2005, 2004, 2006). PGIS gave rise to a community of 'Grassroot GIS users'[2], promoting GIS and mapping practices that can situate and navigate the local initiative and knowledge for diverse reasons but for priorities important to the local community. Along with many other examples to PGIS and community mapping (e.g. Livengood & Kunte,2012;Corbett et al., 2006; Makau et al., 2012), the Federation of the Kenyan Urban Poor (Muungano wa Wanavijiji) has already engaged in PGIS tools for enumerating and mapping urban informal settlements in Kenya (Kerenja, 2010).

We are using PGIS for mapping the issues that the community identified are supported by local and external experts and analysts in a collaborative way for collecting and analysing the data. We also adopt innovative way of multiple representation of places (as illustrated in Fig 1 and described below) by bridging citizen science[3] tools (mobile apps and balloon mapping) with PGIS tools to create appropriate community data and knowledge platform that ensemble all partial and situated knowledge through 'multi-layered way of knowing' in inclusive and empowering manner. Such –'representational flexibility inherent in existing forms of the technology, creatively mixing and shifting representations, epistemologies, and signification strategies'(Elwood, 2009, p60).

Cognitive ability of the community participants are used whenever possible to harness and situate local knowledge. For instance, community view on issues on food-scapes and environment are captured

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[2] Refers to the kinds of individuals and organisations that tend to be involved in PGIS initiatives: smaller NGOS, activist groups, community organisations' (Elwood, 2009, p.59).

[3] ---' scientific activities in which non-professional scientists voluntarily participate in data collection, analysis and dissemination of a scientific project' (Cohn 2008; Silvertown 2009 in Haklay, 2013)

through narratives but cognitive mapping tools using satellite images and paper maps are gleaning local spatial knowledge from the community and helping them to identify locations that require mapping (on food and environment) on the ground. At this stage, the community is also using 'participatory sensing' techniques (Haklay 2013) that are now readily available in smartphones; The GPS and camera abilities are used of the mobile location-aware devices for mapping food vending types, in addition to general demographics of the vendors (age, sex), locations and food safety measures observed to have a rapid scan of food consumption sites in public spaces within the settlements as this is the predominant mode of consumption within such settlements in Nairobi, previously identified by Tacoli et al. 2013 and later confirmed by this study in community discussions. They are also using external sensors like balloon mapping tools (for more information on the technique, see publiclab.org) for generating cheaper DIY high resolution community aerial photos that provide different and unique bird-eye visual representations of the community, particularly having scalar view of environmental hazards (open sewerage lines, dumping sites, and so one), and also helps to update local base mapping and enumeration activities. Cognitive ability of the community participants are also being used to stich the images to have settlement-wide images (Figure 1) and also to have a purview of scale of environmental problem they are facing.
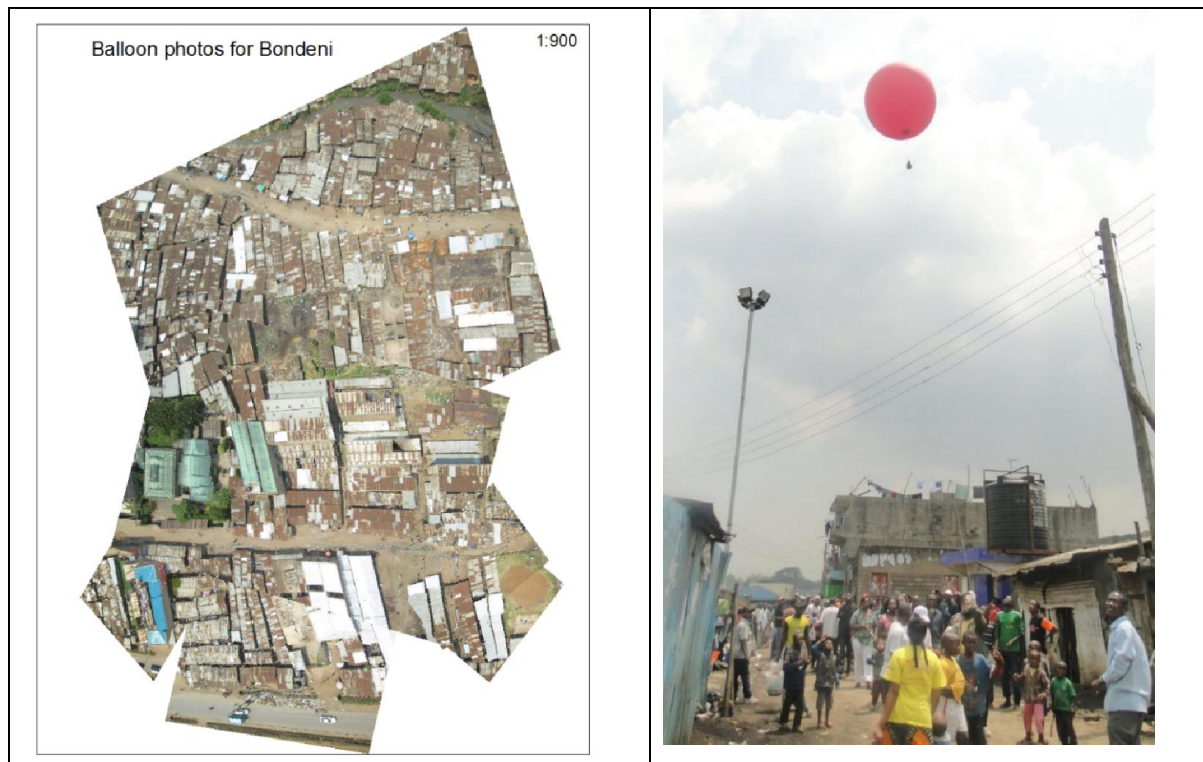
Figure 1 visual representation of the same village captured through balloon mapping

We argue that the raison d'être behind such multi-representations are helping the community to frame and reframe the community narratives to situate to 'representational practices' (as coined by Elwood, 2009, p61) that are navigating and shifting to new priorities while also challenging existing meaning and identities embedded in those spaces. For example, the Federation has developed local base maps (as Mathare Zonal Plan[4]) highlighting inadequate infrastructure provision and thus showcasing and advocating the need for resource allocation with explicit pointers to areas that require more attention within this settlements; As food came to the fore of their agenda, the representation spaces and practices started to take shape around it which actually culminated in the study that this paper is referring to – food-environment-human interface (fig 2).
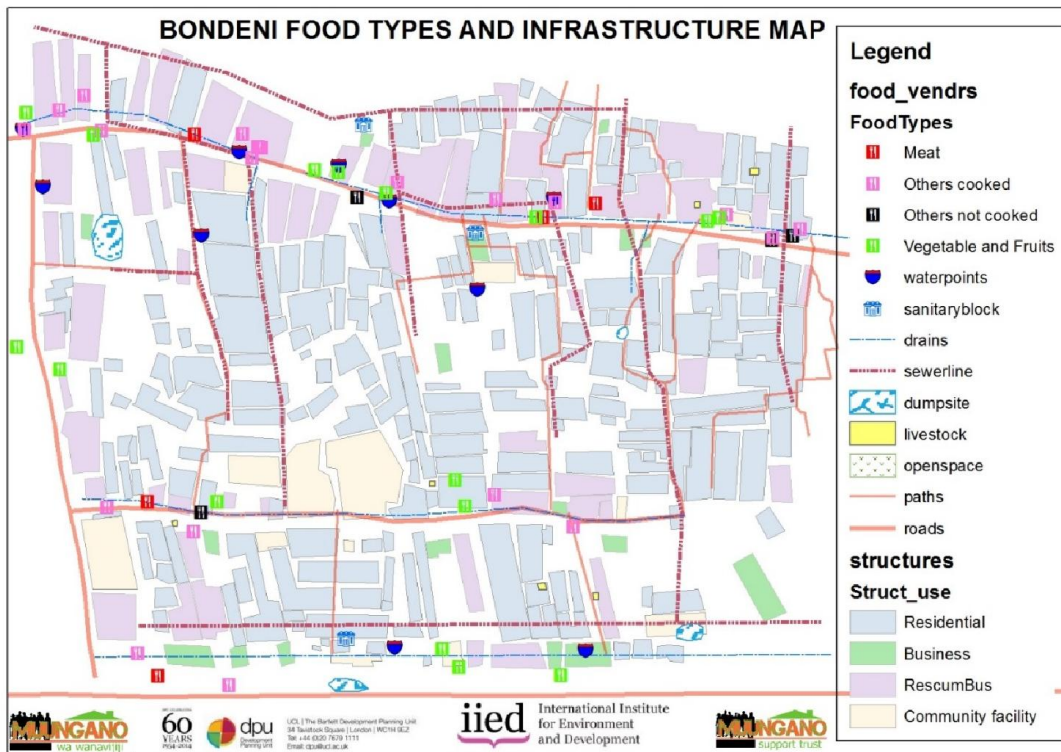
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[4] http://www.mustkenya.or.ke/index.php/settlement-zonal-plans/mathare-zonal-plan

Figure 2 Food-environment-human interface for the village, Bondeni in Mathere
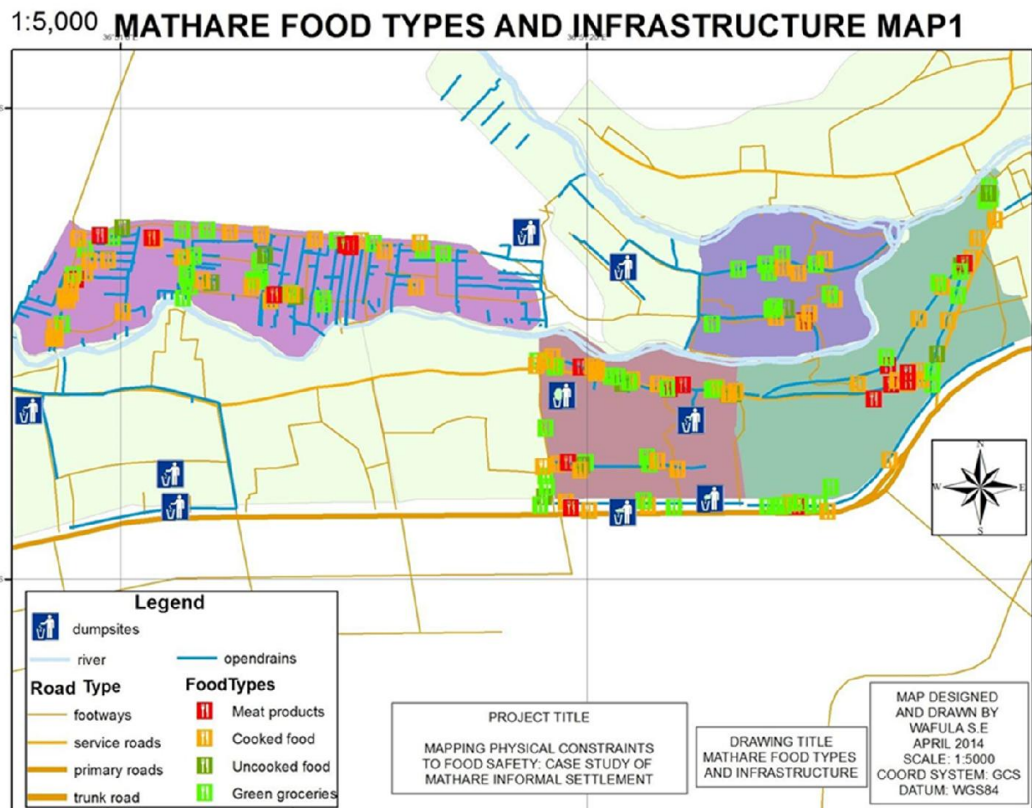

Figure 3: Illustration of how food and infrastructure are interacting

We also argue that such fixed production of places through maps are 'travelling' as their causes are

changing .Using 'expert power'[5] of GIS with other powerful visual representations like those from the ground and from the air linked to maps can only make the claim firmer.

3. Conclusion: knowledge that leads to action

Bridging Participatory GIS with citizen science tools such as food mapping with mobile apps and capturing high resolution community top-view with Balloon mapping with conventional GIS functionalities is allowing the community to have a deeper contextualisation than simple digital cartography cannot afford, and is also acting as a knowledge building tool, platform that empowers community. Using the narratives coming from community discussions are being translated into planning for immediate and future location-specific and settlement-wide interventions- e.g. settlement-wide awareness building by showcasing these multiple forms of visual representations ; with such multi-layers synoptic geographic overviews of settlements, communities/neighbourhoods are identifying hazardous areas in relation to food spaces and infrastructure provisions (road networks, water and sanitation provisions etc.) e.g. inadequate solid waste collection fosters food contamination(fig. 3), which is allowing the community to prioritise areas for clean-up and putting their priorities forward to local authorities. There are signs that this study is gathering quite a momentum as the community managed to get in touch with the Nairobi County Government with the preliminary findings which helped them to initiate Public-Private (PP) based solid waste collection effort as well as opportunity to consult the findings in a Parliamentary Committee. In other settlements in Nairobi, the communities are also forming food vendors association (FVA) like the one in Mathere which can make a big difference and can help in making the impact of the project sustained for longer.

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[5] As other actors, particularly public and local government actors, usually treat 'GIS-based data and maps as accurate representation of local conditions', and take it more seriously as 'expert or legitimate portrayal on the ground'(Elwood, 2009, p.70).

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5. Acknowledgements

6. Biography

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