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Gathering data on food environments and food practices through photo elicitation in Copenhagen, Denmark: Implications for adapting the EAT-LANCET reference diet to local circumstances

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ABSTRACT

Unhealthy diets are the leading cause of mortality and morbidity globally. Simultaneously, the factors that influence diet-related ill-health also drive climate change. Acknowledging the link between health and environmental sustainability, in 2019 the EAT-Lancet Commission outlined a diet beneficial for both humans and the planet. There has since been a drive to adapt this diet for a range of settings. Thus, the *Shifting Urban Diets project* was initiated to support the City of Copenhagen's move towards a planetary diet. Food environments are key to shaping dietary practices. To provide evidence on how Copenhagen residents experienced their food environments, one component of this project explored, through photo-elicitation, how residents from one neighbourhood navigated and engaged with their food environment. Ten participants attended participatory photo-elicitation workshops over three weeks in November to December 2019, photographing their food environment and discussing the implications for human and planetary health. Data from the workshops (photos, notes and captions) were analysed thematically. Participants demonstrated the myriad factors that shape food environment engagement. Beyond cost and the built environment, participants chose food outlets that allowed for socialising, that were convenient enough to make time for other activities, and that aligned with values and understandings about the role of food. Participants also naturally drew links between practices that were healthy and practices that were sustainable when considering how they would like the food environment to change. When food priorities and values align with material factors, people are more likely to purchase healthy, sustainable foods.

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Introduction

Unhealthy diets are the leading cause of mortality and morbidity globally (Mannar and Micha 2014, Abbafati *et al.* 2020) with both over- and under-nutrition linked to a range of non-communicable diseases (Swinburn *et al.* 2019). Simultaneously, the same factors that contribute to diet-related ill-health are also key drivers of climate change (Swinburn *et al.* 2019). Indeed, global food systems account for 21–37% of total global greenhouse emissions (IPCC 2015) and negatively impact freshwater resources, biodiversity, and natural ecosystems, among others (Rockström *et al.* 2020). It is clear that human interactions with the food system as well as our diets must change if we are to feed an ever increasing global population in a way that is good for both people and planet.

Working on the understanding that 'diets inextricably link human health and environmental sustainability' (Willett *et al.* 2019), the EAT-Lancet Commission on healthy diets from sustainable food systems produced a report – *Food in the Anthropocene* – in early 2019. The report sets out a global reference diet that it suggests would allow the global population to eat in ways that are

beneficial for human and planetary health (Willett *et al.* 2019). The resulting reference diet is one that is rich in legumes, nuts and whole grains, contains modest amounts of fish and poultry, and limited amounts of red meat, refined grains, added sugars and ultra-processed foods (Willett *et al.* 2019). Since the publication of the EAT-Lancet reference diet there has been interest amongst the research community in exploring how the diet might be adapted for particular cultures, contexts, incomes, and geographical settings (Jones *et al.* 2019, Wood *et al.* 2019, Lassen *et al.* 2020). This is based on the understanding that people are more likely to consume the diet if it fits in with prevailing food norms. This includes Copenhagen, which committed in 2019 to moving towards a 'Planetary Health Diet' as a part of the Good Food Cities Declaration (C40 2019).

There is a long history of research and investment in public sector food environments in Copenhagen and the sustainability of those environments, with the city considered a leader in the public procurement of certified organic food served in schools, day-care centres, nursing homes, social care services and leisure facilities (*Copenhagen's Organic Food Revolution, 2016*;

Halloran *et al.* 2018). In this vein, City of Copenhagen (2019) food strategy focuses on the quality of the 70,000 meals per day served in schools, workplaces, and other public facilities (City of Copenhagen 2019). Additionally, efforts have been made to influence the private sector through voluntary plans to increase the sale of organic and sustainable products (Ministry of Food Agriculture and Fisheries of Denmark 2015, The Danish Environmental Protection Agency n.d.). However, there is limited knowledge of how people navigate and engage with private sector food environments (e.g. shops and restaurants) in Copenhagen and how these environments shape their diets. Understanding how residents navigate and engage with these private sector environments, together with the individual, social, and structural contexts in which they do so, is critical to ensuring that healthy and sustainable diets are affordable, accessible, and appealing for all.

The Shifting Urban Diets project was initiated in 2019 to assist Copenhagen in moving towards a planetary diet in both public and private sector food environments. This is a three-year multi-method project funded by EIT Climate-KIC (*Climate-KIC | The EU's Main Climate Innovation Initiative*, n.d.) and involving academics, architects, and civil society organisations, that aimed to develop evidence, interventions, and strategies to implement the findings of the EAT-Lancet report at the local level in Copenhagen, Denmark (*Shifting Urban Diets – EAT Initiatives*, 2019). Two neighbourhoods in Copenhagen, Vesterbro and Nørrebro, were incorporated into the project as case study sites.

One component of the Shifting Urban Diets Project aimed to explore, through a qualitative photo-elicitation project, the experiences of residents from one of these Copenhagen neighbourhoods (Vesterbro, a young, economically and ethnically diverse neighbourhood). The purpose of this was to provide evidence for the wider project on how Copenhagen residents navigated and engaged with their food environments (i.e. how they made decisions about where to acquire food and how their engagement with their food environment and associated spaces shaped these decisions). This data could then be used to inform place based interventions that were trying to shift people towards a planetary diet.

The photo-elicitation component sought to explore what the situation looked like for residents now, and what was needed to facilitate positive change, and draw out the implications for transforming diets. The project took as a starting point the participants' perspectives on what healthy foods meant to them rather than the researchers prior understandings of nutrition and sustainability. It focused on three related research questions:

- (1) How do residents of Vesterbro, Copenhagen navigate and engage with their local food environment?
- (2) How does the local food environment influence Vesterbro residents' and their families' food purchasing and consumption?
- (3) What would allow Vesterbro residents to obtain the food they need to consume a nutritious diet?

Over three weeks in November-December 2019 (prior to the start of the COVID-19 pandemic), 10 Vesterbro residents took photos of their food practices and food environments, and came together in three discussion groups to 1) critically consider the role of the food environment in shaping their and their families' consumption practices, 2) determine what the strengths and weaknesses are of the food environment, and 3) propose areas for change.

The role of the food environment

Understanding the role that food environments, the sites where people acquire foods, play in shaping diets has been a central concern of public health policy and practice over the past two decades (Swinburn *et al.* 2013). Linking particular elements of the food environment to people's diets has proved challenging, with many studies offering contradictory evidence (Cummins *et al.* 2003, Janssen *et al.* 2018, Widener 2018, Hobbs *et al.* 2019). Qualitative research has demonstrated, however, how various facets of people's food environments shape what food people buy and ultimately consume (Pitt *et al.* 2017). These facets include the cost of foods (Zenk *et al.* 2011, Zachary *et al.* 2013, MacNell 2018), the availability of different types of foods in different stores (Bridle-Fitzpatrick 2015), the ease of getting to those stores (Kumar *et al.* 2011, Evans *et al.* 2015), the location of food outlets in relation to people's homes, schools, and workplaces (Burgoiné *et al.* 2014, 2018), and the influence of the information environment (e.g. marketing) on what people purchase (Boyland *et al.* 2016, Russell *et al.* 2019). In addition to the physical features of food environments, equally, if not more important is the relationship that people have to those environments and the foods sold in them (Cannuscio *et al.* 2014, Fielding-Singh 2017, Liese *et al.* 2017, Thompson *et al.* 2018). In a study on perceptions of the food environment in Madrid, for example, Díez *et al.* highlighted the importance of the relationships that residents built up with particular market vendors, influencing them to continue shopping at markets rather than at the newer full-service supermarkets (Díez *et al.* 2017).

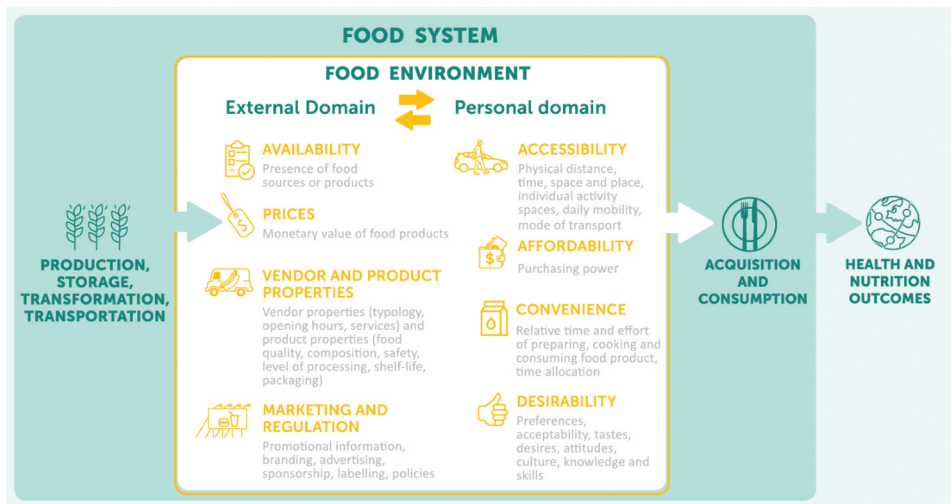


Figure 1. Food system/food environment conceptual framework (Turner et al.).

Considering all of the diverse elements of food environments, we draw on a definition of the food environment developed by Turner *et al.* (2018), which allows us to focus not just on the physical, or ‘external’ aspects of the environment (e.g. shops and shopping routes), but also on what shapes each person’s environment and their experience of it (e.g. whether the food in them is desirable and/or culturally appropriate), or those ‘personal’ aspects (see Figure 1). Increasingly, physical food environments also include online environments which has expanded where people are able to access food from (World Health Organization European Office (WHO) 2021). Turner et al’s definition offers a means of

understanding food environments as not just as a physical entity, but as ‘the interface that mediates people’s food acquisition and consumption within the wider food system’ (Turner *et al.* 2018).

The (food) environment in Vesterbro, Copenhagen

The neighbourhood of Vesterbro in Copenhagen is 8.22 km² and houses approximately 72,688 residents, around 11% of the city’s population (Figure 2) (Københavns Kommune 2019a). It is a young

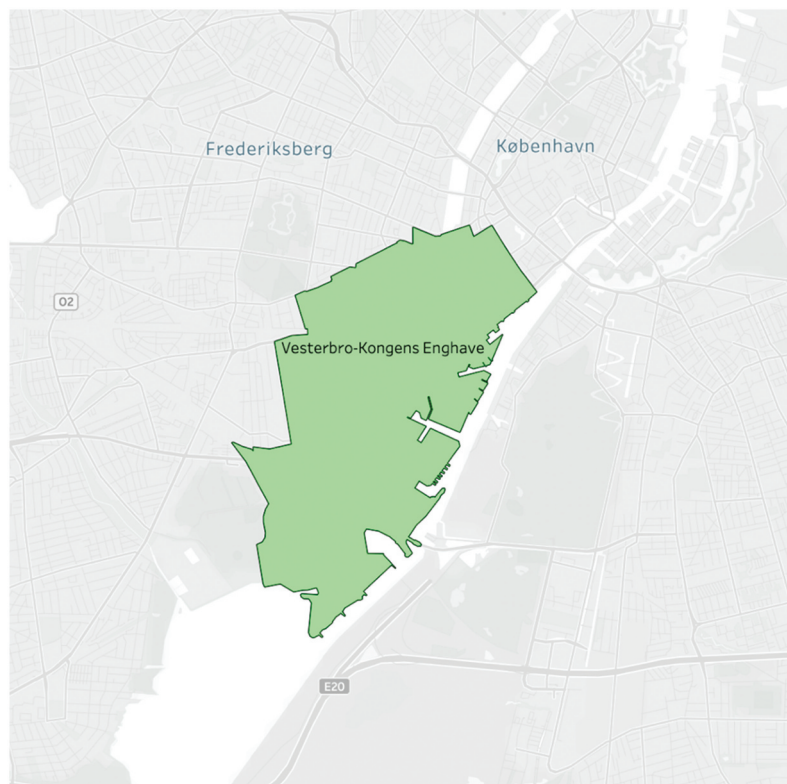


Figure 2. Boundary of the Vesterbro-Kongens Enghave neighbourhood as defined by Copenhagen municipality (Københavns Kommune 2020).

neighbourhood, with almost half of the population in their 20's or 30's and approximately 25% with origins other than Denmark (Københavns Kommune 2019b). Vesterbro is economically as well as ethnically diverse. While it was once characterised by significant deprivation, its demographic profile has changed somewhat since the late 1980s when it became the site of a number of revitalisation projects which aimed to increase Vesterbro's public and green spaces, while preserving its historic buildings. An increase in wealthy residents has facilitated high rent sprawl and increased residential density, in particular, near the central train station (Bancroft and Houborg 2020). In 2019, unemployment rate in Vesterbro was 4.1%, compared with 4.3% in Vesterbro as a whole. 36% of the population is educated to undergraduate, graduate or post-graduate level, compared with 33% in Copenhagen as a whole (Københavns Kommune 2019a).

Alongside its changing demographic profile, 'New Nordic'¹ food culture has flourished in Vesterbro by way of new restaurants, boutiques, specialty cafes and bakeries (Mathieson 2014, Leer 2016). These sit alongside homeless shelters and safe drug consumption facilities (Bancroft and Houborg 2020). Central to Vesterbro's gentrification is the culturally protected meatpacking district. Many of the butchers and meat processing shops were turned into to night clubs, bars and restaurants (Strömberg 2018).

In May 2020, an analysis of the central business registry database shows that Vesterbro had over 525 restaurants, cafes, bakeries, fast food spots and street food carts. Of those, 430 were restaurants that offer an in-house dining experience, 83 were registered as pizzerias, grills, take away street food, and the remainder were cafes and bakeries. Vesterbro also had nine large chain supermarkets, several independent² shops such as fishmongers, butchers, and speciality food stores and 50 corner shops, with many offering fresh produce and extended hours (Virk 2020). Finally, Vesterbro hosts a number of stores which sell highly discounted produce that is about to, or has just gone off, and would otherwise be thrown away. Residents of Vesterbro, along with the rest of Copenhagen also have access to a variety of online options offering delivery of both groceries and meal kits.

Methods

In this photo-elicitation study, a group of 10 participants took photos of their food practices and food environments over three weeks and came together in three discussion groups to 1) critically consider the role of the food environment in shaping their and

their families' consumption practices, 2) determine what the strengths and weaknesses of the food environment are, and 3) propose areas for change that were grounded in their lived experiences. The participants chose which photos they would like to display in an end of project exhibition and assigned captions to them. While we were mindful of the implications of the project findings for the Eat-Lancet reference diet, we did not focus on the diet itself during these sessions as we wished to foreground the participants' priorities.

Photo-elicitation is a broad term for a range of participatory, photo-based methods where the participant takes photos related to a specific topic over a set period of time. The photos and their meanings are subsequently discussed with the researcher in a semi-structured/facilitated manner (Harper 2002). Since participants can photograph what they wish, when they wish, the participant, rather than the researcher, can control the research narrative to a larger extent than usual (Bignante 2010). Additionally, photo-elicitation can capture aspects of lived experience that may be harder to access through more traditional qualitative methods (Wall-Bassett *et al.* 2014, Snyder and Kane 2016). Photographic methods have been used to document a wide range of food environments, including in Madrid (Díez *et al.* 2017), South Africa (Spires *et al.* 2020), Ethiopia (Trübswasser *et al.* 2020), and the U.S.A (Colón-Ramos *et al.* 2018).

In the present study, researchers directed the initial topic (food environment navigation and engagement). However, in its design and structure, the project drew on aspects of one particular form of photo-elicitation: participant-led Photovoice (Wang and Burris 1997). Photovoice is a method that facilitates participants to document and represent their community through photography in order to effect change. In a traditional Photovoice project, a group of participants meet up over a series of weeks to share photos related to a particular issue and discuss its impact on their lives, with the project culminating in an exhibition of their work (Wang and Burris 1997).

In the present study, Photovoice elements were that the photo-elicitation was incorporated into a series of focus group discussions (hereafter referred to as photo-elicitation workshops), where participants could reflect both over a period of time and with others who resided in the same environments as them. Participants were also left to define what healthy, good food looked like to them. Additionally, a selection of photos and accompanying captions, chosen by the participants, was displayed in an exhibition attended by various Copenhagen stakeholders. Ethical approval for the research was sought and obtained through the [*ethics committee name redacted*].

Although participants are pseudonymised here, they were given the option to display their names at the exhibition. All participants chose to do this.

Sample

A Copenhagen-based recruitment company recruited a purposive sample of 12 participants to take part in three 1.5-hour photo-elicitation workshops. A recruitment company was used because the main researchers (AI and MS) were not resident in Copenhagen and because the project was being conducted within a very short timeline of four weeks. Participants were included if they were over the age of 18, primary food shoppers, resident in or on the borders of Vesterbro, and completed most of their shopping in Vesterbro (when not online). Two did not manage to attend all three sessions due to ill health. Recruitment was initially carried out by a recruitment agency. The agency retains details of individuals who have agreed to take part in research projects and contacted those who fit the researchers' inclusion criteria with information about the project. Once the potential participants arrived at the first workshop, the agency ceased involvement. The researchers then managed the consent process and all subsequent research. Written informed consent was obtained by all participants to conduct and record the workshops, to publish the findings of the research, and to display the photos in an exhibition. Workshops were held in an office building located on the main street running through Vesterbro. In line with the inclusion criteria, all the participants lived in or directly adjacent to Vesterbro and were the primary food shoppers in their respective households. Given the size of the sample participants were not intended to be representative of the demographics of Vesterbro or Copenhagen as a whole. They were also not recruited due to a prior interest in food. Participants differed in socioeconomic status and family set up (see [Table 1](#) for additional demographic details). Participants were provided with a 500DKK (67 EUR) incentive in the form of a voucher and a professional photo portrait. Vesterbro was chosen as it was one of

the two neighbourhoods that were case studies of the larger Shifting Urban Diets study. All names used are pseudonyms. While 10 is a small sample, repeated engagement with each of the participants ensured there was significant depth to our findings.

Research process

A series of three 90-minute photo-elicitation workshops were convened over three weeks between mid-November and early December 2019. All 10 participants listed in the table above attended these. This was followed by an exhibition of the resulting photographs in mid-December (see [Figure 3](#) for a depiction of the research process). The workshops were conducted in Danish and facilitated by AH. TS, a bilingual research assistant, took live notes to record the discussion in English during each workshop. The sessions were also recorded so that TS could fill in any gaps after the session. These notes, together with the photos, form the basis of the analysis. Each workshop was also observed by either AI or MS.

The first workshop started with a training session by a professional photographer, an introduction to the principles of the project, and the establishment of informed consent to participate. Participants were then introduced to the concept of food environments and provided with a definition adapted from Turner et al. (see [Figure 4](#)). Participants all shared their own initial observations about buying and eating food in Vesterbro. At the end of the workshop, a specific photography task was set by the facilitator. The task was for each participant to take five photos of aspects of their local food environment that make it easier to purchase and consume healthy food (as defined by the participants) and five photos of aspects that make it difficult. We did not ask participants to define healthy foods in the group, as we wanted each participant to interpret this themselves. Rather, we anticipated that perceptions of healthy foods would be reflected in the photographs. When taking the photos, participants were asked to consider a series of questions adapted from the SHOWeD methodology. This is a method of photographic analysis designed to facilitate participatory analysis by encouraging the participants to answer a set of questions about each photo they take (Wallerstein and Bernstein 1988, Wang and Burris 1997). Participants were offered the choice of borrowing a digital camera or using their own phones and all chose to use their phone cameras.

What is this a photo of?

Where was it taken?

Why did I take this photo?

What does this photo represent?

Table 1. Participant characteristics.

Participants	Gender	Age	Number of children at home	Current occupation
Sofie	F	55	1	Early retirement
Emil	M	44	2	Unemployed
Magnus	M	46	2	Event manager
Clara	F	43	3	Abuse therapist
Frederik	M	41	2	Pedagogue
Agnes	F	68	0	Retirement
Felix	M	34	0	Project leader
Josefine	F	38	2	Student
Karla	F	37	2	Buyer (maternity leave)
Freja	F	65	0	Retirement

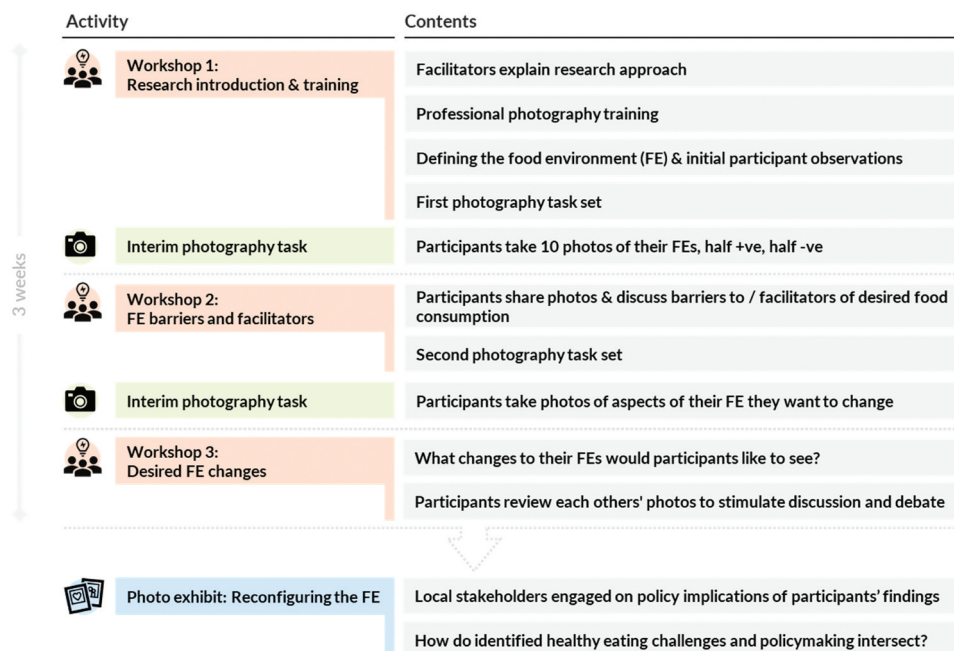


Figure 3. Research process.

Availability	Desirability
<i>What foods are in our shops?</i>	<i>How much do we want the food that is available?</i>
Accessibility	Convenience
<i>How easy is it to get to the shops?</i>	<i>How easy is the food to prepare?</i>
Affordability	Marketing
<i>How much does food cost?</i>	<i>How is food advertised?</i>

Figure 4. Definition of the food environment modified from Turner et al. (2018).

In the second workshop, participants' photos were projected on to a wall, and the group collectively discussed the photographs they had each taken during week one. Based on the discussion, the participants themselves set the second photo task. The task in week two focused on taking photos of aspects of the food environment they would like to change.

The third and final workshop involved two activities: firstly, participants discussed the second set of photos they had taken and considered how food environments might be changed to enable people to eat healthy and sustainable diets. Second, participants chose three to five of their photos each that they felt best depicted what they wanted to communicate in relation to the study's aims. Participants then provided captions for these photographs to communicate what was in the photograph and why they felt it was important. These were then later displayed at the photo exhibition (which is not a part of our overall analysis) to which local government stakeholders were invited, along with the participants and their families.

Analysis

The analysis comprised two stages: First, the analysis took place with the participants, alongside data collection, through an established process known as 'Participatory Analysis' (Wang and Burris, 1997). As the participants came together to discuss the photographs in each workshop, they considered and recorded what the images said about their environment (common themes) and its implications. The participants received photograph feedback forms to assist them with this. The iterative nature of the workshops allowed participants to deepen their analysis over the weeks. At the end of the third workshop, participants chose captions to describe the photographs that were displayed during the exhibition. Finally, through a facilitated discussion in the final workshop, the group developed a list of potential food environment interventions to address the issues/concerns raised through their photographs and analyses.

The second stage of analysis involved the researchers (AI and MS) analysing the live notes taken by TS in the workshop discussions and the participants' written

notes and captions. Here, the researchers used an adaptation of an established process of thematic analysis to determine the main themes (Braun and Clarke 2006). Steps in the analysis process included: 1) familiarisation with the data – AI and MS read through notes and captions multiple times and noted initial ideas; 2) a process of open coding to generate initial semantic codes (the various facets of the food environment as outlined in Turner et al.'s definition (see Figure 3) informed but did not dictate this code generation); 3) development of key themes – MS and AI jointly analysed the codes and their contents to identify potential themes; and 4) reviewing and finalising identified themes. Given the method of joint analysis it was planned that any disagreements between MS and AI were resolved through discussion. This was not necessary however.

Because we did not transcribe the sessions verbatim, but made live notes instead, we have not included any participant quotes in our findings. However we were able to sense check the notes against recordings that were made so we could be sure that all discussions and comments were covered. Additionally, by including the captions that participants attached to photos (see below) we were able to reflect exactly what the participants wanted to say about these images.

Findings

Collectively the participants took a total of 171 photographs over three weeks, reflecting on a) aspects of the food environment that made it easier or harder to purchase healthy food and b) potential areas for change in the food environment. Through thematic analysis of the discussions and photo captions, the researchers identified four key themes: (1) Competing priorities shape capacity to purchase healthy and sustainable foods, (2) physical elements shape engagement with the Vesterbro food environment, (3) unease characterises feelings related to the changing food environment, and (4) the Vesterbro food environment facilitates social life. These themes are presented here, followed by the participants own analysis of the changes required to improve the Vesterbro food environment.



Figure 6. Everything looks great and looks right except the price. This prevents me from buying here (Emil).

Theme one: competing priorities shape capacity and desire to purchase healthy and sustainable foods

Although this project's broad focus was on healthy foods (as defined by the participants), the issue of sustainable foods quickly came up as something of importance to the participants in addition to the nutritional value of the food. The participants were united in considering the Vesterbro food environment to be a place where a broad and diverse range of healthy and sustainably produced foods were physically available. Furthermore, participants described such products in ways that demonstrated they were desirable and culturally salient, and for some, constituted important identity markers. However, a set of other priorities related to both time pressure and affordability meant that these foods did not constitute a frequent part of many of the participants' food environment.

While 'healthy' foods such as fresh fruit and vegetables were not felt to be out of the price range of this relatively affluent sample, foods that were considered healthy *and* sustainably sourced, such as those from package-free stores, were. For the most part, the priority to purchase foods that were considered affordable took precedence over other values. Thus, a number of participants photographed 'ideal-type' products that they would have bought had the price been right (Figures 5 and 6).



Figure 5. This store has no packaging and is all organic. This is the only place in Vesterbro that allows this kind of purchasing (Karla).





Figure 7. This photo shows how we use our time differently. Most of the time we play with the kids instead of making food (Karla).



Figure 8. This is delivered 1-2 times a week, every week year round. It provides a lot more time for everything else, like time with the kids and relaxing (Karla).



Figure 9. Avoiding food waste encourages me to try vegan and paleo options (Frederik).

While it did not necessarily lead to less healthy purchasing, time-related priorities also took precedence over food purchasing and preparation for those participants with young families. Products or delivery options that allowed them to spend less time engaging with the built food environment and more with their families were preferred [Figures 7 and 8](#).

When foods or food stores aligned in terms of availability, values and desirability, and affordability they were integrated more readily into participants' personal food environments. For example, several participants photographed food waste stores as an aspect of the food environment where affordability and priorities were aligned. Many supermarkets sell produce that is close to expiry, and would otherwise be wasted. Here participants could buy relatively cheap products and feel that they were contributing to alleviating food waste [Figure 9](#).

Agnes, who was retired, described significantly greater financial constraint on food acquisition than the other participants. To depict an enabler of healthy food purchasing, she photographed a series of meals from a healthy ready meal provider ([Figure 10](#)). This provider formed a salient part of her food environment because the meals came within her price range and appealing on the grounds of health and taste.



Figure 10. This is delivery from a premade place. It provides healthy, really tasty food, and some are reasonably priced (Agnes).

Theme two: participants were uneasy with ongoing changes in the food environment

The Vesterbro food environment was conceived of as a place that was changing rapidly, with more independent shops being replaced by a narrow range of supermarkets. Perceptions of the changing food environment evoked a set of conflicting narratives among participants. Narrative one suggested that the number of independent food shops was declining amidst rising numbers of mainstream chain supermarkets (Figures 11 and 12). In this narrative, participants lamented the declining opportunities to purchase foods from independent and speciality stores and the impact that their disappearance was having on the aesthetics of the neighbourhood.

In a co-occurring narrative, produce from the independent stores in Vesterbro was significantly more expensive (Figure 13) than that available in supermarkets, which meant that they shopped in them only occasionally (for some participants) and never (for others).



Figure 11. This is a local fishmonger and butcher we need more of this in the area. We don't have many since we rely heavily on the large supermarkets (Magnus).



Figure 12. The local fish store is closing due to more large supermarket chains, fewer specialty shops (Sofie).



Figure 13. This costs 4 times as much as at Lidl, but it looks nice and there are a lot of these 'a bit more expensive' places, but 22 KR (€4) for a bun, no thanks! (Emil).

These narratives demonstrated a critical tension between an idealised food environment in which independent shops would make up the majority of the shopping offer, and a reality where considerations of cost and ease played a predominating role, leading to an increased patronage at newer, larger food retailers (e.g. supermarkets) offering food at more affordable prices. As with the challenges described above related to the tension between preferences for health and sustainability, time, affordability, and price played a major role in directing participants to engage in their FEs in ways that did not necessarily correspond with their values.

Theme three: the physical makeup of the food environment and surrounding built and home environments impacts people's purchasing practices

Beyond the interplay of values and affordability, physical aspects of the Vesterbro food environment, both inside and outside stores, played a role in shaping participants' personal food environments.

In terms of the physical layout of people's own homes, a number of the participants lived up several flights of narrow stairs (Figure 14) without elevator access, resulting in a strong preference for online deliveries that negated the need to carry groceries too far.

Preferences for online shopping were also strengthened in some instances by challenges in navigating external food environments. For several participants, accessibility of shops was challenged by limited bicycle parking space (Figure 15), causing frustration and a preference to avoid specific locations. Given that many relied on bikes as their primary form of transport, this challenge was not insignificant.

While a particular consideration for those at the more affluent end of the sample, the aesthetics inside stores played a role in determining comfort in and preference for particular stores over others. A sense that stores were clean and well looked after (Figure 16) was more likely to encourage



Figure 14. Another reason to not buy in the grocery stores – too far up the stairs. Nemlig, the delivery app and company – can do it (Karla).



Figure 15. There is hardly ever room to park your bike, and this photo is actually the best kind of scenario. It gets way worse. Usually there's a bus stop, bikes laying around, and people have parked in places they aren't supposed to. It's hard to find places to park a bike that allows you to get at it again (Josefine).



Figure 16. This makes me come back to the same store. They take the time to make it presentable – the organic items are clearly defined – they take time to water their herbs, and keep things welcoming and comfortable (Sofie).



Figure 17. Many stores have dirty shopping baskets, which puts me off from returning, or buying more than I can carry (Sofie).

repeat custom, versus stores that seemed dirty (Figure 17) and were more likely to be used out of necessity.

Theme four: food environments facilitate social life and wellbeing

Participants reflected that not only did out of home eating enable them to socialise with friends and family, but that the spaces of their food environment were, themselves, social. The social component of the food environment was considered one of the strengths of Vesterbro and a particular draw in the neighbourhood. Participants chose food outlets not only for the food they served but also for the other benefits they brought, such as spaces to sit outside with friends, or opportunities to eat communally due to the table structures in a restaurant (Figures 18 and 19). Food plays a social role in participants' food environments and also contributed to their social and emotional wellbeing. This demonstrates how the role of food and food environments in promoting health can be understood far more broadly than merely metabolic health. It is important to note that this was shaped by financial capacity, however. The participants for whom money was a concern were excluded from this use of the food environment to some extent.



Figure 18. This group dinner is a great option for communal eating. Creating a space for community and healthy, cheaper food. It works well, fun, great atmosphere and healthy (Karla).

Participant perspectives on healthy and sustainable environments

The final phase of the photography project took participants from describing the barriers and enablers of healthy food consumption related to their food environments and how those food environments might change for the better. These related to the geographical accessibility of food environments (e.g. providing more bicycle parking, the cost of products that were considered sustainable, the presence of certain types of stores, and the display of certain types of products).

To bridge the gulf between desirability and affordability, participants suggested bringing the cost of certain types of products more in line with those they more commonly purchased. One way of achieving this was through the existence of more shops that sold food that would ordinarily be wasted at discounted prices (Figure 20).

Despite conflicts around pricing, an attachment to independent shops as a component of an ideal food environment was a common feature of recommendations to improve the food environment. Participants suggested a need for numbers of independent shops in general and noted creative ways that this might be achieved that would also increase the food environment's healthiness. Suggestions included repurposing



Figure 19. Ricco's Coffee Bar. This is where all my friends come (Figure 17). It's central for me, it has great atmosphere, it's a meeting point and there's always conversation between guests/friends. There are lots of regulars that I know and it is an area where people sit outside – even in the winter – and chat or hang out. Vesterbro has a small town vibe – people meet and chat. That's something I really put a high price on (Felix).

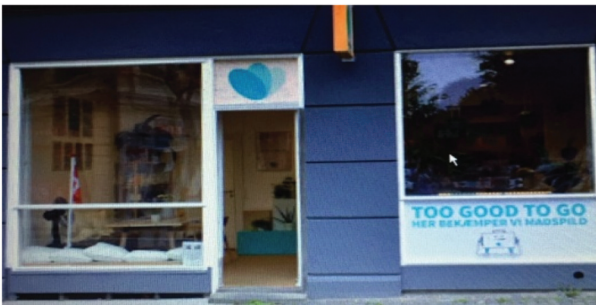


Figure 20. This is too good to go. More of these equals less food waste (agnes).

unused areas for food markets and using financial (Figures 21 and 22) incentives to bring in healthier food trucks.

The changes participants suggested were ones that would enable their food environments to become places where their values and ideal preferences aligned with other more immediate priorities such as price and accessibility.



Figure 21. It would be nice to cover this, maybe make an open air market, with fish, meat, specialty shops (Freja).



Figure 22. I would like more healthy options, and I would like it to be easier for people to access. For example, if people are applying for a food truck license, perhaps the more sustainable, healthy options could be prioritized and decision makers could tailor the takeaway food scene (Emil).

Discussion

Exploring a group of Vesterbro residents' lived experience of their food environment and priorities for change, through a participatory and resident-led process helps us to understand how people's practices are constituted in relation to their environments. This offers important lessons for efforts to transition diets

to one's beneficial for human and planetary health in ways that complement people's pre-existing practices and priorities. It further highlights how and where the various aspects of Turner et al's food environment definition interrelate (e.g. appeal and affordability) and thus where food environment modifications need to be made.

The findings reflect and bolster findings from other qualitative studies, both in public health and the social sciences, which demonstrate the complex relationships between people's food environments and what they eat (e.g. Pitt *et al.* 2017, Mattioni *et al.* 2020). While based on a small and specific sample, the study can be considered to achieve analytical generalisability (Smith 2018) in that while the participants and setting might differ, there are many similarities in the mechanisms via which people relate to their environments.

All the participants in this photo-elicitation study were exposed to the same physical food environment in Vesterbro, Copenhagen. However, the ways in which they engaged with the various aspects of that food environment related to a much wider range of factors than physical food availability or even affordability, despite the importance of these elements. Participants chose food outlets that were convenient enough to allow them time to pursue other activities, and that aligned with their values and understandings about the role of food, health, and sustainability. Additionally, food outlets were chosen that enabled participants to socialise with their families and/or friends, that fit in with physical environment constraints, and in which food could be purchased at an acceptable price within the time they had available. People utilise food environments in ways that reflect their underlying food practices (Wertheim-Heck *et al.* 2019, Mattioni *et al.* 2020). That is, the meanings, materials (e.g. financial capacity, food availability), and competencies specific to each individual that over time shape actions (Warde 2014). Wertheim-Heck has described, for example, how an expansion of supermarkets in Vietnam, considered optimal from a food safety perspective, did not lead to the expected transition in shopping habits among those on lower incomes, because people's practices had already developed around the frequent use of market stalls (Wertheim-Heck *et al.* 2019). This has important implications for the transition to the Eat-Lancet reference diet, as the creation of a locally appropriate food environment and diet must be not only affordable (Hirvonen *et al.* 2020), appealing and accessible, but also slot into people's prevailing food- and associated practices.

In line with the EAT-Lancet recommendations, and without prompting from the researchers, participants naturally expressed preferences for foods that were both nutritious *and* produced in an

environmentally friendly manner (food waste and unnecessary packaging being particular concerns). Indeed, it has been argued that, for the most part, foods that provide positive health impacts generally have lower environmental impacts (Clark *et al.* 2019, Willett *et al.* 2019). Over the past decade-and-a-half, the City of Copenhagen has emphasised healthy and environmentally sustainable dietary habits through its public procurement policies, placing multiple dimensions of food high on the municipal agenda (Halloran *et al.* 2018 *Copenhagen's Organic Food Revolution*, 2016; City of Copenhagen 2019). All public institutions must follow strict guidelines in terms of the meals they serve. Because some Copenhagen residents consume up to five meals a week in a public canteen, their diets conform to these guidelines for many meals (Halloran *et al.* 2018). This is intended to influence how residents then act when engaging with the food environment the rest of the time, and indeed participants did suggest that foods that were considered sustainable were highly desirable.

Despite an intention to consume sustainable and healthy foods, pragmatic considerations related to time and price conflicted with a commitment to the ideal type of shopping. A similar approach could be seen with independent outlets being preferred to supermarkets in principle, but were often not used due to the higher cost associated with these products. Even where there is a particular vocalised principle such as shopping at independent stores or buying the most sustainable products, these do not become regular practices if cost is considered prohibitive. Other in-depth explorations of shopping practices have similarly found that people balance a range of different and sometimes competing priorities when choosing where to purchase food (Cannuscio *et al.* 2014, Colón-Ramos *et al.* 2018). Where values and cost were aligned, such as at stores selling food waste, the Vesterbro participants were far more likely to engage.

As well as being places to procure food, participants' photos demonstrated the important function that elements of the food environment play in facilitating sociality. Both food outlets themselves, and the spaces outside them were valued as places where friends and family could gather together. Understanding the social and symbolic roles that certain aspects of food environments play is important in explaining why people frequent their places. In exploring food practices in east London, for example, Thompson *et al.* explained the role of fried chicken shops as an important community space that played a role beyond just providing food (Thompson *et al.* 2018). Similarly, Wills *et al.* noted that young people expressed strong positivity towards fast food outlets near their schools, due to the social salience of these spaces (Wills *et al.* 2016). Adapting the EAT-Lancet reference diet requires an understanding of

what sort of food is locally acceptable and all the other values associated with consuming food and with specific food outlets. In considering how to alter the diets of people in particular places, it is thus crucial to consider how to capitalise on the meanings of different aspects of the food environment, and on how they facilitate everyday life. While Turner *et al.*'s definition of food environments draws on many of the aspects that impact people's food environments, both on the supply and demand side, this relational aspect is less clear, yet is equally critical.

Physical aspects of both the food environment (e.g. unappealing shop interiors and the overcrowding of bicycles outside of food shops) and the broader built environment (e.g. steep steps leading into people's homes) did shape engagement with, and perspectives on, the Vesterbro food environment. To mitigate challenges associated with these aspects, some participants used online shopping services from outside of Vesterbro for the bulk of their groceries. This is a practice that increased during the subsequent COVID-19 pandemic, although the long term impacts of this are as yet unclear (Halloran *et al.* 2020). It is also a practice that is limited to those above a certain income threshold. Barriers in the built environment intersected with time related priorities to reinforce this practice. Participants were further encouraged to choose online deliveries when engaging in other activities such as spending time with their families. When considering local adaptations to the food environment and how best to capitalise on people's use of it, it is important thus to have a clear sense not only of where participants are purchasing their food from, and how far outside the local food environment this expands, but also where they are not purchasing foods from and how aspects of the built space influence this. All sources of food, rather than those which are visibly available, need to be considered.

In considering the implications for transitioning food provision in line with the EAT-Lancet diet, it is evident that, in this context, the aims of planetary reference diet, as defined by the Eat-Lancet commission do not conflict with residents' own preferences and priorities. However, what is available in the food environment needs to match with what people can afford, what they have the time for in their current context, their embedded practices, what they might wish to do, and how practices might change. Only then will a particular place or food become a salient part of someone's local food environment and food-related practices. This was demonstrated by participants in that the food outlets they spoke most positively about in Vesterbro were places that enabled them to achieve multiple goals, e.g. healthy and affordable, affordable and sustainable, healthy and quick to prepare. The possibility to have food outlets that serve

these multiple goals relies not only on policy priorities on the part of the City of Copenhagen, but also on commercial ones as well in terms of their profitability.

Implications

This study has implications in terms of engaging citizens in the process of changing environments and diets more broadly as well as highlighting areas for further research. Through committing to a participant-led process where citizens are able to define both problems and solutions, it is possible to identify interventions and opportunities for change that are truly grounded in the lived experience of a particular context and that can demonstrate how broader environments shape how and what people eat. Policy makers can then start with where citizens are, rather than where they would like them to be.

In particular, the findings demonstrate the importance of further exploring the links between people's perceptions of health and sustainability. Sustainability played an important role in how the participants understood and engaged with their food environments. It was considered an important priority and incorporated into notions of health. Most food environment research does not prioritise sustainability, and the question of how individuals balance health and sustainability priorities is critical when thinking about how to shape people's purchasing and consumption practices.

Limitations

There are five key limitations to this study. First, due to time constraints, we were required to reduce the number of participatory workshops from four to three. This meant that the participants had a shorter time to document their food environments and analyse their lived experiences, and it was necessary for the researchers to play a more directive role in the project than had been initially intended.

The second limitation relates to the sample. While this was a small qualitative project, and thus not intended to be representative of the neighbourhood of Vesterbro or the city of Copenhagen as a whole, we acknowledge that the sample was both small, narrow and non-representative. It included largely well off participants from a higher income area, all of whom were over the age of 30. This does not mirror the demographics of Vesterbro or Copenhagen. We can therefore not assume that individuals outside of these demographics would have engaged in a similar way, nor that others in Vesterbro would have engaged in this way. Because of the size of the sample, we did not gather in-depth data on socioeconomic status (beyond job) which prevented us from analysing the data against this metric.

Thirdly, participants self-defined health and sustainability – while this could be considered a strength since the project is grounded in their lived realities as far as these terms are concerned, it cannot be assumed that they correlate directly with externally validated notions of health and sustainability.

A fourth limitation relates to the nature of participant-led research of this nature in that by foregrounding the priorities and perspectives of the participants, subconscious aspects of people's practices may be less well attended to (e.g. potential underlying reasons for which people buy what they buy). There are therefore potentially important aspects of people's shopping practices that were not discussed. This is also a strength however in that it is fully grounded in the participant's lived realities.

Finally, the project took part before the onset of the COVID-19 pandemic which dramatically altered people's lives in both the short and long term. It is possible that the ways people engage with their food environments may have changed markedly since.

Conclusions

Adapting the Eat-Lancet reference diet to local circumstances in a way that will effectively shape diets requires an in-depth understanding of how and where people acquire those diets (i.e. their food environments), and what other roles food and food environments might play in people's lives. Even in a largely affluent sample, where health and sustainability were expressed values, the more pragmatic norms of cost and convenience played an important role in shaping participants' everyday food practices. This photo-elicitation study in Vesterbro, Copenhagen, provides additional data to the body of evidence that suggests that to reshape diets, what is available in the food environment needs to match what people can afford and have time for and what fits in with pre-existing practices and values. Efforts to reshape diets end must incorporate an understanding of the non-monetary benefits that food environments bring to people's lives, such as affording them time for other activities or promoting broader wellbeing by providing social engagement. It is not sufficient simply to reshape food environments, without also shaping the contexts in which people engage with them. People may have food-related values, but many constraints conflict with these values. When the food environment allows for existing priorities and values to align with material priorities, participants in this study appeared more likely to purchase healthy, sustainable foods.

Notes

1. New Nordic cuisine is a movement which involves reimagining traditional Nordic foods with a focus on health and seasonality (*The New Nordic Food Manifesto* | *Nordic Cooperation*, n.d.).
2. It was not possible to establish whether these shops were truly independent, or rather financed by larger chains.

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