



## Exploring the multiple dimensions of perceived food access in the local food environment in Flanders: Perceptions of adults in socioeconomically disadvantaged situations

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### ABSTRACT

Persons in socioeconomically disadvantaged situations are more susceptible and disproportionately exposed to unhealthy food environments, which results in limited access to healthy foods and poorer dietary outcomes. This qualitative paper examines the various dimensions of perceived food access to healthy and unhealthy foods (i.e., *availability, affordability, accessibility, accommodation, desirability, convenience and acceptability*) within the local food environment among persons in socioeconomically disadvantaged situations.

A total of 23 participants in socioeconomically disadvantaged situations expressed their perceptions of food access within their local food environment and its role in their eating behaviour through participant-driven photo-elicitation in a focus group context ( $n = 7$ ) and researcher-driven photo-elicitation interviews ( $n = 16$ ). Reflexive thematic analysis has been used to analyse our data through an access framework.

Four overarching themes were constructed. The first two themes concern barriers to perceived food access in respectively the home and community food environment – including the importance of kitchen infrastructure, household composition and transport options. The third theme encompasses the interaction of perceived food access with the sociocultural environment, highlighting its dual role as facilitator (e.g., through food sharing practices) and barrier (e.g., through social stigma and shame). The fourth theme concerns awareness and the ability to navigate within the information food environment, which has also been proposed as a novel dimension of food access.

This study emphasizes the complexity of food access and the need for a multifaceted approach that integrates perceptions to ensure equitable access to healthy foods.

### 1. Introduction

The persistent socioeconomic inequalities in healthier eating behaviours contribute to a higher prevalence of overweight and obesity, in addition to an increased incidence of diet-related chronic diseases, in socioeconomically disadvantaged groups compared to their more advantaged counterparts (Giskes et al., 2010; Mackenbach et al., 2019;

Sawyer et al., 2021). The food environment exerts a significant influence on eating behaviours, influencing the food that people have access to, choose to purchase and consume (Mackenbach et al., 2019; Pitt et al., 2017; Sawyer et al., 2021). The term “food environment” is commonly defined as “the physical (e.g., number of food outlets), economic (e.g., food retail prices), political (e.g., restriction of marketing and advertising to children) and socio-cultural context (e.g., cultural prohibitions

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for eating a specific type of food) in which people engage with the food system” (Drewnowski et al., 2020; Monterrosa et al., 2020; Swinburn et al., 1999).

Persons in socioeconomically disadvantaged situations are more susceptible to and disproportionately exposed to unhealthy food environments, resulting in limited access to healthy foods and poorer dietary outcomes (Evans et al., 2015; Løvhaug et al., 2022; Sawyer et al., 2021). For instance, previous research has demonstrated that socioeconomically disadvantaged neighbourhoods have limited access to healthy foods such as fresh, unprocessed and nutrient-rich foods (Fleischhacker et al., 2011, Sawyer et al., 2021; Turner et al., 2021). Additionally, households living in socioeconomically disadvantaged situations are more vulnerable to the costs of food (Darmon & Drewnowski, 2015; Janssen et al., 2018; Story et al., 2008). Not all households in socioeconomically disadvantaged neighbourhoods are socioeconomically disadvantaged, and vice versa. This suggests that there may be important differences between the determinants of eating behaviour in socioeconomically disadvantaged households and those indirectly affected by living in a socioeconomically disadvantaged neighbourhood (Sawyer et al., 2021). Consequently, it is of paramount importance to investigate the experiences of individuals in accessing food within their local environment in order to identify effective strategies for addressing inequities in food access.

Food access plays an important role within the wider food environment and is described as “a multifaceted determinant of food acquisition” categorized into multiple dimensions (Turner et al., 2018). These dimensions of food access include availability, accessibility, affordability, acceptability, accommodation, convenience and desirability (Caspi et al., 2012; Herforth & Ahmed, 2015; Penchansky & Thomas, 1981). Turner et al. (2018) further categorized food access dimensions into external and personal domains, emphasizing their interplay in determining food access and subsequent effects on eating behaviour and associated health outcomes. Definitions of these dimensions are provided in Table 1. However, challenges remain in appropriately defining and conceptualising food access (e.g., multiple studies employ diverse food access dimensions without consistent use of definitions) and several literature reviews have called for further refinement and exploration of food access domains (e.g., Caspi et al., 2012; Charreire et al., 2010; Herforth & Ahmed, 2015; Turner et al., 2018).

Traditional conceptualizations of the food environment often differ from the actual experiences of individuals due to the influence of dynamic contextual factors across space and time influence food access and dietary behaviours (Caspi et al., 2012; Chen & Kwan, 2015). Persons in socioeconomically disadvantaged situations frequently encounter unique challenges, such as limited financial resources or inadequate transportation, that can shape their perceptions of food access (Wainer et al., 2023). Moreover, perceptions are shaped by social and cultural contexts, which significantly impact how people perceive food access and navigate their food environment (Monterrosa et al., 2020). Interventions to enhance food access based solely on objective measures, such as geographic and economic data, may fail to resonate with the lived realities of persons in socioeconomically disadvantaged situations (McGowan et al., 2021). Consequently, personal perceptions and experiences may be significant determinants of food access, particularly among persons in socioeconomically disadvantaged situations (Turner et al., 2018).

Most evidence on perceived food access among persons in socioeconomically disadvantaged situations stems from quantitative studies, as demonstrated by a series of systematic reviews (Caspi et al., 2012; Mackenbach et al., 2019; Madlala et al., 2023; Yamaguchi et al., 2022). Quantitative studies that included perceived measures of food availability, accessibility and affordability showed fairly positive associations with a healthy diet (Caspi et al., 2012; Mackenbach et al., 2019; Yamaguchi et al., 2022). A limited number of studies examined acceptability and accommodation, these studies generally showed a positive relationship between constructs such as perceived food quality,

**Table 1**

The dimensions of food access divided into personal and external domain.

	Dimension	References
<b>External domain</b>	<b>Availability</b> Presence of food sources or products within a given context	(Caspi et al., 2012; Herforth & Ahmed, 2015; Penchansky & Thomas, 1981; Turner et al., 2018)
	<b>Prices/Affordability</b> Monetary value of food products	(Caspi et al., 2012; Herforth & Ahmed, 2015; Penchansky & Thomas, 1981; Turner et al., 2018)
	<b>Accommodation<sup>a</sup></b> Adaptation of food sources to local residents' needs, including the appropriateness, quality and continuous nature of the services (cfr. adequacy)	(Caspi et al., 2012; Herforth & Ahmed, 2015; Penchansky & Thomas, 1981)
	<b>Desirability<sup>b</sup></b> Status of foods, cultural norms, advertisement, product placement and promotions	(Herforth & Ahmed, 2015)
	<b>Accessibility</b> (Relative) proximity in terms of distance and travel time	(Caspi et al., 2012; Herforth & Ahmed, 2015; Penchansky & Thomas, 1981; Turner et al., 2018)
<b>Personal domain</b>	<b>Affordability</b> Purchasing power	(Caspi et al., 2012; Herforth & Ahmed, 2015; Penchansky & Thomas, 1981; Turner et al., 2018)
	<b>Convenience</b> Relative time and effort of collecting and preparing food, including the time allocation and priorities set	(Herforth & Ahmed, 2015; Turner et al., 2018)
	<b>Acceptability<sup>c</sup></b> Individual attitude regarding attributes of the local food environment, including the personal standards (e.g., taste preferences, desires, attitudes, culture, knowledge and skills)	(Caspi et al., 2012; Herforth & Ahmed, 2015; Penchansky & Thomas, 1981)

<sup>a</sup> The dimension ‘accommodation’ has been added to the framework, as described by Penchansky and Thomas (1981); Caspi et al. (2012); Herforth and Ahmed (2015), which overlaps with the dimension ‘vendor and product properties’ (vendor properties (typology, opening hours, services) and product properties (food quality, composition, safety, level of processing, shelf-life, packaging) proposed by Turner et al. (2018).

<sup>b</sup> The original definition of ‘desirability’ used by Turner et al. (2018) has been changed for the definition of Herforth and Ahmed (2015) and has been displaced from personal to external domain. This definition overlaps with the dimension ‘marketing and regulation’ (promotional information, branding, advertising, sponsorship, labelling and policies) proposed by Turner et al. (2018).

<sup>c</sup> The dimension ‘acceptability’ has been added to the framework, as described by Penchansky and Thomas (1981); Caspi et al. (2012); Herforth and Ahmed (2015) which corresponds with the definition of ‘desirability’ (preferences, acceptability, tastes, desires, attitudes, culture, knowledge and skills) used by Turner et al. (2018).

Source: conceptual framework key dimensions food access - adapted from Turner et al. (2018).

sensory characteristics, store opening hours and fruit and vegetable consumption (Caspi et al., 2012; Mackenbach et al., 2019; Yamaguchi et al., 2022). Existing evidence shows that associations between accessibility, proximity and quality of the food environment were more strongly associated with dietary behaviour in the socioeconomically disadvantaged subgroup compared to higher socioeconomic groups (Mackenbach et al., 2019). Moreover, a recent systematic review focusing specifically on adult food choices in association with the local retail food environment and food access in resource-poor communities cited high food costs and transportation as main barriers to healthy food access (Madlala et al., 2023).

Far less research exists that attempts to understand perceived food

access from a qualitative perspective (Pitt et al., 2017). Qualitative studies permit a more comprehensive understanding of people's experiences and can offer insights into the complex factors that hinder or enable food access (Busetto et al., 2020). It is important to gain an understanding of food access dimensions through the lived experiences from persons in socioeconomically disadvantaged situations within their local food environments. This understanding is crucial for the development of effective strategies to promote healthier eating behaviours and equitable access to nutritious foods (Madlala et al., 2023; Turner et al., 2018; Zorbas et al., 2018).

Therefore, the objective of this study is to qualitatively examine the perceived dimensions of food access presented in Table 1 (i.e., *availability, affordability, accessibility, accommodation, desirability, convenience and acceptability*) within the local food environment among persons in socioeconomically disadvantaged situations. This study specifically examines the perceived access of healthy and unhealthy foods (including acquisition, preparation and consumption), without adopting a concrete definition.

## 2. Methods

The current study is part of the CIVISANO-project, a broader study that uses mixed-methods to examine the role of objective and perceived environmental factors in physical activity and eating behaviour among PSEDS in two peri-urban municipalities in Belgium. The study protocol is described in detail elsewhere (D'Hooghe et al., 2022).

The first author (a white, female, with extensive experience in qualitative research and a familiarity with the literature on food and physical activity environments) was primarily responsible for data collection and analysis. The study's epistemological stance is grounded in constructivism, which posits that knowledge is co-constructed through interactions between the researcher and the participants (Kivunja & Kuyini, 2017). This perspective acknowledges the subjective nature of understanding and the importance of context in shaping experiences. Ontologically, we recognize that while there are real-world structures and mechanisms that influence health behaviours, our understanding is mediated through interpretative processes. As the researchers' background and perspectives may influence the research process, we ensured reflexivity throughout the study and engaged in regular discussions among all co-authors.

### 2.1. Setting

Data collection was conducted in 2022 in two medium-sized peri-urban municipalities, Duffel and Herselt, in the province of Antwerp in the Flemish region of Belgium. Duffel is a monocentric municipality (22.6 km<sup>2</sup>, 187 inhabitants/km<sup>2</sup>), while Herselt consists of several sub-municipalities (54.4 km<sup>2</sup>, 277 inhabitants/km<sup>2</sup>).

### 2.2. Recruitment and study sample

PSEDS were recruited in both municipalities through multiple purposeful convenience sampling strategies (Ellard-Gray et al., 2015): prior participation in walk-along interviews focusing on recreational walking within the context of the same project (D'Hooghe et al., 2022), door-to-door visits in disadvantaged neighbourhoods, at local free food distributions, local social organizations, through the municipality journal, social media, the snowball-technique (where participants refer to potential participants from their social circle) (Sadler et al., 2010) and through an invitation in the pre-distributed Civisano-questionnaire. Similar methods have been proven to be effective in reaching out to more disadvantaged and 'hidden' groups of people (Ellard-Gray et al., 2015). Participants had to reside in either municipality, be between 25 and 65 years old, and be in a socioeconomically disadvantaged situation. This was determined by meeting at least two of the following criteria: low educational level (= no tertiary education degree), no current paid

job, perceived financial difficulties (= difficult to very difficult to make ends meet per month), low perceived socioeconomic status ( $\leq 5$  on a scale of 10). The gradient in socioeconomic status was explained as a ladder with 10 steps, where step 10 are the people who are the best off – those who have the most money, the highest education and the most respected jobs (Adler et al., 2000). Participants were asked to position themselves on this ladder. The rationale behind these inclusion criteria can be found in our protocol paper (D'Hooghe et al., 2022). Participants received a €10 voucher after participation to redeem at local stores.

This study was approved by the Medical Ethics Committee of Ghent University Hospital (BC-09260) and was conducted in line with the recommendations of the Belgian Data Protection Authority. All participants signed a written informed consent form prior to participation.

### 2.3. Data collection

In both municipalities, photovoice was applied to investigate perceptions of food access in the local environment among adults in socioeconomically disadvantaged situations. Photovoice is an approach that employs photo-elicitation, specifically with marginalized groups, and aims to foster self-representation, empowerment, critical awareness and social change within their communities (Raby et al., 2018). In photo-elicitation, photographs provided by the researcher or the participants are used in an interview or focus group context, as a means to stimulate discussion (Raby et al., 2018). The use of pictures facilitates communication and encourages participants to reflect on the topic without demanding high levels of literacy (Copes et al., 2018; Nykiforuk et al., 2011; Wang & Burris, 1997). Additionally, these methods provide insights that are not accessible through the use of solely interview methods (Copes et al., 2018). Previous research has demonstrated that the use of the visual image has the capacity to engage vulnerable groups in the data-collection process and provides greater insight into the lived realities, perceptions and experiences of the participants (Bateman et al., 2019; Gravina et al., 2020; Nichols et al., 2016). A focus group context additionally contributes to knowledge exchange between participants, stimulates social interactions and may lead to participant empowerment (Morgan, 2012). In the context of this study, we applied a photovoice method that employs both participant-driven photo-elicitation in a focus group context and researcher-driven photo-elicitation in an individual interview context (see Fig. 1). Data collection took place between May 2022 and September 2022.

For the participant-driven photo-elicitation method, participants were invited to an introductory session where the project was explained and a photovoice training was provided, emphasizing how to make clear and focused pictures and explaining some ethical aspects (such as anonymity, personal safety and data protection laws). Digital cameras were available, however no participants used this option. The participants completed a short socio-demographic survey and were tasked with photographing local environmental factors that they perceived as influencing their access to both healthy and unhealthy foods over the course of two weeks. No concrete definition of 'healthy' and 'unhealthy' food was adopted, but the terms were used as a proxy for the participants' perceptions of (un)healthy foods.

After two weeks a second gathering (the first focus group) convened with the same participants to discuss the taken pictures and to identify the perceived environmental factors affecting eating behaviour. Participants were asked to limit the number of pictures used during the discussions to five they felt most relevant, due to time constraints and based on prior studies (e.g., Gravina et al., 2020; Nykiforuk et al., 2011). They could send the pictures beforehand to the researcher, who printed them out in advance, or they were shown on a projection screen during the session. Participants discussed their selected pictures and reflected in group on the different aspects affecting eating behaviour. The SHOWED method was used to facilitate discussion, which included the following questions: *What do you See here? What is really Happening? How does this relate to Our lives/eating behaviour? Why does this problem or strength*

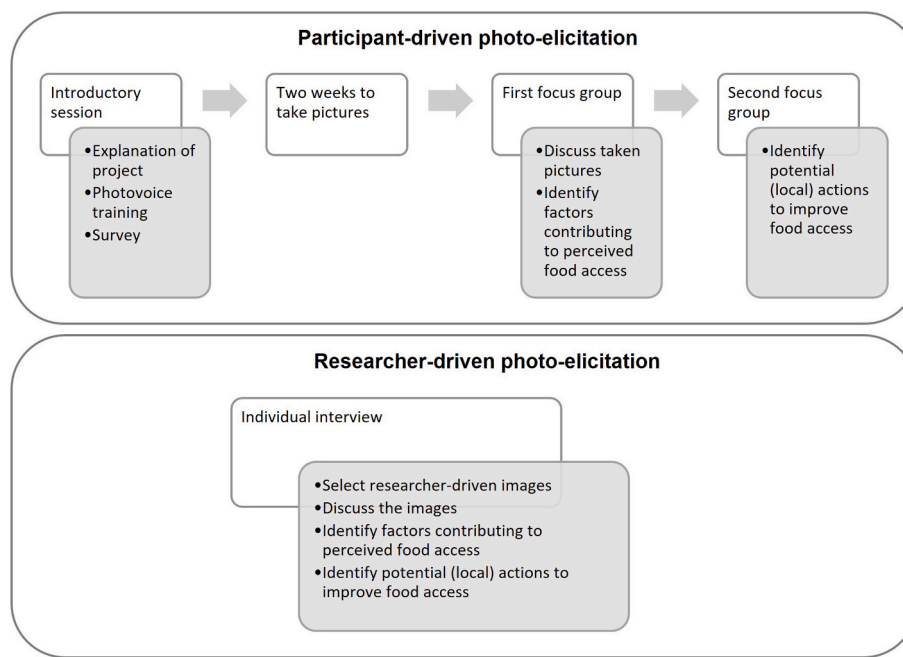


Fig. 1. Photovoice method.

*Exist? What can we Do about it?* (Wang & Burris, 1997). A third gathering (the second focus group) took place to identify potential (local) actions for improving food environments based on the identified aspects during the previous focus group. A total of seven participants from Duffel participated in the photovoice sessions employing participant-generated photo-elicitation in a focus group context.

Potential participants were reluctant to participate due to the perceived workload of taking pictures, the sensitivity of the subject matter (discussing food and eating behaviour), reluctance to engage in a group discussion, and a lack of interest in the topic. This resulted in a change of approach from participant-driven photo-elicitation in a focus group context to researcher-driven photo-elicitation interviews following a discussion with the co-authors (Copes et al., 2018). This entailed participants selecting and providing feedback on pre-determined images during an individual interview, without the necessity of taking pictures themselves or discussing their perceptions in a group setting. The pictures consisted of 30 random stock images of various themes (examples are an image of a forest, a burning fire, abstract images, social gatherings, ...). At the beginning of the interview the interviewer asked the participant to select five pictures that they thought were most significant in relation to their perceptions of their local food environment. The meaning assigned to the pictures during the interview process is more significant than the pictures themselves. The SHOWED method was also used here to facilitate the interview, in combination with a semi-structured interview guide (Supplementary File 1). This adapted methodology was proposed to both the participants who initially refused to participate and new participants. Data saturation was reached after 16 photo-elicitation interviews and 2 focus group discussions with 7 participants, meaning that no new themes were coming up in the interviews regarding to the previous ones (Hennink & Kaiser, 2022; Saunders et al., 2018). The researcher-driven photo-elicitation interviews elaborated on individual perceptions that residents have on food access in relation to their eating behaviours, while the participant-driven photo-elicitation focus groups were used to gather collective discourses on food access within the municipality based on the individual pictures taken by the participants. Each focus group took 2 hours (excluding a mid-break). All focus groups and interviews were audio-recorded with consent of the participants. The interviews took between 39 and 103 minutes, with an average of 66

minutes.

A brief questionnaire (see Supplementary File 1) collected demographic information (age (measured in years), sex (man, woman, other), educational status (highest attained education), employment status (paid work), 6-point Likert scale for perceived financial difficulties, MacArthur scale for perceived socioeconomic status (participants position themselves on a 10 rung ladder (Adler et al., 2000), housing situation (owner, rental, social housing, other), net income (7 categories between less than 1000€ and more than 5000€), weekly food expenses (7 categories between less than 50€ to more than 300€), nationality (Belgian, non-Belgian European, non-Belgian non-European, double nationality), 5-point Likert scale for perceived health, perceived functional limitations (3 categories from very limited to not limited), and weight and length to calculate Body Mass Index (BMI)). The measures were primarily based on the Local Health Interview Survey (Local HIS) of 2019 (Sciensano, 2019). Variables included in the Local HIS 2019 were derived from the Belgian National Health Interview Survey of 2018 (Sciensano, 2018).

#### 2.4. Data analysis

Descriptive statistics of the brief questionnaire were calculated using SPSS Statistics 29.0. Data from the tape recordings were transcribed verbatim. NVivo 12 was used for analysis. Reflexive thematic analysis as discussed by Braun and Clarke (2021) was used to analyse our data. We followed their proposed six-phase process: 1) data familiarisation (transcribing and re-reading interview transcripts); 2) systematic data coding (open coding based on findings related to the perceived local food environment); 3) generating initial themes from coded and collated data (creating thematic clusters of identified codes within the perceived local food environment characteristics); 4) developing and reviewing themes (categorizing the identified clusters into the different dimensions of access); 5) refining, defining and naming themes (through multiple discussions with the co-authors); and 6) writing the report. The seven dimensions of food access identified in literature and the division into the external and personal domain of Turner et al. (2018) were used to analyse the data (Table 1).



### 3. Results

#### 3.1. Participant characteristics

The characteristics of the 8 male and 15 female participants are shown in Table 2. The mean age among the 23 participants was 44.9 ± 11.0. Individual participant characteristics can be found as Supplementary File 2.

**Table 2**  
Participant characteristics.

DEMOGRAPHIC INFORMATION (n = 23)		N	%
<b>Sex</b>	Man	8	34.8%
	Woman	15	65.2%
<b>Education</b>	Elementary education	2	8.7%
	Secondary education	14	60.9%
	Higher education	7	30.4%
<b>Employment</b>	Paid work	7	30.4%
	No paid work	14	60.9%
	No paid work (temporarily)	2	8.7%
<b>Perceived financial difficulties</b>	Very difficult	4	17.4%
	Difficult	3	13.0%
	Rather difficult	8	34.8%
	Rather easy	4	17.4%
	Easy	4	17.4%
<b>Perceived socioeconomic status (SES)</b>	Very easy	0	0.0%
	1 (lowest perceived SES)	3	13.0%
	2	2	8.7%
	3	1	4.3%
	4	3	13.0%
	5	8	34.8%
	6	1	4.3%
	7	5	21.7%
	8	0	0.0%
	9	0	0.0%
<b>Housing situation</b>	10 (highest perceived SES)	0	0.0%
	Property owner	8	34.8%
	Private renting	3	13.0%
	Social housing	7	30.4%
	Other	5	21.7%
<b>Net income</b>	1000-1499€	14	60.9%
	1500-1999€	3	13.0%
	2000-2499€	4	17.4%
	2500-2999€	1	4.3%
	3000-3499€	1	4.3%
	4000-4499€	0	0.0%
	>5000€	0	0.0%
<b>Weekly food expenses</b>	<49€	2	8.7%
	50-99€	13	56.5%
	100-149€	5	21.7%
	150-199€	1	4.3%
	200-249€	2	8.7%
	250-299€	0	0.0%
	>300€	0	0.0%
<b>Nationality</b>	Belgian	20	86.9%
	Non-Belgian non-European	2	8.7%
	Non-Belgian European	1	4.3%
	Double nationality	0	0.0%
<b>Subjective health</b>	Very bad	0	0.0%
	Bad	7	30.4%
	Neither good nor bad	8	34.8%
	Good	8	34.8%
	Very good	0	0.0%
<b>Perceived functional limitation</b>	Very limited	5	21.7%
	A bit limited	14	60.9%
	Not limited	4	17.4%
<b>Weight status<sup>a</sup></b>	Underweight	1	4.3%
	Normal BMI	5	21.7%
	Overweight	8	34.8%
	Obesity	8	34.8%

<sup>a</sup> Data missing for one respondent (n = 22).

#### 3.2. Dimensions of access within the perceived food environment

Four overall themes were constructed regarding the perceived food access of persons in socioeconomically disadvantaged situations in their local environment: 1) barriers to perceived food access in the home food environment, 2) barriers to perceived food access in the community environment, including mobility, 3) perceived food access is embedded in the sociocultural environment and 4) awareness and ability to navigate within the information environment. Each theme consists of sub-themes that link to one or more access dimensions (see definitions in Table 1), which provides insights into the dynamic interplays between the different food access dimensions and the local environment. Photos taken by the participants are provided as illustrative data to enhance the credibility of the findings (Saldana & Omasta, 2016).

##### 3.2.1. Barriers to perceived food access in the home food environment

Four sub-themes were created when reflecting with the participants on barriers in the community home environment: 1) infrastructure, 2) purchasing power, 3) household composition and 4) vegetable garden.

In the home food environment, participants referred to bad kitchen conditions and inadequate equipment (e.g., limited space, cooktop with one or two elements, insufficient cooking material, bad lighting, absence of freezer or small refrigerator) as a barrier for healthy cooking and eating (i.e., *availability and affordability*). A 53-years-old male participant explained: "I always have to turn on a light to cook. My sink is right next to the stove and the cupboard. I don't have the space and money to buy adequate equipment to cook – I only have one sink and two cooking elements. As I'm alone, I won't do all the effort. Sometimes I have to use the same pan three times." (Fig. 2)

Factors affecting individuals' purchasing power were highlighted (i.e., *affordability*). Participants living in single-person households mentioned that it is more expensive to obtain, store and prepare food compared to people living with a partner: "I sometimes buy fresh vegetables and fruits, but I won't make a dish with 10 different ingredients, I only have the budget of a single person. If I turn on the lights, that costs me as much as someone with two budgets. So, when I buy food, I have to look at the price, and that often means unhealthier food." (Woman, 34 years) Additionally, participants living in a single-person household mentioned that their household composition also served as a barrier for cooking fresh meals (i.e., *convenience*): "It all takes time. It's not that you don't want to invest in yourself, but it is again a barrier that you have to cross. Sometimes it's just easy that there's already something that is ready. We are talking about food now, but all the other tasks have to be done by you as well, so there is less space to have a cosy hour of cooking. There are no other persons to divide the household tasks with." (Woman, 34 years, Fig. 3)



**Fig. 2.** Kitchen of one of the participants.



Fig. 3. Illustration of 'single-person household' of one of the participants.

To ensure affordable (and healthy) eating, some participants prioritized home-cooked meals over take-out or restaurant (i.e., *affordability*). However, some participants noted that after a long workday or when facing time constraints, take-out food becomes a convenient option (i.e., *convenience*): “We always eat at home, and if we don't it's because we've had a busy day and no time to cook. Then we usually get some fries and still eat it at home. We don't eat out a lot, it costs more money and at home we have television, and we can give the leftovers to the dogs.” (Woman, 31 years old) Cultivating personal vegetable gardens were also mentioned to reduce store expenses, and community gardens were seen as valuable alternatives (i.e., *availability and affordability*): “It's not that you don't have to buy anything else from the store, but it does help a bit, and it's fun.” (Man, 62 years, Fig. 4) Participants also highlighted the positive impact of personal vegetable gardens on acceptability of vegetables (i.e., *availability and acceptability*): “It's great to eat from your own garden. I know what happened to the vegetables, in the store you never know (...) my



Fig. 4. Vegetable garden of one of the participants.

daughter eats better when she knows it comes from our garden, because she has spent time on it herself. She doesn't like carrots, but if they come from the garden she is going to taste them anyway.” (Woman, 31 years)

### 3.2.2. Barriers to perceived food access in the community food environment

Three sub-themes were created when reflecting with the participants on barriers in the community food environment: 1) the physical community food environment including conventional and alternative food sources, 2) the economic community food environment and 3) mobility issues.

Regarding the community food environment, supermarkets were generally deemed sufficient in both municipalities (i.e., *availability*), yet participants identified a lack of specific products (often vegan, sugar-free, lactose-free or culture specific foods such as manioc, halal food or specific spices) and not adapted to the needs of the participants (i.e., *availability and accommodation*). Fast food and takeout restaurants were noted to be increasing (i.e., *availability*), specifically in the municipality centres: “Another bakery closed in the centre, and then you see it changing into a pita-bar, is this the alternative for healthy food?” (Man, 56 years, Fig. 5)

Rising food prices, particularly for vegetables and fruits, were identified as barriers to healthy eating (i.e., *affordability*): “Healthy food is more expensive. Organic food costs ten times more than chips, so I'm more inclined to buy chips when I take my budget into account. Of course that's a shame. That's hard, that's making choices between what I can afford and what is a bit healthy.” (Woman, 31 years) Moreover, participants highlighted that they prefer buying discounted products, though concerns were raised that these are perceived to apply more frequently to less healthy food items (i.e., *affordability and desirability*) or to products that are almost expired: “I regularly buy things that are almost past their expiration date, often 30% reduction, but it still stays good for a while. I always say: you have eyes and a nose. At home too, I don't throw away food when it's overdue. There are so many people who don't have food, who make so much effort to have one meal a day, and then just throw it in the trash?” (Woman, 31 years). In this regard, the absence of social restaurants offering free or low-cost healthy meals to persons with financial difficulties and social groceries (local convenience store with quality products at greatly reduced prices) were considered a limitation to healthy eating (i.e., *availability and affordability*). Also, alternative food sources such as harvest gardens (where you can harvest free or low-cost fruits or vegetables yourself) and ‘right off the field’ (where you can buy vegetables and fruits directly from local farmers) were mentioned as encouraging for healthy eating (i.e., *availability, affordability and*



Fig. 5. Photo that illustrates the increasing number of fast food stores in the municipality centre.



desirability): “It [the fruits and vegetables] doesn’t have to be perfect. Not taking something because there are bumps in it? I’m not like that, we can just cut that part off. I find it very disturbing in the store that all the colours and shapes are always so perfect.” Weekly markets were available, however considered more expensive than supermarkets (i.e., *affordability*).

Regarding mobility issues, participants often referred to the perceived distance of food shops (i.e., *accessibility*), especially as many lacked personal vehicles and relied on public transport (i.e., *affordability*). Cheaper and more diverse food stores were noted to be situated outside the municipality centre, posing challenges for those dependent on public transport since these areas are less well served in general (i.e., *availability, accessibility and affordability*). Additionally, a lot of participants suffered from functional limitations making it more difficult to cover longer distances by foot and to carry heavier weights (i.e., *accessibility*). This is illustrated by a 53-year-old man: “If you are mobile and you can easily go anywhere, you can compare and go to multiple stores, you can buy the cheapest products everywhere (...) I live in the East, I don’t have a car and because of my back I cannot walk to the store, carry a bag, and go all the way home again.” (Fig. 6)

The participants also linked this (i.e., *acceptability*) to the perceived time and effort they need to put in acquiring food (i.e., *convenience*): “You need to have the time to go to all those stores and compare products and prices. And you have to be mobile. For me personally, it has to be doable on foot or by bike, but then you can only take a limited number of products with you. That’s also a problem.” (Man, 46 years)

### 3.2.3. Perceived food access is embedded in the sociocultural environment

Two sub-themes were constructed when reflecting with the participants on perceived food access in the sociocultural environment: 1) the home sociocultural environment (including the role of family members, perceptions towards food and cultural effects) and 2) the community sociocultural environment (including social interactions and the concept of free food initiatives)

In the home sociocultural environment, most participants noted that food preferences of their family members, especially children, significantly impact their food choices (i.e., *acceptability*): “My daughter decides what we eat. If she doesn’t eat it, I have to prepare something else, so it is better like this for everyone’s sake.” (Woman, 41 years) Also acting as role models for their children’s eating habits is considered important by some participants (i.e., *acceptability*): “They have to taste everything. They cannot play with their food. There are enough people who have no food at all, and also, show some respect to the chef, please.” (Woman, 31 years) Some participants considered less healthy food as a source of comfort, a coping

mechanism for stress or celebration (Fig. 7) (i.e., *acceptability*): “I can’t run away from reality, but I allow myself some little happiness, like eating something I like. I often experience stress, and food helps me letting things go.” (Man, 46 years)

Furthermore, cultural habits were discussed among non-Belgian participants. These included the use of specific products that are considered less healthy in Belgium, such as palm oil and the addition of sugar to beverages (i.e., *acceptability*). Additionally, different eating practices were observed, such as eating lots of meat, eating a hot meal twice a day, and sharing food at any time when someone visits unexpectedly (i.e., *acceptability*). Likewise, the difficulty in finding cultural-specific foods was highlighted (i.e., *accommodation*): “In my country we have very different food. There are a lot of things here that I have never eaten before, and I don’t like it that much. Maybe I also don’t know how to prepare it well.” (Woman, 26 years)

In the community sociocultural environment, social interactions that were perceived ‘positively’ served as a facilitator in terms of approachability to go to certain places (i.e., *accommodation*): “Those are such nice people [at the goat farm] and they have yummy things too. It might cost a little more, what we save at Colruyt [Supermarket] with coupons might go there”. (Man, 62 years) Participants also mentioned that they exchanged vegetables or fruits with neighbours (i.e., *affordability and availability*): “We have an apple tree and a little further down the road lives a man of 93, who likes to make compote, and he gives us rhubarb in exchange. We do that often, exchanging with others, or if we have too much left in the garden, we just give it away for free.” (Man, 62 years) Similarly, social interactions (e.g., ordering a loaf of bread from the bakery, ordering vegetables at a stand at the market, or the social interactions associated with social organizations that distribute free food) also created a barrier to enter certain stores, the market or food banks (i.e., *accommodation*). Some participants felt uncomfortable entering certain stores or food banks due to a perceived sense of not belonging or fear of judgement and shame (i.e., *acceptability and accommodation*): “In the beginning I didn’t know it [a social organization that distributes free food bi-weekly] existed, but now, so many years later, I still don’t know if I would dare to go, I don’t dare take the first step to go to such an organization, because of diffidence I think, because people dare to look at you.” (Woman, 39 years) Shame was also discussed in relation to accessibility and dependence on others (for example, asking a friend or neighbour for a ride to the supermarket because public transport is insufficient), discouraging individuals from seeking assistance (i.e., *accommodation, affordability and accessibility*): “The supermarket was too far away. I also didn’t have a computer or internet in that period, so I was basically stuck. I had to bother people to go shopping with me. You always find people who want to help, but you have to have the



Fig. 6. Photo of the long road that one of the participants needed to take by foot to access the supermarket.



Fig. 7. Photo taken by a participant to illustrate food as a celebration.

courage to take the step to ask for help. It's not easy, especially since you have nothing to give back. You feel so limited and dependent." (Man, 53 years) In this regard, online sharing platforms were mentioned as approachable and affordable alternatives as people share surplus food items freely (i.e., accommodation, accessibility and affordability): "We have a surplus group here in the municipality, where people who have too much food at home can offer to share it for free. Sometimes it's home-cooked meals, but also a lot of times rhubarb, pumpkins or zucchini from their gardens. It's nice and easy and it is good for them too, because there is less waste." (Man, 62 year, Fig. 8)

Free food initiatives, such as food banks, were deemed inappropriate due to perceived lack of variety and quality (i.e., affordability and accommodation). For example, concerns were raised about the provision of frozen foods, as a lot of recipients do not have a freezer at home and they often have to travel a long way back home, with a high probability that the food will already be defrosted. They indicated that the food often consisted of canned or dry products, and that the expiration date had often already expired. Fresh food often seemed of low quality. Additionally, they also felt that the consequences/implications of the free food were not always considered: "For Easter they provided free Easter eggs, very nice, but it had alcohol inside and lots of sugar. It's free food, I'm living on a very tight budget, so I'm not going to say no. My friend, who also lives on a tight budget, has diabetes, but she ate them. Another friend has a known problem with alcohol, she ate them as well. Children too." (Woman, 34 years, Fig. 9)

Moreover, they mentioned that the provided quantities differ from time to time, sometimes it is not enough while at other moments there is too much: "Sometimes we really get a lot of food. However, the expiration date has already passed or is close, so it's like we should eat everything the same day. Sometimes it feels like we can take it home to put it in the garbage ourselves instead of them. It doesn't feel nice. I'm against waste, but it's just not possible to finish it before it expires." (Man, 53 years) Additionally, participants expressed a social pressure to always accept free/given food ("because we are poor") and to be grateful for it ("because they want to help us"), irrespective of quality or healthiness: "It's often the case that we get chips, cookies and chocolate for free. I learned to say no, but there are a lot of people who find this very difficult. We feel like we have to be grateful for everything that we receive." (Woman, 34 years)



Fig. 8. A screenshot made by one of the participants to illustrate the local online sharing community.



Fig. 9. A photo of Easter Eggs made by one of the participants to illustrate the issues regarding free food.

#### 3.2.4. Awareness and ability to navigate within the information environment

The combination of individual literacy and not-well accommodated contexts creates certain challenges in food acquisition and preparation, such as interpreting recipes and knowing where to acquire healthy and affordable foods within the municipality. Two sub-themes were identified: food literacy at the personal level and the information environment at the external level.

On a household-level, some participants expressed difficulties recognizing or preparing certain vegetables: "At the food bank I sometimes receive fresh vegetables, but how should I prepare that? A zucchini, I have never prepared that before. Should I cook it or ... ?" (Man, 42 years) Some participants also expressed difficulties with retrieving and reading recipes: "If I cannot pronounce the ingredients or if I can't find them directly in the store, I already give up. (...) Also, they use specific terms sometimes, but what do they mean?" (Woman, 63 years) Male participants and participants with a non-Belgian nationality encountered more difficulties related to the above-mentioned issues.

At a community level, participants stated that there were multiple alternative food sources already available in the municipality, such as community gardens or local farms, but that a lot of people are not aware of its existence (i.e., availability). They highlighted the lack of communication and information regarding these alternative food sources: "The local government could spread more information. There are a lot of local farmers around with whom they can work together. There will be less transport costs and it is fresh." (Woman, 42 years, Fig. 10) They also noted that the local government could enhance support and promotion for local food initiatives: "There is much more they can do to promote local initiatives and local farmers. It could be financially, or with coordination, but also creating awareness." (Man, 62 years).

Additionally, some participants mentioned issues related to interpreting food labels: "I really think a lot of people assume that a frozen pizza is healthier than canned tomatoes, because of this labelling. That score doesn't say a thing. There is no information about how to interpret it. (...) Before there was information written at the fruit and vegetable section where it came from, what it tastes like and what you can do with it, that was really handy." (Woman, 41 years) Television advertising was noted to increase appetite for predominantly unhealthy food and concerns were raised about its potential misleading nature (i.e., desirability): "You see a group of friends eating fries, all nice and cosy, of course that appeals, but in reality it are us, lonely people, who just fry fries at home out of poverty (...) It's nudging people, they don't put a price on TV. So when you go to the store, you're shocked by how expensive it is. And then you're one of the lower





Fig. 10. A photo of the municipality journal taken by one of the participants that highlights places to eat and drink on a proposed walking route.

classes and you can't buy it. Then you feel guilty and think 'if only I had that money, that I could also buy that for my children.'" (Woman, 56 years) Participants proposed potential facilitators such as flyers with information in supermarkets, organized information sessions, and information and recipes in the municipality journal. Online community groups (e.g., "budget buying", "daily cooking with a low budget") were sometimes found useful for exchanging ideas on budget-friendly cooking and reducing waste. The role of media and advertisements was discussed, with some participants nodding it served as inspiration for cooking, but overall impact was considered limited.

4. Discussion

This study seeks to enhance the existing knowledge by providing insights into the diverse dimensions of perceived access within the local food environment among persons in socioeconomically disadvantaged situations. In our conceptualization of the multiple key dimensions of perceived food access, we built further on prior scholarly work using the access dimensions discussed in Table 1. The present study sought to examine perceptions of food access, encompassing both the personal and external domain. This approach differs from previous research, which has primarily focused on objective and quantitative measurement of external domains (e.g., Turner et al., 2018). The use of qualitative methods allows for a more comprehensive understanding of the subjective experiences and the various factors that influence food access. In analogy with Turner et al. (2018), two domains were identified in which the dimensions of perceived food access interact: the perceived external domain (community level) and the perceived personal domain (household level). In the context of this study, the perceived external domain (community level) refers to the perceived opportunities and constraints regarding food access outside of the household or personal level, within a peri-urban municipality context. The personal domain (individual or household level) encompasses a set of dimensions at the individual or household level that either impede or facilitate food access.

Drawing from our findings, we added specific characteristics to the key dimensions of perceived food access (including food acquisition,

preparation and consumption) among persons in socioeconomically disadvantaged situations. These include 1) incorporating a personal domain to 'availability' (the present utilities or infrastructures related to food storing and preparing), 2) broadening the consideration of costs and purchasing power in 'affordability' to encompass prices related to food acquisition, preparation, and consumption, 3) emphasizing walkability and transport options in contrast to physical ability and mode of transport in 'accessibility', 4) focusing on approachability and social aspects in 'acceptability', and 5) introducing 'awareness' as a novel dimension in perceived food access following the definition of Saurman et al. (2016). Awareness involves effective communication and information, including consideration of the local context and food literacy, knowledge and skills among community members (Saurman, 2016). Therefore, it operates in both the perceived external and personal domain. Table 3 shows the identified dimensions and adapted definitions divided into the perceived external (community level) and personal (individual or household level) domain, based on the findings of this study. In what follows, we will discuss these principal findings in more depth.

Both the objective and perceived availability of food sources within a specific context (external domain) have previously been researched in low-income neighbourhoods, indicating a lower perceived density of supermarkets and healthy food outlets and a higher density of fast food outlets (Madlala et al., 2023; Sawyer et al., 2021). However, our participants also referred to the present materials or infrastructures (such as

Table 3

The applied dimensions of perceived food access divided into external (community) domain and personal (individual/household) domain.

Dimension	
<b>Both external and personal domain</b>	<b>Availability</b> - External: The <b>perceived</b> presence (or absence) of food sources within a given context - Personal: <b>the present utilities or infrastructures related to food storing and preparing</b> (personal)
	<b>Accessibility</b> - External: The <b>perceived</b> proximity and density of food sources within a given context, <b>and the walkability or public transport options</b> - Personal: The (relative) proximity in terms of distance, travel time, <b>physical ability and mode of transport.</b>
<b>External domain</b>	<b>Affordability</b> - External: The <b>perceived</b> monetary values of food products, <b>and the prices related to food acquisition, preparation and consumption</b> - Personal: The purchasing power
	<b>Awareness</b> - External: The <b>perceived</b> effective communication and information, including consideration of the local context and literacy - Personal: <b>Literacy, knowledge and skills related to health and food</b>
<b>Personal domain</b>	<b>Accommodation</b> The adaptation of food sources to local residents' needs, including the appropriateness, quality and continuous nature of the services (cfr. adequacy)
	<b>Desirability</b> The status of foods, cultural norms, advertisement, product placement and promotions
<b>Personal domain</b>	<b>Convenience</b> The relative time and effort of collecting and preparing food, including the time allocation and priorities set
	<b>Acceptability</b> The individual attitude regarding attributes of the local food environment, including the personal standards (e.g., taste preferences, desires, attitudes, culture, knowledge and skills), <b>the approachability (enterability) and sociocultural aspects.</b>

References: Caspi et al., 2012; Herforth & Ahmed, 2015; Penchansky & Thomas, 1981; Turner et al., 2018; Saurman, 2016.

\*Changes to the definitions presented in Table 1 are put in bold.

the physical kitchen space, availability of a cooking top and equipment, lighting, cupboard space, and the presence of refrigerators or freezers) as important factors in food storing and preparing, and therefore limitations in choices towards healthy eating. These factors related to availability in the personal domain tend to be overlooked in previous research. Especially in populations in socioeconomically disadvantaged situations, these might be crucial, as they are also closely linked to affordability. It is well-known that cost and purchasing power are a major barrier for food access worldwide, specifically for persons in socioeconomically disadvantaged situations (Darmon & Drewnowski, 2015; Evans et al., 2015; Pitt et al., 2017; Sawyer et al., 2021). Our results show how affordability is linked to all other food access dimensions, as it is not only about the monetary cost (e.g., prices of healthy food and the purchasing power to buy these products as often discussed in literature), but the fact that obtaining, storing, and preparing healthy food is not cost-free (e.g., transport costs, kitchen and storage space and conditions, cooking utensils, energy costs, ...). Accessibility is especially burdened as people without their own transportation, and in some cases functional limitations, have a harder time to get to locations (Geurden et al., 2022). Some sub-municipalities did not have an optimal public transport causing participants to depend heavily on walking under less than ideal circumstances or getting rides from other people. There is an interaction between the perceived external domain (perceived proximity in terms of distance and travel options such as public transport and walkability) and the perceived personal domain (physical ability, perceived proximity, travel time and possibilities regarding mode of transport). Consistent with previous literature on low-income neighbourhoods is that residents more often need to shop outside of their local environment, and that they experience longer commute times and more complex transport modes to supermarkets or other food sources, and having to visit multiple stores to meet the needs compared to high-income neighbourhoods (Darmon & Drewnowski, 2015; Evans et al., 2015; Pitt et al., 2017).

Researchers agree that eating behaviour is strongly influenced by social context, often referring to social influences, social norms and values, beliefs and attitudes, but also media and advertising (Sawyer et al., 2021; Zorbas et al., 2018). Within our data, social network and support seemed to play an important facilitating role in enabling access to healthy and affordable foods (e.g., by offering transport and sharing (prepared) foods), while social interactions were mostly perceived a barrier due to feelings of shame and being patronised. Previous research showed that social interactions tend to take place more frequently at local markets and specialized shops, compared to supermarkets (Cicatiello et al., 2015). Chebat et al. (2006) argued that consumers have a preference for shopping environments where they can find people they feel similar to so that they feel more at ease (Chebat et al., 2006). Additionally, research suggests that negative interactions might be experienced as something related to them personally, perhaps arising out of an individual failing (Bruckner et al., 2021). This may provide an explanation for the perception that social interactions, such as those encountered at the butcher, markets or social organizations, can act as a barrier. Similar to other research, eating is perceived a social activity, where preferences of family members, especially children, and the modelling role as a parent also affect eating behaviour (Sawyer et al., 2021; Zorbas et al., 2018). Additionally, our results support previous research findings that living alone is related to a reduction in motivation and enjoyment in cooking (often manifested as the preparation of simple meals or use of ready-made meals), an increased perceived cost (often manifested by a lower consumption of fruit and vegetables) and sometimes associated to psychological and mental health factors that might influence food intake (Hanna & Collins, 2015).

We added awareness as a key dimension in food access based on our analysis. This concept has previously been introduced by Saurman (2016) related to access to healthcare, however this caught no previous attention in food access literature. She defined it as “a service maintains awareness through effective communication and information strategies with

relevant users, including consideration of context and health literacy”. Drawing upon our findings, we conceptualized awareness in food access as the interplay between the information and communication environment at the community level and the individual literacy (health, food or digital) at the individual level. Awareness creates the fit between the context and the individual, as not well-accommodated contexts create certain challenges in food acquisition, preparation and consumption. Food, health and digital literacy, knowledge and cooking skills among residents are part of the context, and an outcome of effective communication and information.

Based on our findings, we argue that all food access domains are interlinked and a multi-faceted approach to ensure food access is necessary (Fig. 11).

Turner et al. (2018) posit that the availability of food precedes its accessibility. This is because food cannot be accessible if it is not available. However, it should be noted that awareness is ideally considered to precede availability. This is because if individuals lack awareness, do not have access to information on the existence and utilization of food resources, their perception of availability will differ. For instance, our participants mentioned that they were unaware of local food alternatives, such as local farmers or a bi-weekly free food distribution, and therefore did not use them. Accessibility is closely linked to convenience as evidenced by the participants’ perceptions of the time and effort required to obtain food and the distance and mobility issues they experienced. As earlier said and as our results demonstrate, affordability and individual characteristics affect all dimensions in perceived food access among persons in socioeconomically disadvantaged situations. Affordability affects situational and time constraints because of a lack of resources, including household resources, personal transportation, social isolation, reduced access to childcare, fluctuations in living costs. This is also in line with findings of the systematic review of Pitt et al., 2017. Our findings suggest that structural interventions, such as increasing the availability of fruit and vegetable stores and reducing the number of fast-food outlets, are insufficient. Instead, it is crucial to recognize the connection between the structural (in)accessibility and the processes that enable or constrain food access (Bruckner et al., 2021). The perceived dimensions of food access and their interactions within the local environment could therefore inform policy initiatives, urban planning strategies and community-based interventions to promote equitable access to healthy food. Although the focus of this study was on participants’ local environment, it is remarkable that macro-level determinants (which also impact the micro-level) such as national and regional politics, the broader economic and social system, or the role of media and commercial determinants have scarcely been discussed by our participants. This might be because participants feel more in control of micro-level determinants. Moreover, healthy eating has previously predominantly been considered an individual responsibility by society and governments (McDonald & Braun, 2022). Strategies for addressing healthy eating therefore also primarily focused on individual behaviour change through awareness campaigns and education (Breda et al., 2020). However, such strategies have been insufficiently effective, which led the last decade to a growing recognition for the role of contextual determinants in eating behaviour (Breda et al., 2020). We notice that this ‘old’ way of thinking is also persistent among our participants as they often cite individual coping strategies to support healthy and affordable eating related to diverse food access domains.

This study has certain limitations to consider. First, there may be a self-selection bias among participants, as refusals to participate also concerned the sensitivity of the subject (talking about food and eating behavior). This could mean that persons who experience difficulties with eating healthy might be less inclined to participate. The recruitment process within the same project, albeit focusing on physical activity, exhibited greater ease (D’Hooghe et al., 2023). Second, the perceptions towards food access are embedded in the local context, which means that findings may not be applicable to other regions or

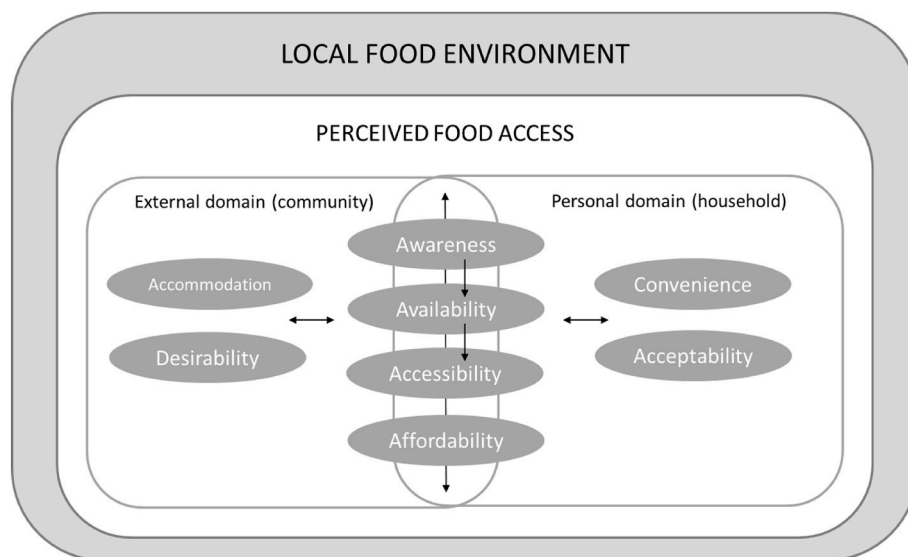


Fig. 11. Interaction of the 8 dimensions of perceived food access.

communities with different characteristics. Third, this study focused on 'socioeconomic disadvantage' based on education status, employment status, perceived SES, and perceived income. However, different cultural backgrounds and practices related to food may also affect perceptions of food access (Monterrosa et al., 2020). Failure to account for cultural diversity within the socioeconomically disadvantaged population might have led to incomplete findings. Future research should therefore carefully consider and define 'socioeconomic disadvantage' and apply an intersectional approach encompassing race, ethnicity, and gender. Lastly, translating perceptions into actionable policies and interventions can be challenging. This study highlights barriers and needs but providing practical solutions that are feasible and acceptable to the community requires further research and collaboration with stakeholders.

This study has various strengths. First, the photo-elicitation data provide a comprehensive understanding of the barriers and facilitators participants encounter in accessing healthy food in their local environment, by offering insights into their perceptions, experiences, and interactions. Unlike closed-question surveys that may overlook relevant features and nuances in understanding people's eating behavior, the qualitative methodology employed in this study yields in-depth and richer information, capturing interactions between the different dimensions of access. Moreover, the participant-driven nature of the data allows the participants to guide researchers towards features related to food access that are most important and relevant to them (Jull et al., 2017). It is critical that we understand barriers that persons in socioeconomically disadvantaged situations face in accessing healthy foods to identify and co-create appropriate interventions. Second, the flexibility of the study, wherein the methods were adapted from participant-driven photo-elicitation in group context to researcher-driven photo-elicitation interviews following an initial low response rate and based on participant findings allowed for a more responsive research process (Holloway & Todres, 2003). While the focus group discussions elicited more in-depth and unexpected experiences compared to individual interviews, this methodological adjustment ensured continued participant engagement and data collection. Third, this study focuses on multiple food access dimensions, also the ones that have been less discussed in previous literature, such as accommodation and acceptability. Additionally, this study examined access to both healthy and unhealthy foods without imposing specific definitions, instead relying on participants' perceptions of these concepts. This approach enables participants to articulate what is significant to them, potentially uncovering barriers to food access that might otherwise remain unidentified when the focus is

restricted to specific food outlets. Fourth, this study specifically focuses on persons in socioeconomically disadvantaged situations in a peri-urban environment, while previous research focused primarily on urban areas and to a lesser extent on rural areas (Olson et al., 2019). Understanding and studying peri-urban areas, which contain a mix of both urban and rural characteristics, may provide insights into complex dynamics that are often overlooked when solely focusing on urban or rural settings (Zlender, 2021). Moreover, prior research shows that food environments and food access differ across communities, neighborhoods, cities and countries, which underlies why studying the local environment in the specific context of peri-urban municipalities in Flanders is important.

## 5. Conclusion

In conclusion, this study contributes to the existing body of knowledge on the perceived food access among persons in socioeconomically disadvantaged situations living in a peri-urban setting. The utilization of qualitative methods permitted a nuanced examination of subjective experiences and the multifaceted factors influencing food access. The perceived food access dimensions could be divided into personal (accessibility and convenience), external (accommodation and desirability) and both personal and external (availability, accessibility, affordability and awareness) domains. Our findings underscore the importance of the home food environment, such as kitchen infrastructure and cooking equipment, which has often been overlooked in the past. We also highlighted the interconnectedness of affordability with other food access dimensions, the limited transport options, and the dual role of the social environment as both a facilitator (e.g., through food sharing) and a barrier (e.g., through social stigma and lack of support). Notably, we introduced 'awareness' as a novel dimension in perceived food access, emphasizing necessity for effective communication and enhancement of the information environment to improve food literacy. Overall, this study emphasizes the complexity of food access and the need for a multifaceted approach that integrate personal, community and broader systemic factors to ensure equitable access to healthy food.

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## Ethical Statement for Solid State Ionics

Hereby, I, Suzannah D'Hooghe, consciously assure that for the manuscript 'Exploring the multiple dimensions of perceived food access in the local food environment in Flanders: perceptions of adults in socioeconomically disadvantaged situations' the following is fulfilled:

- 1) This material is the authors' own original work, which has not been previously published elsewhere.
  - 2) The paper is not currently being considered for publication elsewhere.
  - 3) The paper reflects the authors' own research and analysis in a truthful and complete manner.
  - 4) The paper properly credits the meaningful contributions of co-authors and co-researchers.
  - 5) The results are appropriately placed in the context of prior and existing research.
  - 6) All sources used are properly disclosed (correct citation). Literally copying of text must be indicated as such by using quotation marks and giving proper reference.
  - 7) All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.
- The violation of the Ethical Statement rules may result in severe consequences.

To verify originality, your article may be checked by the originality detection software iThenticate. See also <http://www.elsevier.com/editors/plagdetect>.

I agree with the above statements and declare that this submission follows the policies of Solid State Ionics as outlined in the Guide for Authors and in the Ethical Statement.

## CRedit authorship contribution statement

**Suzannah D'Hooghe:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Yasemin Inaç:** Writing – review & editing, Methodology. **Stefanie Vandevijvere:** Writing – review & editing, Supervision. **Benedicte Deforche:** Writing – review & editing, Supervision. **Karin de Ridder:** Writing – review & editing, Supervision, Conceptualization. **Delfien Van Dyck:** Writing – review & editing, Supervision. **Nico Van de Weghe:** Writing – review & editing, Supervision. **Sarah Dury:** Writing – review & editing, Supervision.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.appet.2024.107609>.

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