

## **Walking off the beaten path: everyday walking environment and practices in informal settlements in Freetown**

### **Abstract**

Walking is the dominant mode of transport in informal settlements across the Global South. This is especially true in African cities where structural deficits, morphological challenges and ineffective urban development constrains sustainable transport planning and delivery for low-income areas. Despite emerging scholarship on walking in Africa, the literature pays little attention to the walking environment's everyday realities. This paper aims to address this gap by presenting an exploratory study that examines the walking environment and everyday walking practices in an informal settlement in Freetown, Sierra Leone, using a web-based mapping and qualitative questionnaire. The results show that walking remains the dominant means of mobility in the informal settlement, mainly due to the challenging topography and poor infrastructure. To improve the walking experience and mitigate risks, residents have resorted to improvisations such as self-constructed routes, self-provided street lights or benches for rest stops. Our results show that local improvisations influence residents' positive experiences of walking. The paper highlights the need for collaborative and participatory local interventions built on everyday walking practices to support the co-production of methodologies for understanding and improving local walking experiences. Through a context-specific understanding of the everyday walking environment, the research provides avenues for urban transport and development planners to work with local actors to improve accessibility in informal urban neighbourhoods facing acute structural deficits for urban mobility and access to essential everyday services.

**Keywords:** Walking environment, everyday walking practices, informal settlements, Freetown

## 1. Introduction

Informal settlements constitute a significant feature of the urban built environment in Africa's current urbanisation pattern (Kita, Okyere, Sugita, & Diko, 2020; Myers, 2011). Their socio-spatial manifestations are pervasive in contexts where urban growth is both rapid and poorly managed (Lynch, Nel, & Binns, 2020). Although differences exist within and between African cities, recent estimates suggest that about 62% of Africa's urban population live in informal settlements (Pieterse, 2017; UNHABITAT, 2012a). The alarmist and dystopian narrative of Africa's informal population as marginal and disorderly (Davis, 2006; Rakodi, 2008) is gradually being side-stepped, giving way to scholarship highlighting the ingenuity and improvisations of everyday urbanism (Okyere, 2018; Okyere & Kita, 2016; Satterthwaite et al., 2020; Simone, 2010). Given the unplanned nature of Africa's urbanism and its socio-spatial dynamics and structural drivers (Fox, 2014; Schindler, 2017), the need to advance research rooted in everyday urban realities (i.e. livelihoods, mobilities, and associated local practices) becomes a critical concern (Evans, O'Brien, & Ch Ng, 2018; Obeng-Odoom, 2015; Pieterse, 2017; Pieterse, Parnell, & Haysom, 2018; Uteng & Lucas, 2017b).

Current research on urban mobility in African cities emphasises transport-related vulnerabilities and the role of local transport planning (Oviedo et al., 2017). Several studies highlight existing problems, barriers, and regulations around investment in urban transport infrastructure and management, land use and mobility constraints for disadvantaged socioeconomic groups (Venter, 2011; Williams, White, Waiganjo, Orwa, & Klopp, 2015). Previous studies have also uncovered mobility patterns, levels of accessibility, agency in both formal and informal transport systems and demand variations in inner-city and peri-urban areas (Andreasen & Møller-Jensen, 2017; O'Brien & Evans, 2017; Olvera, Plat, & Pochet, 2019; Salon & Gulyani, 2019). One key area that has emerged relates to the everyday dimension of mobility and accessibility in informal urban settlements. Mobility is critical to the sustainable improvement of informal settlements and their residents' wellbeing (Andreasen & Møller-Jensen, 2017; Evans et al., 2018; Oviedo, Levy, & Dávila, 2017). Nevertheless, informal settlements' marginal location and municipal authorities' limited capacity to provide essential urban infrastructure reinforce disconnection and exclusion cycles (Hill, Hühner, Kreibich, & Lindner, 2014). Consequently, most of Africa's urban population resort to informal transport systems. In addition, UN-Habitat (2012b) notes that given the geography, morphology and the organic structure of informal settlements, the complex formal-informal structure of urban mobility is critical to safeguard livelihoods and reduce social exclusion.

Research shows that walking conditions in African cities are precarious and unsafe, primarily because of the prioritisation of local urban design for automobility (Behrens, 2005; Pedaku, 2005). African cities are therefore 'walking cities' that are not walkable (Chege, 2019). Existing literature suggests that improving the quality of non-motorised transport infrastructure is necessary to encourage the health benefits associated with walking, while, asserting the urgency of integrating walking into urban transport planning in African cities (Behrens, 2005; Mitullah, Vanderschuren, & Khayesi, 2017; Oyeyemi et al., 2017; Oyeyemi et al., 2019). These studies offer insights into walking regarding road and personal safety. Moreover, they shed light on context-specific elements of the built environment that influence this form of mobility in SSA such as water access points (Oyeyemi et al., 2017) and informal open spaces (Anciaes, Nascimento, & Silva, 2017). Despite such developments, there is still little evidence about the role of walking in improving accessibility and the behavioural, planning and policy constraints that limit its development in African cities. Accordingly, residents' everyday walking practices in their local environment (e.g. activities and improvisations) and their impact on their walking experiences are still unexplored, particularly in informal settlements.

This paper addresses this gap and contributes to the above literature through an exploratory study on the walking environment and residents' everyday walking practices in one informal settlement in Freetown, the capital of Sierra Leone. Freetown provides an ideal setting to study this: the city is experiencing rapid urbanisation, and the majority of its urban growth is occurring in informal areas along steep terrain. The paper presents an analysis of residents' everyday walking practices shaped by the constraints of the walking environment and how residents navigate them to secure some accessibility. It draws on results from a study undertaken through a participatory mapping tool (Maptionnaire) to explore the variety of walking routes and their characteristics, and a qualitative assessment of local walking practices and experiences to shed light on the realities of everyday walking experiences. We consider that in the case of informal settlements, it is analytically relevant to (i) identify the physical condition of daily walking routes and (ii) residents' practices to reduce risks and improve walking experiences. We suggest that a local and context-specific understanding of urban mobilities' everyday realities can support collaborative responses to improve urban transport conditions in Freetown and other cities in SSA.

The paper is structured as follows. Sections 2 and 3 present a literature review of walking in urban settings focused on Sub-Saharan Africa (SSA) and the study's analytical framework, respectively. Section 4 introduces Freetown and the informal settlement – Moyiba –. Section 5 entails the methodology. Section 6 follows with the analysis of the walking environment and practices. Discussion and conclusions are shown in section 7 and 8, respectively.

## **2. Literature Review**

Walking as a form of urban mobility is influenced not only by individual physical and behavioural characteristics but also by objective and perceived conditions of the built environment. The latter, framed as walkability, can encompass the urban form, street materials, traffic levels and crime. In the last two decades, walking as a mode of transport has received increased attention from transport planning research and practice (Massingue, 2017). It is recognised for its health and environmental benefits (Farkas, Wagner, Nettel-Aguirre, Friedenreich, & McCormack, 2019; Hirsch, Winters, Clarke, Ste-Marie, & McKay, 2017; Maizlish et al., 2013; WHO, 2014; Yu, Davey, Cochrane, Learnihan, Hanigan, & Bagheri, 2017; Zadro et al., 2017) and its impact on social capital (Leyden, 2003; Yamamoto & Jo, 2018). Accordingly, studies focusing on the behavioural and built environment characteristics needed for walking as a principal mode of travel for leisure have increased considerably (see reviews Krizek, Forsyth, & Baum, 2009; Su et al., 2019). Until recently, most of such research focused on North American, Australian and European cities proposing metrics based on urban form features such as street connectivity, residential density and land use mix, and on pedestrian infrastructure and subjective perceptions (Cervero and Radisch 1996; Crane and Crepeau 1998; Grasser, van Dyck, Titze, & Stronegger, 2017; Leyden 2003; Lund 2002; Moura et al., 2017; Nilles & Kaparias, 2018; Sisiopiku and Akin 2003). Empirical studies about walking experience and walking are less frequent in the literature (Battista & Manaugh, 2018; Middleton, 2010, 2018; Ziegler & Schwanen, 2011).

Current discussions acknowledge that the built environment's objective and perceived conditions facilitate or discourage physical activity (Farkas et al., 2019). Various studies have also produced evidence about the characteristics of the built environment that are favorable for walking (Su et al., 2019). Land-use and density, urban form and neighbourhood design, and traffic conditions, are among the most frequently studied determinants of walkability. High land-use mix and population density are positively related to people choosing walking as their travel mode (Giles-Corti et al., 2011; Grasser et al., 2017, 2013; McCormack and Shiell, 2011). People also walk more in cities or neighbourhoods that have street grids

with higher intersection density, street density, link node ratio or/and smaller block size and block length (Cervero and Radish, 1996; Grasser et al., 2013; Levinson and Wynn, 1963; McCormack and Shiell, 2011).

However, the reliability of the above measures is limited (Adkins et al., 2017; Berrigan et al., 2010; Cambra, 2012; Steiner and Butler, 2012), pointing to the relevance of elements of evaluation at the individual level, including perceptions of comfort, safety and appeal. Studies have addressed the effect of pedestrian infrastructure, traffic and associated factors such as speed (Brown et al., 2007; Giles-Corti et al., 2013; McCormack and Shiell, 2011; Saelens and Handy, 2008), availability of green and public spaces (Owen et al., 2004; Pikora et al., 2003; Saelens and Handy, 2008), aesthetics (Cerin et al., 2014; Sugiyama et al., 2014) and more recently household socioeconomic characteristics (Adkins, Makarewicz, Scanze, Ingram, & Luhr, 2017) have on walking trips.

Beyond these factors, perceived neighbourhood walkability positively correlates to weak-tie communication frequency as conceived within social processes (Yamamoto & Jo, 2018). Neighbourhoods with pedestrian-oriented designs have higher social capital than car-oriented suburbs where political participation, trust and social engagement is lower (Leyden, 2003). Accordingly, Lund's (2002) comparative study in Oregon, controlling for demographic characteristics, show that objective and perceived favourable conditions for walking enhance a sense of community. Other studies have also shown the importance of walking in social networks' vitality (French et al., 2014; Wood, Frank, & Giles-Corti, 2010; Zhu, Yu, Lee, Lu, & Mann, 2014).

## **2.1. Walking in Africa**

Although walking has recently gained attention in transport policy and research in the Urban North, there is still very little empirical research and policy attention in the Urban South. The lack of research is more striking in cities where there is evidence that walking is one of the main modes of urban mobility (Bryceson, Mbara, & Maunder, 2003; Olvera et al., 2013; Pendakur, 2005; Venter, 2011), especially among low-income households (Behrens, 2005; Bryceson et al., 2003; Sohail et al., 2003). Evidence about travel behaviour, particularly non-motorised trips, is limited (Behrens, 2005; Venter, Vokolkova, & Michalek, 2007). Accordingly, studies that refer to or focus on walking tend to emphasise its positive effects as a means of physical activity and a sustainable mode of transport (Adkins et al., 2017; Bostock, 2008; Bereitschaft, 2017). The current body of knowledge on walking in Sub-Saharan Africa (SSA) can be categorised in three main themes: safety, health, and inequality.

### *Walking and safety*

In Nairobi and Eldoret in Kenya and Dar es Salaam and Morogoro in Tanzania, Pandakur notes that "there is a complete lack of physical infrastructure dedicated exclusively for walking" (Pendakur, 2005, p. 147). Learnings drawn from interventions aimed at improving the quality and safety of non-motorised travel in these cities, highlight the importance of dedicated pedestrian infrastructure and prioritising traffic control, law enforcement and education. In South Africa, Behrens (2005) shows that walking conditions are precarious and unsafe due to urban designs seeking to shorten inter-neighbourhood walking trips and favour automobility. The same study suggests that 'public rights-of-way' should be the guiding principle to increase pedestrians' traffic safety. Moreover, Pendakur (2005) finds that painted pedestrian crossings did improve pedestrian safety as drivers do not respect the crossings, and pedestrians gain a false sense of safety. By contrast, raised crossings were found to be more effective. This same study emphasises the need to understand road users' behaviours. Importantly, missing links and shortcuts are relevant pedestrian spaces

used intensely by low-income households. In the same vein, this research recognises street vendors' role in pavements and allocation of space for walking (ibid).

In terms of perceived safety related to crime, particularly for women, Behrens (2005) points to the importance of pathways that allow for continuous and multidirectional movement while suggesting public surveillance of pedestrian spaces to be critical. Crossings also play a crucial role in improving walking conditions. In a study on rural and peri-urban communities, Bradbury (2014), found that traffic levels become a limitation for women, elderly and children to access local facilities due to its barrier effect.

In a more recent study, Obeng-Atuah, Poku-Boansi, and Cobbinah (2017) analyse pedestrian safety in New Juaben, Ghana, building on information about the condition and use of crosswalks, including pedestrian perceptions. They show the centrality of pedestrian behaviour to safety in terms of the quantity and severity of collisions. Walking time, fatigue and walking spaces are significant factors influencing pedestrian injuries and deaths. Research in Ethiopia shows that the absence of sidewalks, crossings, and street lighting, alongside roadside vendors' presence play vital roles in decreasing road safety (Tulu et al., 2013). In Ghana, lack of designated pedestrian space, high competition for road space by different users (including informal economies) and walking at night are also identified as key sources of risk for pedestrians (Amoako, Cobbinah, & Niminga-Beka, 2014; Damsere-Derry, Ebel, Mock, Afukaar, & Donkor, 2010).

#### *Walking and health*

In a series of studies in Nigeria, Cameroon, Ghana, Kenya, Mozambique, South Africa, and Uganda, research has unearthed the importance of physical activity for health from the perspective of the links between walking and perceived built environment characteristics (Oyeyemi et al., 2012, 2013, 2016, 2017, 2019).

Adapting the Neighbourhood Environment Walkability Scale for these seven SSA countries (NEWS-Africa), these studies point to three specificities. First, the importance of personal safety from both crime and traffic. In previous studies, Oyeyemi et al. (2012, 2013) had established strong links between personal and traffic safety and moderate and vigorous physical activity in Nigeria. Second, context-specific aesthetics (e.g green space), proximity of destinations and access to amenities and places (e.g. water access points, shops, etc) are necessary adaptations to better-understand the relation between characteristics of the built environment and walking (Oyeyemi et al., 2013, 2016, 2017, 2019). Third, an application of the NEWS-Africa index found that land-use mix, and pedestrian infrastructure and recreational space availability were positively correlated to the likelihood of mental outpatients walking in Uganda (Vancampfort et al., 2019). Relatedly, Oyeyemi et al (2018) show that health enhancing physical activity and walking provide physiotherapeutic benefits to older adults in Nigeria.

#### *Walking and inequality*

Research exploring urban transport planning considerations for improving walkability and urban equity is gradually taking shape. Although walking can be considered as the most equitable mode of transport, as it is available to the majority of able-bodied populations (Forsyth and Southworth, 2008), for many citizens walking is not a choice but an imposition of unequal and exclusionary built environments and urban configurations (Mitullah et al., 2017). Thus, walking is an expression of structural social and spatial inequalities (Pendakur, 2005; Venter, 2011).

Anciaes, Nascimento, & Si's (2017) GIS-based analysis is the only one in SSA on walkability inequality within one city. The authors consider differentials in walkability between neighbourhoods with different income and urbanisation levels by measuring accessibility (jobs, people, shops, facilities, leisure areas and bus stops) and six quality variables (designated pedestrian space and its proportion, collision risk, crime, slopes, and risk from flooding and landslides). In contrast with studies in North American, Australian and European cities, Anciaes et al. (2017) include public squares, gardens and informal open spaces as part of the pedestrian space. Furthermore, neighbourhood-level results are ranked to account for the influence of perceptions in walking experience. The assumption is that the subjective experience of walking is influenced not only by the absolute scale of difficulty but also by comparison with the conditions faced in other parts of the city (Anciaes et al., 2017). One key conclusion is the variation of walking accessibility and quality by income and urbanisation level across different neighbourhoods, with poor communities predominantly locating in slopes and facing higher environmental risk and personal security issues.

In sum, empirical research about walking in SSA urban areas is developing and signalling some areas worthy of more attention and exploration. First, regarding the walking environment, urbanisation patterns and pedestrian infrastructure related to road safety has been at the centre of the studies. Second, research on travel behaviour suggests that walking entails health benefits and that it is the predominant form of mobility, especially for lower-income inhabitants. Third, Anciaes et al. 's (2017) results of a direct relation between walking conditions for a neighbourhood and income level suggest the need for more studies that account for the perceptions of pedestrian infrastructure and the inequalities associated to it. Finally, the literature review suggests that features associated with comfort, such as levels of fatigue, are still scarcely incorporated in walkability research in SSA with only one research incorporating this aspect into the analysis of everyday walking practices (Obeng-Atuah, Poku-Boansi & Cobbinah, 2017).

### **3. Analytical framework: the subjective and objective dimensions of walking**

Our approach to the everyday walking environment and practices in informal settlements builds on two primary sources. First, the considerable evidence of the positive association between walking and characteristics of the urban form and design of the built environment (Su et al., 2019), including its subjective perception (Saelens, Sallis, Black, & Chen, 2003) and experience (Middleton, 2018). Second, the still-scarce but rich empirical knowledge about walking practices from urban contexts in the global south, which suggests walking is a predominant travel mode for low-income populations. The latter entails acknowledging that the relation between walking behaviour and the characteristics of the built environment are different (Adkins et al. 2017). The exploration of walking practices when it is not a choice but an imposition carries an implicit urban equity dimension. Decades of research show the importance of standardised methods and measures that can be contextualised and validated in different urban realities (Grasser et al., 2017; Qureshi, Shaikh, & Memon, 2018; Oyeyemi et al. 2016, 2017, 2019). Accordingly, we develop a framework applicable in cases with limited resources to produce evidence and inform policy interventions.

We can classify aspects commonly measured in the walking environment analysis and its links to walking behaviour into three categories: accessibility, safety and pleasurability (see Table 1). Accessibility includes characteristics of the built environment, such as the geographical distribution of economic and recreational activities, and the urban form. Safety accounts for characteristics related to personal security and road safety when walking. Pleasurability encompasses comfort and aesthetics, such as road material, shade, street furniture, cleanliness and greenery. These three proposed dimensions seek to encapsulate measures suggested by the Neighbourhood Environment Walking Score adapted to SSA countries (Oyeyemi et al. 2016). By proposing fewer categories and more flexible groupings, we seek to develop a research

methodology rooted in informal settlements' everyday urban reality. Such methodology seeks to underscore residents' ingenuity and improvisations in traversing socio-spatial challenges in the urban environment (Okyere, 2018; See also Calvert, Jain and Chatterjee, 2019).

Table 1 summarises illustrations of reviewed measures of walking studies under the categories defined for this paper's analytical framework. Perceptions of the built environment differ from physical attributes, being "more important than objective measures" when areas or routes are perceived as unsafe or unpleasant (Hoehner, Brennan Ramirez, Elliott, Handy, & Brownson, 2005). Koohsari et al. (2015) found that perceived walkability is related to the likelihood of walking for transport for some attributes of the built environment by up to 60%. In global south urban contexts, safety (and personal security) perceptions, including traffic and crime, appear to have a more significant difference with objective measures such as connectivity (Qureshi, Shaikh, & Memon, 2018). Furthermore, perceived conditions can be either individual or collective. The latter shapes community behaviour and ultimately, the environment. Perceived walkability appears to have a higher effect on social interaction and community than objective measures (French et al., 2014; Jun & Hur, 2015). Walking is an intrinsically social activity as "its sociality does not hover above the practice itself, [...] but is rather immanent in the way a person's movements – his or her step, gait, direction and pace – are continually responsive to the movements of others in the immediate environment." (Ingold, 2004, p., 328).

In the absence of behavioural aspects to signal the positive or negative way the built environment and its perception affect walking practices, we incorporate the psychological concept of affect. In psychology, affect is understood as the basic sense of feeling, resulting from a combination of two parameters: arousal level from high to low and a balance scale that ranges from pleasant to unpleasant. Walking in a specific built environment will depend on the combination of those two parameters and how the individual interprets (including unconsciously), the experience. Considering the limited evidence on pedestrian subjective experiences (Middleton, 2018) and the difficulties of its operationalisation (Kim, Park, & Lee, 2014), the subjective experience of walking is focused on this basic psychological concept. Thus, aiming to account for adaptive preferences, satisfaction with walking as a travel mode (Friman, Fujii, Ettema, Gärling, & Olsson, 2013) is understood as the positive affective psychological state of pedestrians (Kim et al., 2014).

Authors	Walkability measures						Type of measurement		Location
	Accessibility		Safety		Pleasurability		Objective	Perceived	
	Connectivity	Economic and recreational activities	Personal	Traffic	Aesthetics	Comfort			
Anciaes et al. (2017)	A		CS	TS		WCF, PES, PER	x	x	Praia, Cabo Verde
Arvidsson et al. (2013)	SC	RD, LUD					x		Stockholm, Sweden
Bereitschaft (2017)	WS						x		Charlotte, Pittsburgh, and Portland, USA
Brian et al. (2003)	SC	RD, LUD					x		San Diego, CA, USA
Brown et al. (2007)	A		CS	TS	PS				Irvine-Minnesota audit measures Salt Lake City, Utah,
Cerin et al. (2006)	SC	RD, LUD and LUA	CS	TS	AE	WCF			Baltimore USA
Cerin et al. (2009)	SC	RD, LUD and LUA	CS	TS	AE	WCF			Baltimore, MD, USA
Cervero et al. (2009)	SC						x		Bogotá, Colombia
Collins et al. (2018)	WS						x		Ontario
Doyle et al. (2006)	SC	RD, LUD and LUA	CS	TS	AE	WCF			Large urban areas in USA
Forsyth et al. (2009)	MBS	RD					x		Minneapolis, USA
Frank et al. (2004)	CT	RD, LUD					x		Atlanta, USA
Frank et al. (2008)									
Frank et al. (2010)	ID	RD, LUD and FAR					x		King County, Washington, and Maryland
Freeman et al. (2012)	ID	RD, SSD, LUD, FAR					x		New York City, USA
Giles-Corti & Donovan (2002)		A, PNA	CS	TS	NI	PSS	x	x	Perth, Australia
Grasser et al. (2017)	ID	HUD, LUD					x		Graz, Austria
Grasser et al. (2017)	ID	HUD, LUD					x		Graz, Austria
Handy et al. (2006)	WS						x		Northern California, USA
Hooker et al. (2005)						PES		x	Rural South Carolina, USA
Ivory et al. (2015)					SS		x		Auckland, Wellington,



Kelly et al. (2011)	ID and detours			TS	SS	WCF		x	and Christchurch (New Zealand)
Owen et al (2007)	SC	RD, LUD and LUA	CS	TS	AE	WCF		NEWS	York and Leeds, UK
Oyeyemi et al (2013)	CT	RD, LUD and LUA					x	x	Australia
Oyeyemi et al (2019)	SC	RD, LUD and LUA	CS	TS	AE	WCF		NEWS - Africa	Maiduguri and Ilorin in Nigeria
Oyeyemi et al. (2016)	SC	RD, LUD and LUA			AE	WCF		NEWS - Africa	Maiduguri, Nigeria
Qureshi et al. (2018)	SC	RD, LUD and LUA	CS	TS	AE	WCF	GIS	NEWS	Cameroon, Ghana, Kenya, Mozambique, Nigeria, South Africa and Uganda
Vacamfort et al. (2019)	SC	RD, LUD and LUA	CS	TS	AE	WCF		NEWS - Africa	Putrajaya, Malaysia
Yamamoto, & Jo. (2018)	SC	RD, LUD and LUA	CS	TS	AE	WCF		NEWS	Kampala, Uganda
Yu et al. (2017)	WS						x		Chicago, USA
Zadro (2017)	WS						x		Australian Capital Territory
									Washington state, USA

Conventions: Accessibility (A); Street Connectivity (SC); Walk Score (WS); Median Block Size (MBS); Connectivity (CT); Intersection Density (ID); Residential Density (RD); Land-Use Mix Diversity (LMD); Land-Use Mix Access (LMA); Subway Station Density (SSD); Household Unit Density (HUD); Floor Area Ratio (FAR); Perceived Neighbourhood Attractiveness (PNA); Crime Safety (CS); Traffic Safety (TS); Pleasurability (PS); Aesthetics (AE); Neighbourhood Interest (NI); Streetscape (SS); Perceived Environmental Support (PES); Perceived Social Support (PSS); Walking/Cycling facilities, such as sidewalks and pedestrian/bike trails (WCF); Perceived Environmental Risk (PER)

Table 1: Summary of measures of walkability's accessibility, safety and pleasurability in the literature

Source: Own elaboration

Ethnographic research suggests that inhabitants' everyday practices in informal urban settlements in SSA are shaped by the need to live with limited or absent public infrastructure (Okyere & Kita, 2016; Okyere, 2018; Simone, 2010). Building on such research, we define a scale from objective to subjective conditions of the urban built environment that affect walking to explore these characteristics of the everyday walking environment in informal settlements (Figure 1). As shown in Table 1, accessibility, safety, and pleasurability can be assessed from either an objective lens or by considering users' perceptions. However, we account for three conditions by distributing walkability over the scale shown in Figure 1. First, walking as a mobility practice requires minimal objective infrastructural and design elements for a built environment where walking is not a source of physical fatigue and psychosocial stress. Directly addressing this issue is crucial for captive walkers. Most walkability studies are based on behavioural aspects (e.g. number of walking trips) that become irrelevant when walking is not a choice but a compulsory activity. Second, in a context of limited information about objective conditions such as crime rates or official registers of the location of economic activities or facilities, subjective measures become more feasible. However, scarce resources also imply limited time to develop in-depth qualitative research, as was the case in this project.

Accordingly, framing the understanding of walking conditions within an objective to a subjective range of elements introduces flexibility to move along the spectrum depending on the resources available and the aim.

In contexts where walking is approached as a practice to be encouraged, several studies have found a mismatch between the exclusive focus on its objective or subjective aspects (Jensen et al., 2017). Evidence suggests that the subjective perception mediates objective measures of walkability and actual walking behaviour (Kelly et al., 2011; Giles-Corti et al., 2013; Kelly et al., 2011; Liu & Titheridge, 2016). Research points to the importance of subjective perceptions to understand walking as a mobility practice. This dimension accounts for the variation in meaning and significance of different objective conditions depending on users and locations. Indeed, from the perspective of sensing the city, "the street looks and feels different depending on the perspectives of those inhabiting urban spaces" (Law, 2005, p. 440). In captive walkers, subjective perceptions do not discourage walking, but they still shape the experience.

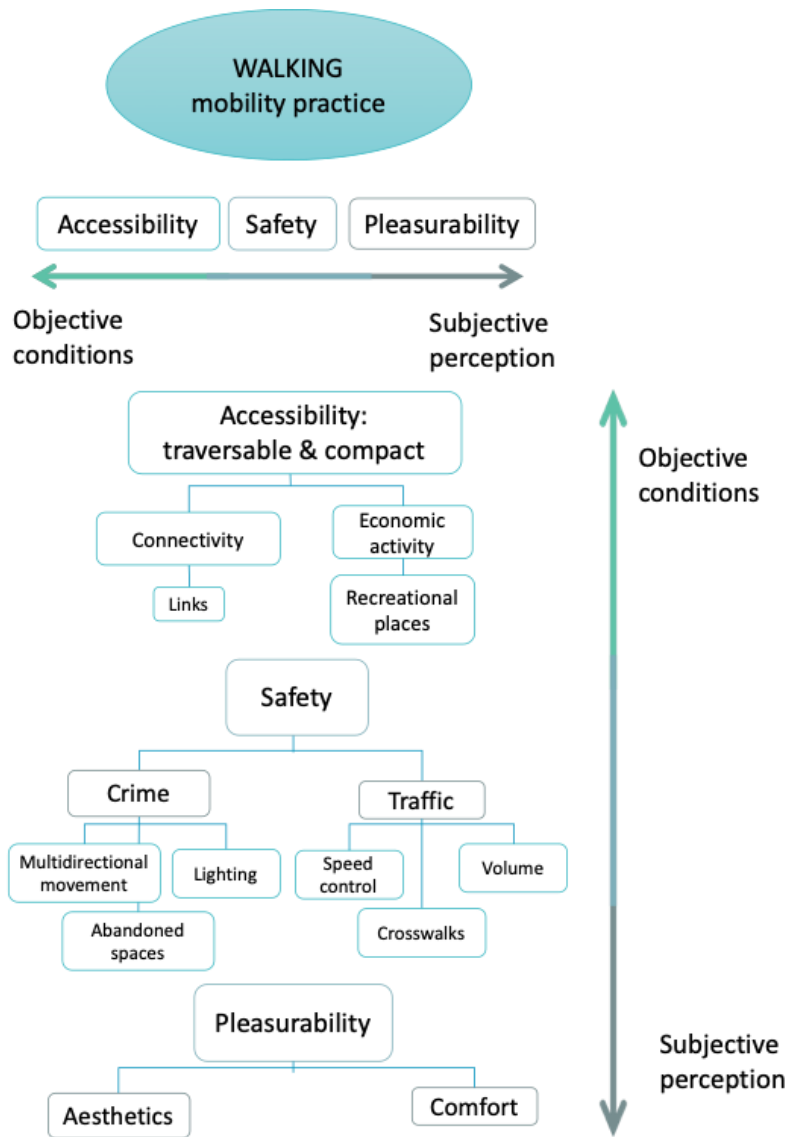


Figure 1. Analytical framework

## **4. Context**

### **4.1 Overview of Freetown**

Freetown is Sierra Leone's national capital and largest city, housing about 21.1% of its population (1.2 million) but representing less than 0.1% of its total landmass (Statistics Sierra Leone, 2016). It is considered one of the world's densest cities, with 12,959 persons per km<sup>2</sup> (World Bank, 2019). In the last century, Freetown has grown from 100,000 to more than 1 million inhabitants between the early 20<sup>th</sup> and 21<sup>st</sup> century (Statistics Sierra Leone, 2017). The population is projected to reach 2 million residents by 2028 if current trends persist (GoSL, 2014a). The city's average population growth rate is about 4%, primarily fuelled by rural-urban migration that has continued since 1963 and was exacerbated due to the civil war (Statistics Sierra Leone, 2016).

Faced with growing demographic and social pressures, Freetown has been unable to create adequate housing, infrastructure, and service provisions. A vast proportion of this growth comes from unplanned development of informal settlements, which house most of the population. Over 68 informal settlements have been identified in Freetown Federation of the Rural and Urban Poor (FEDURP). Freetown's topography – located between sea and hills - limits the city's spatial expansion, forcing low-income groups to settle mostly on marginal lands. Informal settlements have mainly developed along with three major spatial patterns: coastal settlement along the rocky beaches of the Atlantic Ocean; sprawling inland settlements along the Sierra Leone River estuary; and hillside settlements in the steep hills of the city, which are rapidly encroaching into vital forestland (Allen et al. 2017).

The limited capacity to cope with urbanisation and urban growth, in addition to other socio-political factors, has resulted in a sprawled urban pattern, poor infrastructure and management of road space, and inadequate public transport (Mayor of Freetown quoted in Lynch, Nel, & Binns, 2020). Macarthy et al. (2017) observe that in much of Freetown, spatial inequality has led to a decline in social and economic interactions between various income groups of the city, restricting economic mobility and creating social networks in most informal areas. The high concentration of the urban poor in slum communities and large-scale inequalities between formal and informal areas affects people's daily lives and capabilities to overcome poverty (Macarthy and Koroma, 2016; Allen et al., 2020). Crowded urban informal settlements that have developed outside any planning approval system are among the most hazard-prone areas of Freetown.

Economically, 95% of Freetown's residents depend on the informal sector for their livelihood, as only 5% are employees in the public sector. This means that the majority have low and irregular incomes to support their basic needs, including transport expenses. Spatially, the city has expanded beyond 40 kilometres from the Central Business District (CBD), thereby increasing travel time and transport costs, especially among vulnerable groups. Most primary roads in Freetown have sidewalks, but the accessibility of Freetown's sidewalk facilities to pedestrians due to street trading, illegal parking and poor maintenance is a significant concern (World Bank, 2018).

### **4.2 Moyiba**

Moyiba is an informal settlement situated in a hill area on the eastern side of Freetown, 5 km away from the CBD. According to the last census (2015), the settlement's population is 37,000, although it is estimated at 50,000 today. The settlement was established in 1929 and was originally a farming community (Kamanda farm) until 1966 when a quarry was established to support the construction of major construction works.

The houses in the community are predominantly built of mud-brick walls and corrugated iron sheets with cement floors. Very few makeshift structures commonly called 'pan bodi' exist in the community. The hillside is scattered with houses cut into the slopes. This leads to unstable conditions increasing the risk of landslides, rockfalls, road accidents and mudslides, particularly during the rainy season. There is a lack of formal land title deeds, with most of the land informally owned by individuals/families and occupied by tenants. The community has no clear delimited boundary (Koroma et al., 2018, p.25-26).

Given the settlement's unplanned nature, infrastructure and services provision remains a challenge for Moyiba's residents. The settlement has precarious road networks – with one main dirt road acting as the artery of the settlement. As a result of the rugged terrain (especially the hillside settlements), the vast proportion of residents access the community via footpaths. The road network in Freetown is generally poor – roads cover only 5% of Freetown's land compared to the internationally recommended 30% (World Bank Report, 2019). Informal hillside settlements such as Moyiba are mostly inaccessible due to either lack of connectivity, unaffordability of transport or lack of transport options. As a result, walking offers affordable and accessible options for most urban poor and other vulnerable residents living in this community. The topography makes vehicular access extremely difficult and thus, harder to provide citizens with public transport and emergency services. Access to water is obtained primarily through four community water points, one piped water supply, and a dam. There is limited access to electricity. Residents mainly rely on pit latrines, 'flying toilets' (defecation into polythene bags that are subsequently dumped along major drainage channels), and open defecation. The lack of sanitation facilities and poor hygiene practices contribute to the water contamination faced by downslope residents and the prevalence of water-related diseases in the area such as cholera, typhoid, and malaria. There are 23 schools (four secondary and 19 primary) and one health centre in the community. Figure 2 shows a panorama of the settlement.



Figure 2. Hilltop overview of Moyiba. Photo: Oviedo (2020)

## 5. Methodology

Moyiba provides a lens to unravel everyday dynamics in restrictive geographies of urban transport where walking is not a choice but a need. Fieldwork was carried out during three weeks in March 2020. The first phase involved mapping the conditions and features of walking pathways and streets in the neighbourhood. The second phase involved structured interviews with respondents to interrogate walking practices and experiences, exposure to risks and socioeconomic and demographic background of respondents. Both phases of the study used an online map-based survey tool (Maptionnaire). Data collection was preceded by a two-day training programme for field enumerators. Following the training programme, the research team approached local leaders who acted as gatekeepers and facilitated access to the community. Such a meeting serve to introduce the research to the community and obtain informed consent for participation in the study from voluntary participants. The online tool allowed real-time data collection and monitoring. The main aspects of each phase of the data collection are summarised in Table 2.

Phase of study	Variables	Instrument	Procedure	Sample
First phase (March 2-14, 2020)	Walking routes (streets and pathways)	Maptionnaire (mapping), Observation kit,	Mapping of streets, paths and features along routes by enumerators	11.9 km audited
<i>Field Mapping of walking routes (walking environment)</i>	Road condition (paving, surface materials)  Facilities or features along walking routes (school, churches, trees, rest stops)  Exposure to risks and safety	Photographs	Field notes	
Second phase (March 15-21, 2020)	Walking route alternatives and use for everyday activities	Maptionnaire-based structured questionnaire	Convenient sampling of residents	38 respondents
<i>Everyday walking practices</i>	Preferred routes and reasons  Initiatives along walking routes (e.g. stairs, street lights, benches)  Everyday experiences of risk and safety  Mobility options available to residents Reasons for mobility choices		Shared walking experience, mapping	

Table 2: Summary of data collection mechanisms

The first phase involved a simple mapping exercise using Maptionnaire. Data collection was undertaken by four field enumerators. The mapping exercise was supervised by three senior academic staff and a

researcher coordinator. Each of the enumerators involved in the mapping exercise was provided with one tablet and a personal modem to conduct the data collection. To gain further topographical information, enumerators used 'Rramblr', a free walking application that identifies critical geographic information including distance, duration (total, active and paused), average speed and ascent.

The second phase of data collection involved structured interviews of thirty-eight respondents (38) in the study area facilitated by enumerators to map out everyday walking practices. Respondents were conveniently sampled with facilitation from community leaders and residents involved in community organisations and networks. Convenient sampling enabled the team to mitigate challenges such as research fatigue. Moyiba has received much research attention in Freetown, although the visible impact of such research on the lives of the residents has not been substantial. This has contributed to scepticism from local residents to new research, restricting participation. As the availability of informants was an essential consideration in the selection process, we approached the study as an exploratory study that can shed early insights for further extensive and comparative studies on everyday walking practices in similar contexts in Freetown or other African cities.

Respondents were sampled along streets and access routes. There were no allocations concerning specific sample size along the routes; however, sampling was conducted in a manner that ensured that respondents were distributed along the routes mapped. The structured interviews included aspects of biodata, mobility practices and experience along walking routes, risk exposure along routes and comfort in walking. Details of variables on which data was collected are provided in Table 3

Theme	Variable	Format
Sociodemographic characteristics	Gender	Multiple Choice
	Age	Multiple Choice
	Religion	Multiple Choice
	Time living in Moyiba	Multiple Choice
	Reason for moving to Moyiba	Open-ended
	Former neighbourhood/municipality/country of residence	Multiple Choice/Open-ended
	Role in the community	Multiple Choice/Open-ended
	Disability (physical and cognitive)	Multiple Choice/Open-ended
	Literacy	Multiple Choice
	Level of education	Multiple Choice
	Household structure	Multiple Choice/Open-ended
	Role in the household	Multiple Choice/Open-ended
	Occupation/Main Activity	Multiple Choice/Open-ended
	Access to essential services in the household	Multiple Choice/Open-ended
	Land and housing tenure	Multiple Choice
Income	Multiple Choice/Open-ended	
Walking practices	Frequency of walking as the sole form of transport	Multiple Choice/Open-ended
	Perceived speed and effort when walking	Multiple Choice/Open-ended
	Level of awareness while walking	Multiple Choice/Open-ended
	Main concerns when walking	Multiple Choice/Open-ended
	Main reason for walking	Multiple Choice/Open-ended
Preferred walking route to mandatory activities	Main activity	Multiple Choice
	Walking route to economic or education activity	Mapping: Line drawing
	Walking route from economic or education activity	Mapping: Line drawing
	Frequent and sporadic stops and reasons	Multiple Choice/Open-ended
	Perceptions of the walking routes	Multiple Choice/Open-ended
	Alternative routes	Mapping: Line drawing
Walking time on regular route	Number	
Walking time on alternative route	Number	

	Places where the respondent finds herself out of breath	Mapping: Point drawing
	Time of the day when walking takes place	Multiple Choice
Walking routes to other opportunities	Location of spaces for religious activities	Mapping: Point drawing
	Location of spaces for sports and recreation	Mapping: Point drawing
	Location of rest stops	Mapping: Point drawing
	Location of community spaces	Mapping: Point drawing
	Walking route to non-mandatory opportunities	Mapping: Line drawing
Subjective perceptions of safety and comfort	Areas of the neighbourhood the respondent is more familiar with	Mapping: Area drawing
	Paths/streets/routes perceived as negative	Mapping: Line drawing
	Reason(s) why routes are perceived as negative	Multiple Choice/Open-ended
	Paths/streets/routes the respondent avoids	Mapping: Line drawing
	Paths/streets/routes perceived as positive	Mapping: Line drawing
	Reason(s) why routes are perceived as positive	Multiple Choice/Open-ended
	How does the respondent feel when walking on positive and negative routes	Multiple Choice/Open-ended
	Intensity of the emotion	Multiple Choice
Pleasurability of walk	Multiple Choice/Scoring	

Table 3: Aspects covered in the structured interviews

## 6. Results

### 6.1 Characterisation of the sample of respondents

Out of the 38 respondents from the structured interviews with residents of Moyiba using Maptionnaire, there were 16 males and 22 females. 6 out of the 38 respondents reported that they have physical disabilities. 22 out of the 38 respondents are within the age group of 18-35, while three were above 65 years of age. Most respondents were long-term residents, with 29 residing in the community for more than three years while the remaining nine have been in the community for a shorter period. The survey also showed that 17 of the respondents have moved to the community from other parts of Freetown or neighbouring cities. Respondents explained that moving to the community was due to presence of family and friends or social relations (18), affordable accommodation or the prospects of house ownership (13), evictions from previous accommodation (2) and proximity to either work or school (5). In terms of employment, only 5 of the respondents were formally employed, while those in informal or irregular employment (e.g. day labourers at the quarry or street vendors) and unpaid domestic work constituted 16 and 12 respectively. For the most part, the primary source of livelihood for respondents comes from informal economic activities. The majority of those employed work locally (16) and are mostly self-employed or in casual labour, compared to those who worked in other areas in the city of Freetown (5). All respondents identified walking as the main mode of transport within the neighbourhood. For trips outside Moyiba, daily commuting patterns combine walking with other informal transport modes known as the 'okada' (motorbikes) or the poda poda (minibus).

### 6.2 The condition of the walking environment

Data from Maptionnaire reflects the characteristics and conditions of the walking environment in Moyiba. Field enumerators mapped various walking routes and features such as their physical condition and surface materials. For this study, walking routes are categorised into streets and pathways, in line with the existing physical structure of the urban fabric and the everyday use of these walking routes. Hence, streets are defined as corridors that can accommodate the circulation of motorised vehicles. In contrast, pathways refer to alleys, access paths and other corridors used by residents connecting buildings across the neighbourhood with the streets (see Figures Figure 3a, b, c).



In terms of physical conditions of the mapped routes, 9.4 km (out of 11.9 km) were unpaved. 11% of the walking routes that were paved consisted of surface materials such as asphalt, a mix of concrete and asphalt, or gravel. However, paved routes were severely damaged. Additionally, dumping sites for construction materials, abandoned water tanks, and solid residues littering the walking routes are common, particularly in pathways. All participants revealed that unpaved or severely damaged walking routes reduced access and comfort, especially during the rainy season (see sections 6.4 and 6.5).



(a) Street (allowing motorised traffic) in Moyiba



(b) Access pathway (stairs)



(c) Access pathway (bridge)



Figure 3: Street and access pathways examples in Moyiba. Photos: Oviedo (2020)

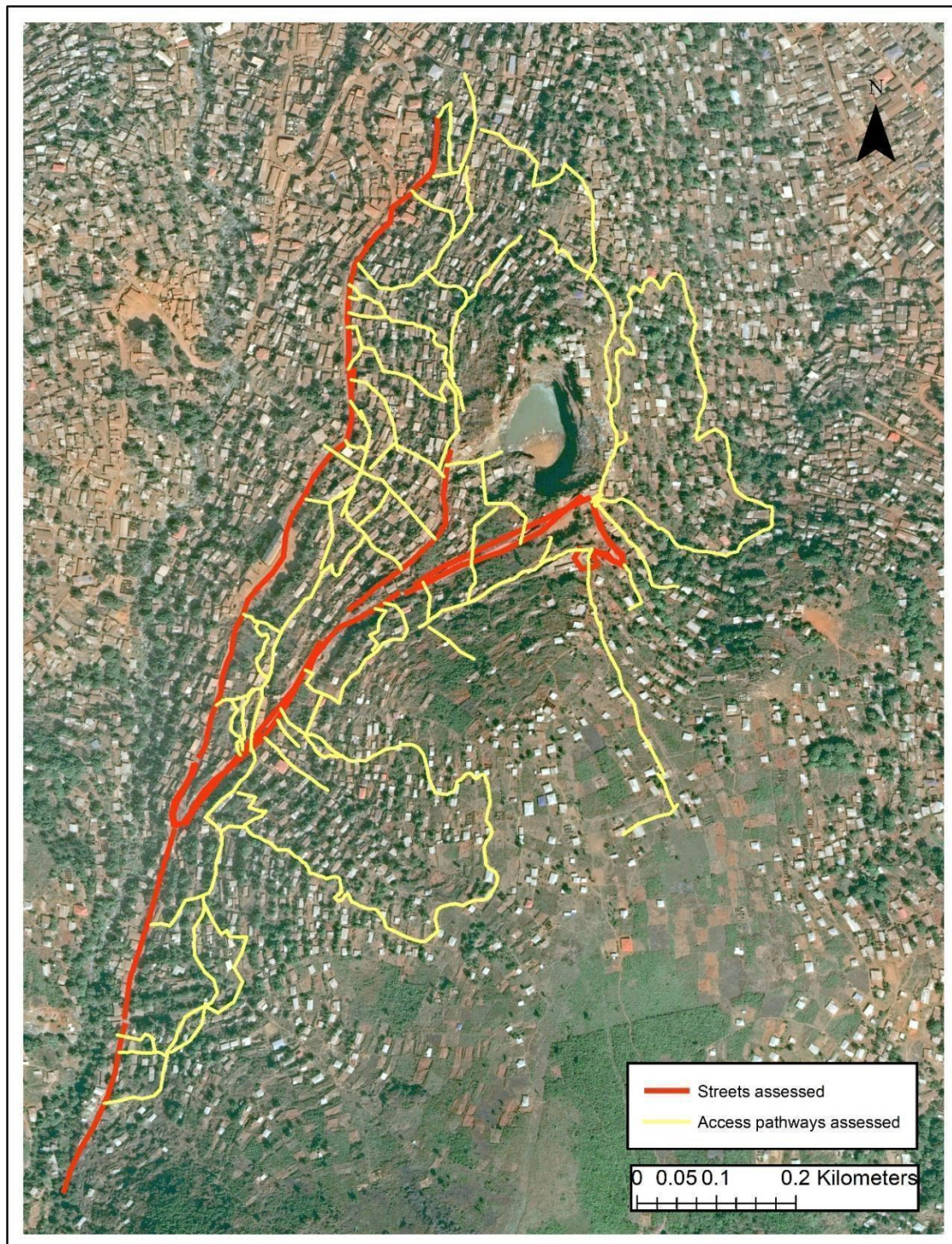


Figure 4. Mapped streets and access paths in the neighbourhood. Source: Own elaboration with data from Maptionnaire surveys and Satellite Imaging from Freetown City Council (2020).

### 6.3 Everyday walking practices and local accessibility

According to respondents, walking became a predominant mobility alternative in response to low availability of public transport (9 out of 38), high cost of public transport fares (3 out of 38), walking being faster to reach destinations than other alternatives (6 out of 38). For various respondents, walking becomes a way to “save money for more urgent needs” (M, 26-35). A female respondent argued that she “usually go(es) out like four or five times a week to shop in town and sometimes I walk to go and use a vehicle to come back at the junction but walk to come up the community because it is sometimes very much expensive” (F, 18-25).

The possibility of adapting to the topography is one of the most common reasons for walking (18 out of 38). Communities “get together to build stairs, bridges and ways to sort ditches and other obstacles, so we can walk” (Community Leader, F, 46-55). Our findings suggest that reasons why respondents walk intersect with social identities, life stages and individual capabilities. Elderly respondents and respondents that reported a form of disability (6 out of 38), report their mobility is limited (with one respondent being completely immobile), because the conditions of roads and pathways cannot accommodate their needs.

Respondents argued that walking is at the centre of their economic and social lives. A female trader argued that because there is no public transport “people walking become the source of business in the roadside” (F, 26-35). Most respondents working in the informal sector (16 out of 38) use streets and pathways for street vending. The walking environment enables access to livelihoods and critical social services such as water stations, schools, and toilets (4 respondents had no toilet facilities in their houses). Walking becomes the way of “finding what we need” (F, 46-55). As argued by a participant: “usually we buy food stuffs like fish, paper, groundnut and the rest at ‘Bottom Mango’ [the junction at the bottom of the community], but these traders now come and sell to us in the community making things easier for us” (M, 46-55). Moreover, walking within the community also enables access to essential services such as drinking water. “People also come with water in drums to sell to us so that we will not have to go down the community every day to fetch water for household uses” (F, 26-35). The walking environment is also crucial for maintaining social networks. 14 out of 38 participants reported that pathways are their main walking routes to visit friends and relatives in the community, as well as interacting with others. People tend to stop in the way to “greet neighbours and friends [...] that you meet in the road because most people walk” (Community Leader, M, 56-65). Such trips are necessary to sustain social bonds and create new connections. Walking routes, either paved or unpaved, are utilised to access household necessities from the shops located along the routes.

About half of the respondents (19 out of 38) indicated that they use familiar walking routes. The remaining respondents frequently change their walking routes due to sudden changes in street conditions such as heavy rains or disasters (e.g. landslides) that block access pathways. Where available, respondents use alternative walking routes or construct new pathways. Figure 5 shows the audited regular and alternative walking routes in the neighbourhood.



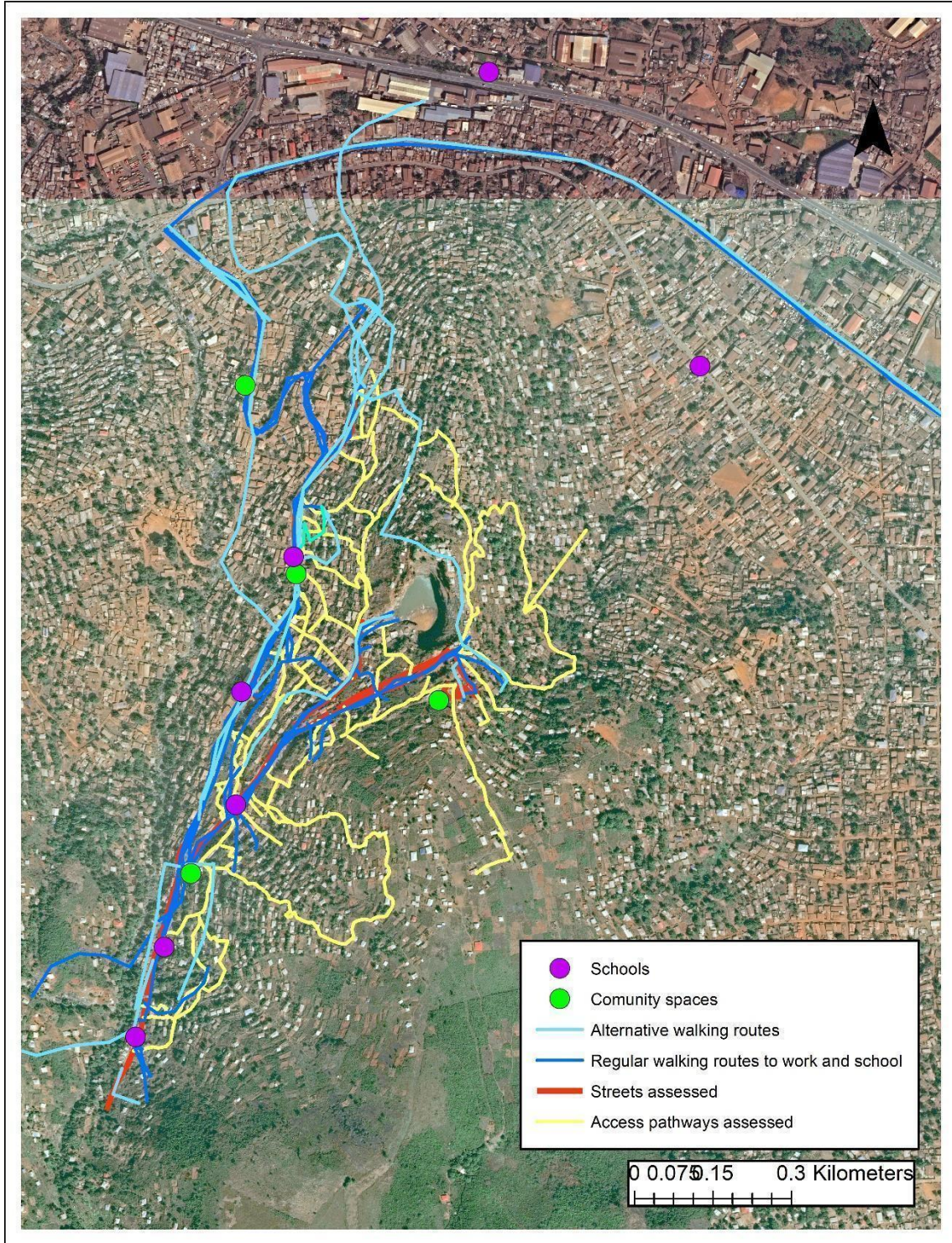


Figure 5. Mapped walking path going to work and school and alternative paths. Source: Own elaboration with data from Maptionnaire surveys and Satellite Imaging from Freetown City Council (2020).



Furthermore, the study identified facilities along walking routes (e.g. schools, churches, mosques, football fields, and water stations), as shown in Figures 6 and 7. These facilities are identified by the community as opportunities where they can access goods, services and social interactions that are relevant for them. Facilities such as schools and the football field were collective initiatives, while water stations were individual informal enterprises. An analysis of the spatial distribution of local facilities showed that most are along the main street connecting Moyiba with the rest of Freetown.

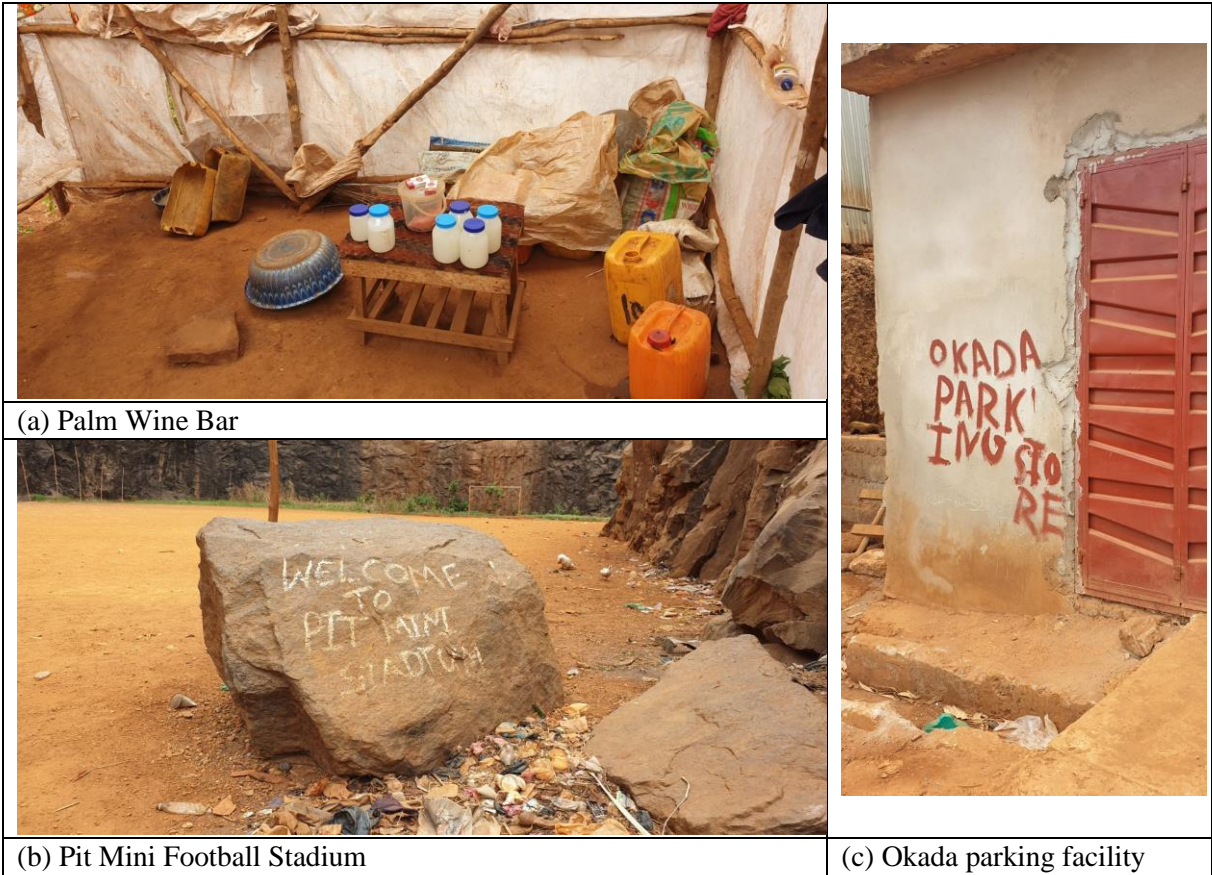


Figure 6: Examples of facilities around Moyiba. Photos: Oviedo (2020)



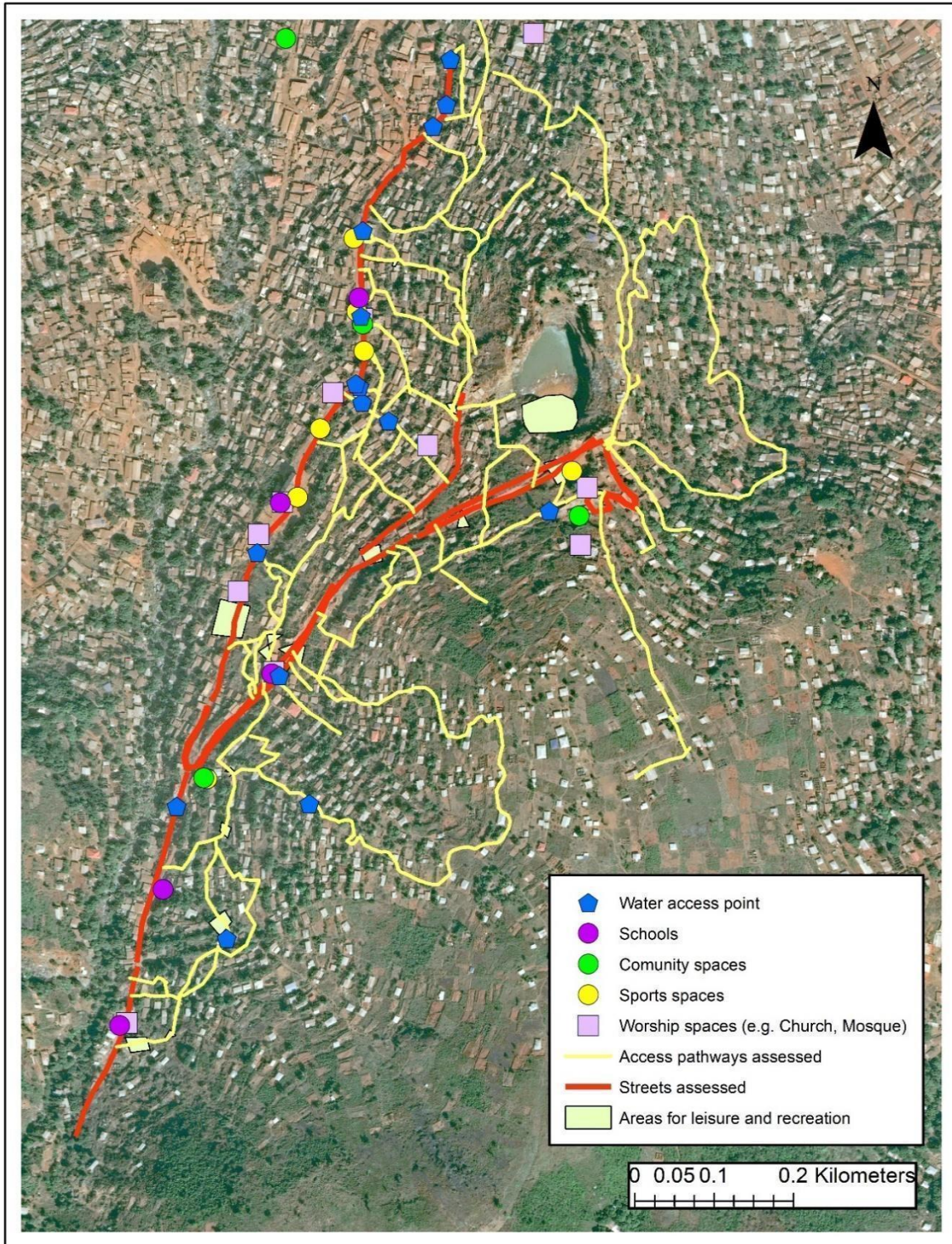


Figure 7. Distribution facilities in the neighbourhood. Source: Own elaboration with data from Maptionnaire surveys and Satellite Imaging from Freetown City Council (2020).

#### **6.4. Risk: Exposures and responses in everyday walking**

We obtained evidence on risks and how respondents traversed them in everyday walking practices using Maptionnaire. Respondents were asked to identify perceived sources of risk along everyday walking routes. Reported risks were then located in the field, documented and geocoded using Maptionnaire. About 120 risk factors along the walking routes were identified. These included large boulders, stones or rocks that blocked routes (50), steep routes that were a potential for mud/landslide (28), potholes (20), incomplete or abandoned construction works along routes (14), uncleared bush (5), uncovered drains (2) and open electrical wires (1). Given that landslides are a common disaster risk in Freetown, ditches and holes left by previous landslides hinted at the potential risk that future landslides and heavy rain pose to the walking environment (Figure 8c). A small number of streetlights, as well as poor management of open quarrying, reinforce the risk of injury associated with the features of the terrain. Further, 29 out of 38 respondents indicated that they walk less during the rainy season and rarely use the streets at night. The latter is both a response to the risk associated with lack of visibility to navigate the walking environment and the risk of theft. The mapping exercise also revealed that there are no formal infrastructure or facilities for road safety such as traffic signals, and we only identified one intersection with a signalled pedestrian crossing.

Nonetheless, the study showed that local responses have emerged as initiatives to mitigate risks and barriers within the neighbourhood's walking environment. For example, most streetlights found along walking routes were self-provisions by residents in the neighbourhood. These build on informal connections to the power grid. However, such street lights could only illuminate their immediate surroundings, having a limited effect to mitigate risks.

As shown in Figure 8 (a and c), many access pathways involve self-built infrastructure designed to overcome particular challenges such as ditches and open drainage using small footbridges made of wood and other locally sourced material. Residents also made stairs from sandbags to support the use of pathways during the rainy season. More sophisticated stairs carved directly in the terrain or built using gravel and rocks from the quarry can be found across the more consolidated parts of Moyiba—incrementally developed in response to risks faced in everyday walking environment. Indeed, these self-constructed paths are widespread across the neighbourhood as a means of reducing the myriad of risks and obstacles that respondents encounter on a daily basis (Figure 9). Some residents responded through behavioural changes such as the use of alternative paths (see Figure 7). 8 out of the 16 respondents who reported changing their regular walking routes attributed it to risks associated with the walking environment. Some residents also reduced their daily use of the regular walking routes during the rainy season by stockpiling daily necessities.



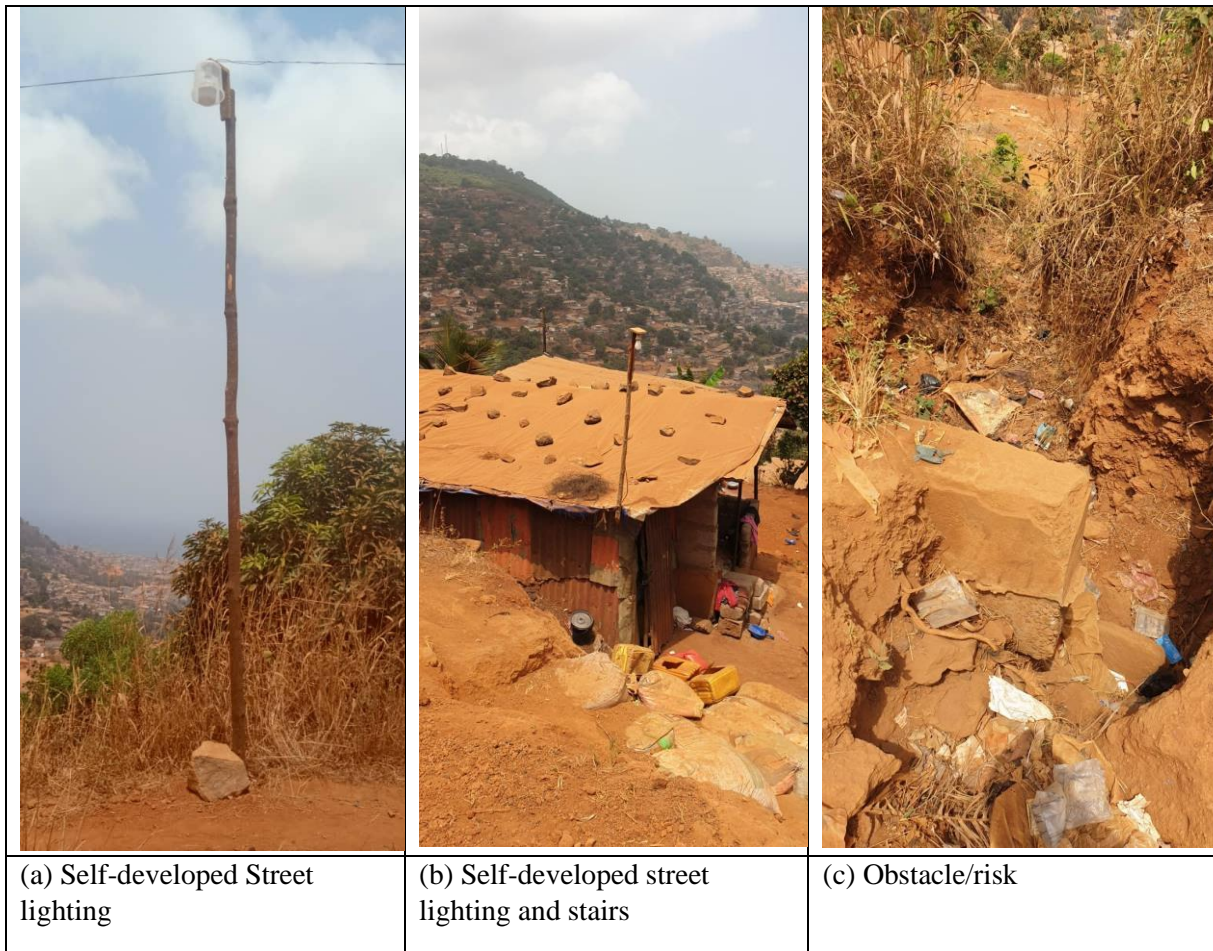


Figure 8. Examples of self-provision of access and security and obstacles/risks. Photos: Oviedo (2020)



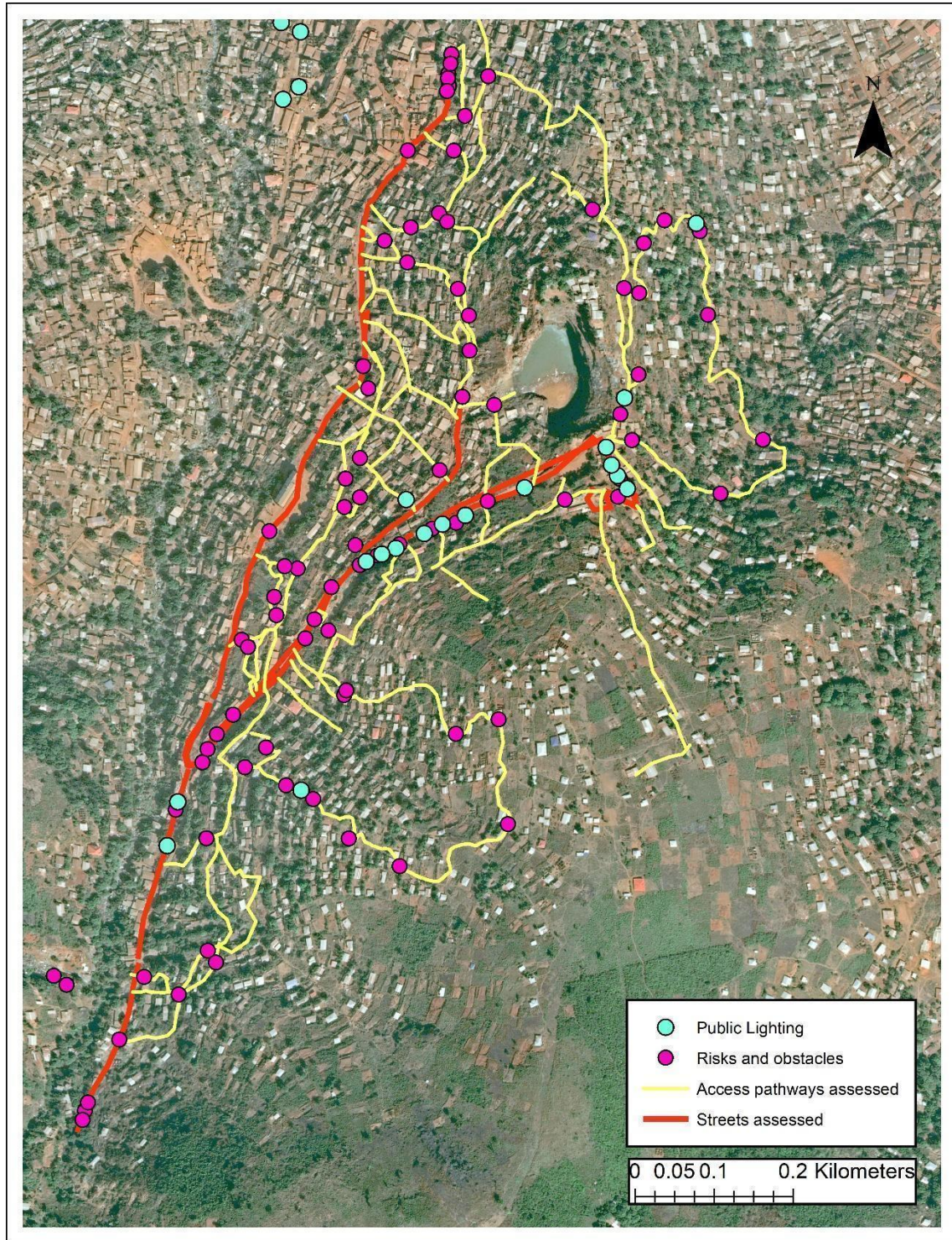


Figure 9. Street lighting, trees, and risks and obstacles. Source: Own elaboration with data from Maptionnaire surveys and Satellite Imaging from Freetown City Council (2020).



## 6.5 Comfort, aesthetics and walking experiences

In the context of this study, the pleasurable dimension of walking incorporates aspects of aesthetics and comfort. Aesthetics relates to the presence of trees and other natural features of the surroundings that may improve the perceived experience of walking. Comfort refers to the presence of facilities such as benches/street furniture and the ease with which residents can navigate the streets and pathways.

In terms of aesthetics, the results show that most of the walking routes have trees (Figure 10). Out of 246 trees counted along streets and pathways, 172 produce shade, while the remaining 74 do not. These were either natural or planted by residents for the dual purposes of beautification and shade along walking routes. In addition to the trees, the mapping identified about nine rest stops along walking routes. Such stops were mainly benches sourced by residents to ease the walking experience. Such adaptations of local walking routes have a perceived positive effect in the everyday walking experience for residents of Moyiba.

Figure 11 shows routes where respondents had positive or negative walking experiences. Respondents identified 18 positive and 12 negative routes. Availability of proper lighting, more shade or street furniture, diversity of street activities, and the volume of pedestrians on routes were the main reasons behind positive experiences. On the other hand, dust, dirt, street isolation, and lack of trees and benches explained the negative walking experiences. 24 out of the 38 respondents indicated that they found walking in the community pleasant. Vistas reinforce such perception of the walking environment, which also includes aspects such as the breeze, lack of traffic during the majority of the day, and the availability of facilities for social engagement.

These perceptions were markedly different when considering the gender of respondents. Most male participants reported that their walking experience was overall pleasant. On the other hand, over half of female respondents consider the experience of walking unpleasant. The degree to which respondents perceive the walking environment as physically demanding influences these differences. Given the topography and terrain, respondents reported having to take careful notice of surroundings either always (7%), often (25%) or sometimes (67%) when walking. Familiarity with the local environment influenced the reported positive and negative experiences as long term residents tended to navigate the area easily.

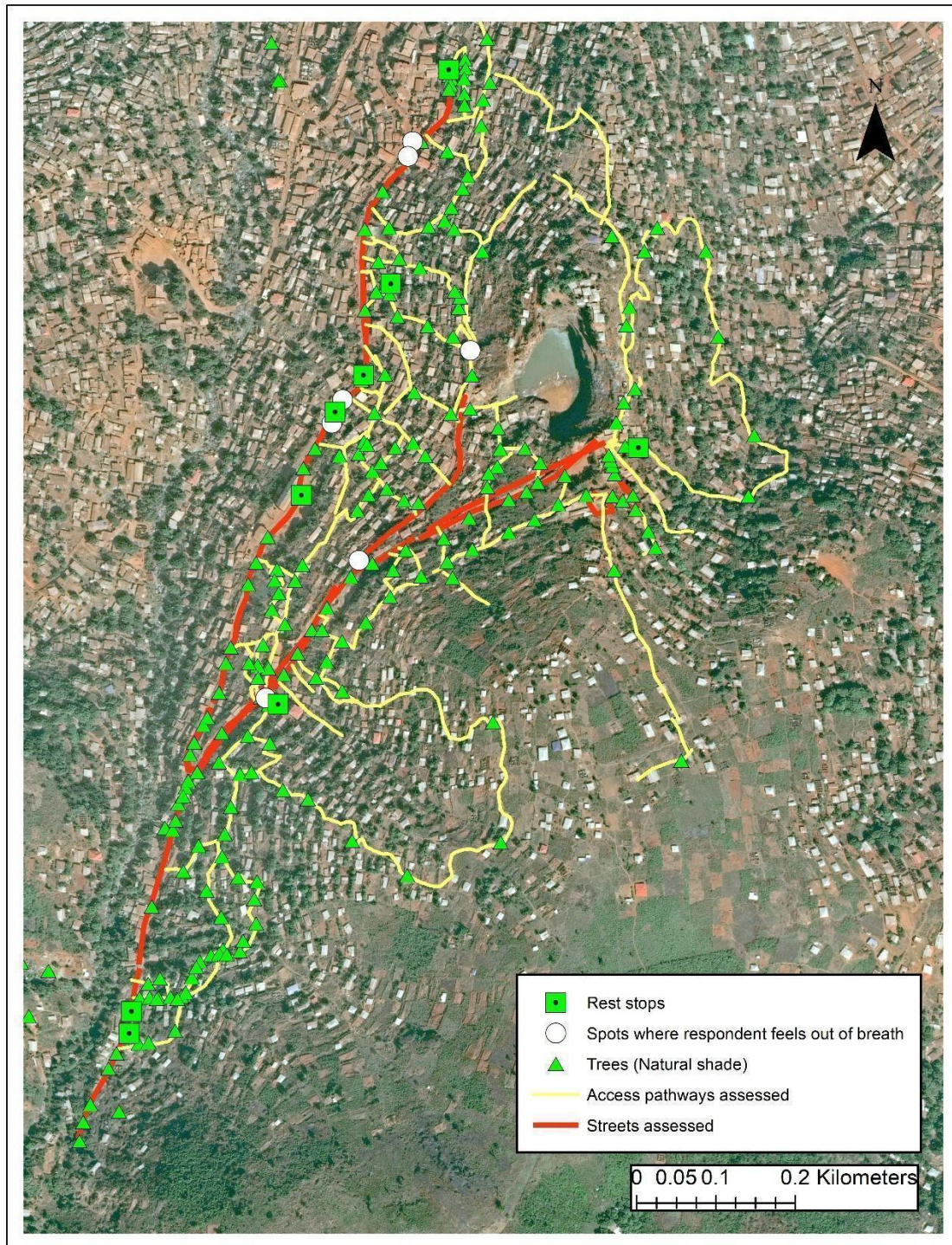


Figure 10. Places where pedestrians get out of breath and where there are rest stops. Source: Own elaboration with data from Maptionnaire surveys and Satellite Imaging from Freetown City Council (2020).



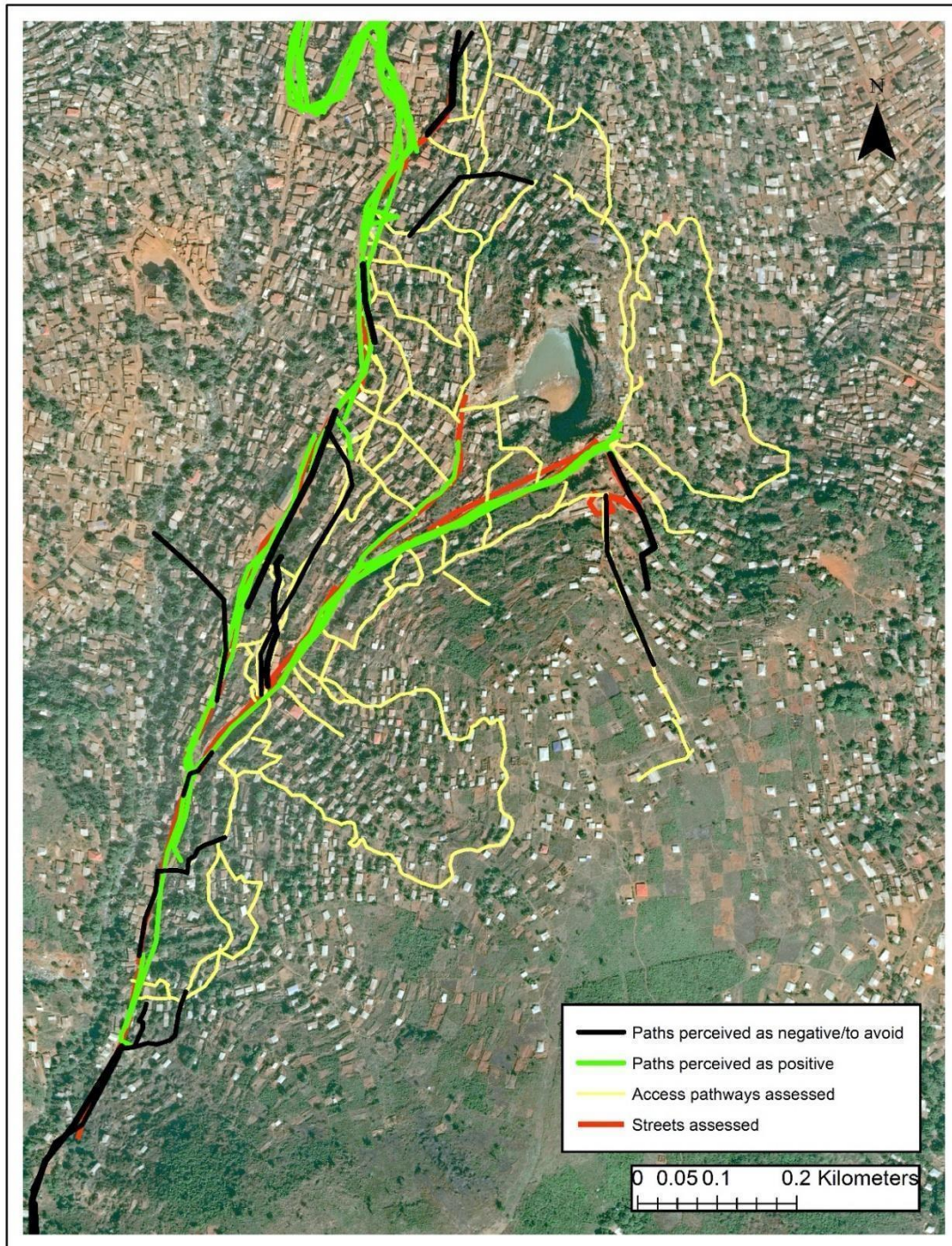


Figure 11. Path perceived as positive and negative or to avoid. Source: Own elaboration with data from Maptionnaire surveys and Satellite Imaging from Freetown City Council (2020).

## 7. Discussion

Findings illustrate aspects of accessibility, safety and pleurability that define the everyday walking environment and influence walking practices of residents in Moyiba. Results align with preceding research

summarised in Table 1 while illustrating the strategies captive walkers use to reconfigure their walking environment to improve conditions for local access, security and comfort. Residents from Moyiba find their choice of walking removed as a consequence of an unequal and exclusionary urban configuration (Mitullah et al., 2017) and the inability of the formal provision of adequate infrastructure and motorised transport services to connect informal neighbourhoods in Freetown (Pendakur, 2005; Behrens, 2005).

In response to a challenging environment for walking due to the topography, connectivity and associated risks, residents adapt their behaviours to find solutions to context-specific problems (French et al., 2014). Our findings reflect the individual and collective responses to the needs of access, risks, and expectation around the comfort and aesthetics of the walking environment. The community in Moyiba self-organised to provide local facilities and infrastructure that strengthen social and human capital, which positively reinforces local mobility and access (Okyere, 2018; Satterthwaite et al., 2020; Kita et al, 2020; Oviedo, Davila & Levy., 2017). Quotidian walking practices in Moyiba and the configuration of the walking environment to connect with family and friends supports findings from previous research suggesting walking can contribute to social cohesion (Zhu et al., 2014). Moreover, the facilities identified in the analysis of the accessibility dimension supports findings by Anciaes et al. (2017) suggesting that informal open and collective spaces play a significant role in local accessibility by walking, particularly among poor populations.

Our findings show how the exploration of physical attributes of the built environment such as design, form and functionality (Su et al., 2019) can contribute to understanding the everyday walking environment of informal settlements, as suggested by previous research (see Table 1). However, subjective factors that influence mobility and travel behaviour (French et al., 2014; Jun & Hur, 2015) also contribute to enhancing understanding of walking practices and decisions by residents. Objective and measurable features of the built environment relate to subjective perceptions of risk, discomfort and definition of priorities. For instance, self-provision of street lights tends to concentrate on the streets identified as positive and pathways identified as negative. A street with lighting has more extensive pedestrian use and available facilities for collective benefit, and they are therefore the target of larger community-led interventions. Pathways, on the other hand, provide access only to a small portion of the community placing them lower in the priorities for using collective resources for improving the walking environment. Improvements in pathways tend to be more frequent in those pathways perceived more negatively. This in turn increases risk factors and induces higher perceptions of insecurity in some parts of the walking network while decreasing them in others. Community-led responses and interventions seek therefore to reinforce favourable walking routes and mitigate negative ones. The effect of perceptions and experiences of walking on material changes in the territory supports Obeng-Atuah, Poku-Boansi, and Cobbinah's (2017) suggestion to incorporate subjective factors to understand peoples' strategies and efforts to improve their walking experience.

Figure 9 suggests that despite a high degree of adaptability, innovation, and collective transformations of the walking environment to mitigate risks, the scale at which these can materialise is limited. Earlier research has suggested that addressing risks associated with walking requires support and resources from integral policies led by the public sector (Amoako et al., 2014; Damsere-Derry et al., 2010). While informal and collective responses from residents can mitigate such risks, only by building on localised knowledge and investing on evidence-based priority areas can public action improve the walking environment (Anciaes et al., 2017). Figure 10 points at marked differences between the steeper eastern side of the neighbourhood and the flatter western side, where the main road connecting Moyiba with the rest of Freetown is located. Moyiba serves as an illustration at a micro and meso scale of the spatial and social inequalities associated with walking as suggested by previous studies in SSA (Pendakur, 2005; Venter, 2011). In line with such

research, understanding the social, spatial and physical distribution of such inequalities may contribute to identifying better responses to facilitate connectivity and increase accessibility for pedestrians.

Self-constructed routes in Moyiba are unlikely to score high in standardised street connectivity indicators adopted in walkability studies in the urban north (see Grasser et al., 2017, 2013; Giles-Corti et al., 2011; McCormack and Shiell, 2011). However, they enable essential social and economic connections that contribute primarily to people's wellbeing. Similarly, despite their precarity, facilities such as Moyiba's "Football stadium" and palm-wine bar speak volumes about the vibrant social capital and community organisation that underpin the everyday walking environment in informal settlements. Strategic planning interventions can go a long way in enlarging the potential for access, safety and comfort of existing communities actions tailored to walking (See Rogers, Halstead and Gardner et al., 2011).

## **8. Conclusions**

This study suggests one approach for examining the everyday walking environment and practices in an informal settlement in SSA using spatial and qualitative methods. Our methods enabled us to map and illustrate collective and individual practices that shape the walking environment in a context marked by high social and transport deprivation (Mitullah et al., 2017). To understand walking from the perspective of local residents sheds light on the challenges and opportunities to improve access and inclusion. Moreover, by recognising the quotidian relevance of walking in people's lives allow researchers and practitioners to go beyond mainstream concerns about sustainability and health.

Our inventory of the features that shape the walking environment in Moyiba and the daily practices of a group of residents helps understanding walking from the perspectives of accessibility, safety and pleasurability (comfort and aesthetics). The walking environment in Moyiba is shaped by individual and collective forces seeking to address the structural needs of access and security in the neighbourhood. In parts of the neighbourhood where formal roads are almost non-existent, collective and individual responses have created opportunities and pathways that respond to the needs to navigate the built environment, access friends and family, and share spaces for social interaction.

We can conclude that access is not the only driver of collective adaptation and transformation of the walking environment. Self-organised interventions to provide streetlights, bridges, stairs, greenery and rest stops along walking routes suggest risk, security and comfort play a relevant role in the definition of strategies around walking in informal neighbourhoods. The widespread distribution of risk factors and community actions to mitigate such risks are a two-sided issue. On the one hand, streetlights and other improvisations point at the resilience and ingenuity of the local community and their responses to risk and discomfort. On the other hand, the diversity of such responses in terms of quality, materials, and integration with the rest of the built environment points at the lack of sufficient resources for improving the walking environment in the long-term. Responses by the community may often be trading off short-term and long-term risks. For example, bridges to improve access may also block natural rainwater canals, leading to flooding and landslides during heavy rain periods.

Improving the everyday experience of walking and addressing risks in informal settlements of cities in SSA poses a considerable challenge. Our study provides insights for urban transport and planning practitioners in Freetown and other cities in SSA. The first relates to the integration of everyday walking behavior into transport and urban development planning at the city scale. Findings from this study suggest the need for more attention from planning authorities to mundane but important practices of everyday walking as a relevant source of knowledge about the walking environment. The limited capacity and resources available



for community-led responses make evident the need for further support from the public sector. Devising collaborative strategies, particularly through experimentation and coproduction can therefore reduce risks and enhance the comfort and pleasurability of the walking experience. This can be layered on existing community initiatives and structures for collective mobilisation, building their capacity to understand and mitigate risks, as in other sectors of planning (Allen et al., 2020).

Our research highlights the value of combining objective and subjective metrics and evidence for examining everyday walking experiences. By combining more flexible methods we can adapt better to the conditions of rapidly changing informal settlements and the core features of walking when it is not a choice. Limited availability of information plays a significant role in this study. In Freetown, as in many other cities in SSA, data about issues such as crime, security, and even road safety is scarce, more in settlements like Moyiba. This makes mapping and interviews a more viable approach to data collection and analysis that can be built by the community and completed with relatively small investments.

Despite the usefulness of the proposed method, our study does not account for broader processes of accessibility at the city scale, which is a critical component of the definition of walking practices. Furthermore, the lack of further in-depth qualitative evidence implies missing insights that could enrich the current understanding of everyday walking practices. Future studies may need to look at the walking environment on a larger scale with the inclusion of semi-structured interviews and focus groups. Moreover, in light of the COVID-19 pandemic, it is essential to critically examine the role of the walking environment and the changes in daily walking practices in enabling safe access and reducing exposure. Constraints imposed by health emergencies such as the pandemic are likely to affect not only the way people define their day-to-day decisions but also the configuration of their surrounding built environment.

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