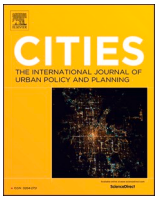
Cities 155 (2024) 105471

Contents lists available at ScienceDirect

Cities

journal homepage: www.elsevier.com/locate/cities



High mobility lifestyles: Unpacking travel behavior in Accra's rapidly expanding periphery

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ARTICLE INFO

Keywords:
Travel behavior
Mobility
Urban transport
Urban expansion
African cities
Accra

ABSTRACT

This paper explores everyday travel behavior among urbanites in Accra's periphery and unpacks how travel choices and preferences are conditioned and constrained in a context of rapid urban expansion, unregulated residential sprawl, infrastructural deficits, congestion and changing socio-economic conditions. The paper draws on qualitative interviews ($n = 48$) and a travel survey ($n = 2107$) targeting economically active adults residing in peripheral neighborhoods. Their travel behavior is characterized by a high proportion of adults who regularly travel outside their neighborhoods, over relatively long distances (10+ km) and mainly using motorized transport. The paper proposes "high mobility lifestyles" as a metaphor to capture key aspects of travel behavior in the peripheries and explores how travelers navigate the opportunities and constraints associated with living in the peripheries. As a unique feature, spatially explicit destination data are used to map the predominant destinations and long distances travelled from Accra's peripheral neighborhoods. The research illuminates how infrastructural deficits, long distances, severe congestion and rising transport costs combine to make high mobility lifestyles exceedingly strenuous, costly, and time-consuming. Ultimately, in-depth understanding of travel behavior, embedded in contextual conditions, can provide insights on how travel choices may be changed and how transport, systems may be made more sustainable and inclusive.

1. Introduction

African citites are expanding rapidly and much expansion in fringe areas consists of low-density, residential sprawl, often emerging in poorly accessible locations isolated from main roads (Atlas of Urban Expansion, 2023; Three City Land Nexus Research Team, 2020; Yussif et al., 2023). Road networks commonly lag far behind the spatial growth of cities and remain highly concentrated in central areas (Foster & Briceno-Garmendia, 2010; Lall et al., 2017; Pieterse & Hyman, 2014; Sietchiping et al., 2012). Meanwhile, employment opportunities, commercial areas, educational institutions, and political-administrative functions are concentrated in central areas. This "spatial dislocation" encourages long commutes, fosters reliance on motorized transport and increases household spending on transport (Acheampong et al., 2022).

A growing body of literature illuminates the pervasive accessibility challenges associated with the sprawling residential developments emerging in the peripheries of African cities. Studies based on GIS-based modelling of urban accessiblity provide an indication of the poor accessiblity and long travel times associated with peripheral areas of large, rapidly expanding African cities (Acheampong & Asabere, 2022; Andreasen & Møller-Jensen, 2017; Castro et al., 2022; Melbye et al., 2015; Møller-Jensen et al., 2012; Venter et al., 2021). Qualiative studies suggest that residents in peripheral areas often navigate long and arduous journeys, on bad roads, through highly congested transport systems and spend a high share of household budgets on transport (Acheampong & Asabere, 2022; Adu-Gyamfi, 2020; Andreasen & Møller-Jensen, 2017; Chikengezha & Thebe, 2021; Lucas, 2011; Williams et al., 2022). Locating in the periphery can be entwined with experiences of immobility and social exclusion, especially for low-income urbanites struggling to afford transport on a regular basis (Chikengezha & Thebe, 2021; Lucas, 2011; Williams et al., 2022).

This paper contributes to this emerging literature with an examination of everyday travel behavior among residents in Accra's areas of recent urban expansion. Accra is the capital city and largest urban center

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https://doi.org/10.1016/j.cities.2024.105471
Received 3 August 2023; Received in revised form 29 August 2024; Accepted 30 September 2024
Available online 4 October 2024
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of Ghana with a population of 5.4 million people recorded in the 2021 census (GSS, 2022). Accra offers a prime example of a large and rapidly expanding African city, characterized by widespread residential sprawl and discernible challenges in its transport system (Gaisie et al., 2019; Møller-Jensen, Agergaard, et al., 2020; Møller-Jensen, Allotey, et al., 2020). The paper draws on qualitative interviews ($n = 48$) and a large travel survey ($n = 2107$) targeting economically active adults residing in Accra's peripheral neighborhoods. The paper explores how everyday travel behavior intersects with the expansion dynamics of the city and how travelers navigate the opportunities and constraints associated with living in the peripheries.

The main contribution of the research is to combine insights from qualiative interviews exploring the travel choices, preferences and lived experiences of residents in peripheral neighborhoods with systematic and highly detailed data on their travel behavior, including travel frequencies, travel purposes, destinations and modal choices. Large travel surveys are scarce in the context of African cities and offer limited insights on travel behavior in peripheral neighborhoods (notable exceptions are Poku-Boansi (2021) and Lesteven et al. (2022)). The specificities of travel behavior in peripheral neighborhoods are obfuscated in large city-wide surveys designed to be representative at the city level, because a large share of urban populations resides in densely populated, centrally located neighborhoods close to employment opportunities. As a unique feature, spatially explicit destination data are used to map the predominant destinations and the long distances travelled from Accra's peripheral neighborhoods. In existing research, there is an almost absence of spatially explicit information on destinations and directions of travel, despite such information being crucial for transport planning (notable exceptions inlude Salon & Aligula, 2012 and Mendiate et al., 2020).

We propose “high mobility lifestyles” as a metaphor to capture key aspects of travel behavior in the peripheries, characterized by a high share of adults travelling regularly outside their neighborhoods, over relatively long distances (10+ km) and mainly using motorized transport. The research illuminates how infrastructural deficits, long distances, severe congestion and rising transport costs combine to make high mobility lifestyles exceedingly strenuous, costly, and time-consuming. Ultimately, we suggest that an in-depth understanding of travel behavior, embedded in contextual conditions, can provide insights on how travel choices may be changed and how transport systems may be made more sustainable and inclusive.

2. Existing research on travel behavior in African cities

Travel behavior is a multi-dimensional concept, which includes the frequency of travel, transport modes, destinations, route choice, timing of travel, trip chaining practices and considerations concerning comfort, convenience and travel arrangements within families and social groups (Van Acker et al., 2016). Travel behavior is concerned not only with how and why people travel around in a city, but also how travel choices and preferences are shaped by the wider social and spatial context (Van Acker et al., 2010). Travel behavior is a derived demand, as people travel to access locations and activities of importance for their daily lives and livelihoods (Van Acker et al., 2016).

A wealth of research from African cities, grounded in qualitative methodologies, emphasize that mobility is essential for peoples' ability to sustain livelihoods, maintain social networks and access basic services (e.g Andreasen & Møller-Jensen, 2017; Esson et al., 2016; Gough, 2008; Langevang & Gough, 2009; Wignall et al., 2019). However, systematic data on travel behavior in contemporary African cities remains rather scarce. Outside South Africa, only a handful of recent travel surveys offer a comprehensive perspective on travel behavior across mode users (Adetunji, 2013; Lesteven et al., 2022; Poku-Boansi, 2021; Tatah et al., 2022; Tatah et al., 2023). A number of recent travel surveys focus on users of specific transport modes, such as public transport (Abane, 2011; Salau, 2015), ride-hailing services (Acheampong et al., 2020), bicycles (Irlam & Zuidgeest, 2018; Mendiate et al., 2020) and walking (Mfinanga, 2014; Olojede et al., 2017). A few recent studies utilize household surveys with a few variables on travel behavior (Nyamai & Schramm, 2022; Salon & Gulyani, 2019; Tembe et al., 2019), which do not offer the same level of detail as dedicated travel surveys.

Existing research illuminates that travel behavior is deeply entwined with the changing opportunities provided by urban economies and labour markets. Older travel surveys conducted in African cities in the 1990s and early 2000s highlight that widespread urban poverty made motorized transport unaffordable for large segments of the urban populations and constrained many urbanites to short-distance trips undertaken mainly on foot (Bryceson et al., 2003; Olvera et al., 2003; Olvera et al., 2013; Salon & Aligula, 2012; Salon & Gulyani, 2010). Salon and Aligula (2012) emphasize that most urbanites in Nairobi in 2004 lead “low mobility lifestyles”, emphasizing that over half of adults did not regularly travel outside their neighborhoods for work or education purposes. In recent decades, many African countries have experienced high economic growth rates and significant growth in disposable incomes (Andreasen, 2024; Andreasen & Agergaard, 2022), which has enabled higher levels of mobility among African urbanites. A number of recent travel surveys indicate that a high share of urbanites travel more frequently and over longer distances to engage in economic activities (Amoh-Gyimah & Aidoo, 2013; Nyamai & Schramm, 2022; Poku-Boansi, 2021; Tatah et al., 2022; Tatah et al., 2023). These more recent surveys record a high share of regular travelers, relatively long distances travelled (10+ km each way or 1–2 h spent in transit daily) and a large share of adults (60–90 %) relying on motorized transport, with passenger transport services being most widely used. A few recent surveys from large cities record considerably lower levels of mobility. A survey conducted in 2013 in Nairobi record a surprisingly short median commute times of only 30 min (Salon & Gulyani, 2019), while a survey conducted in 2015 in Dakar record that 70 % of trips undertaken by respondents in the past 24 h were made by foot (Lesteven et al., 2022). Travel behavior is influenced by city size, as recent travel surveys from small and medium-sized cities record shorter travel times of <30 min (Adetunji, 2013; Salon & Gulyani, 2019; Tatah et al., 2023) and a high share of adults (60–70 %) relying on active modes of transport such as walking and cycling (Mendiate et al., 2020; Salon & Gulyani, 2019; Tatah et al., 2023). There is very limited information on predominant destinations and directions of travel in existing travel surveys. One notable exception include Salon and Aligula's (2012) travel survey from Nairobi, where location of home and destinations are recorded within large geographic zones. Also notable is Mendiate et al.'s (2020) highly illustrative Origin-Destination maps for Quelimane, though these focus only on bicycle trips.

Existing research illuminate signficant social differentiation in travel behavior shaped by gender and socio-economic circumstances. Most travel surveys indicate that low socio-economic status – measured by income or education level – is associated with lower travel frequencies, shorter distances travelled and more reliance on walking (Bryceson et al., 2003; Olvera et al., 2003; Salon & Aligula, 2012; Salon & Gulyani, 2010; Tatah et al., 2022; Tatah et al., 2023). Recent reviews of the literature on travel behavior in African cities characterize walking as a “captive” mode, used mainly by those unable to afford motorized transport (Foley et al., 2022; Randall et al., 2023). Most travel surveys also record significant gendered differences in travel behavior, with male respondents travelling more frequently, over longer distances and being more likely to use motorized transport, and especially private cars (Adetunji, 2013; Amoh-Gyimah & Aidoo, 2013; Salon & Gulyani, 2010; Tatah et al., 2022; Tatah et al., 2023). Qualitative studies illuminate how womens' mobility is subject to negotiations within families and constrained by women's straddling of economic activities, childcare and domestic responsibilities and risks of gender-based harassment and confrontations on the roads (Møller-Jensen, 2021; Møller-Jensen & Agergaard, 2022; Williams et al., 2022).

Existing research highlight the accessibility provided by urban

transport and land-use systems as a crucial factor enabling and constraining travel behavior within African cities. Road infrastructure generally occupies a smaller share of land in African cities than elsewhere in the world and paved roads are highly concentrated in central areas (Lall et al., 2017). Passenger transport services are provided mainly by private operators in the form of road-based paratransit services, i.e. minibuses, shared taxis, motorcycles, and three-wheelers, while formerly state-owned mass transit services have declined (Bruun & Behrens, 2016; Randall et al., 2023). Vehicle ownership rates remain low, but are increasing rapidly (Hesse & Ofosu, 2014; Mokonyama & Venter, 2007; Mrema, 2011). Active transport modes are widely neglected in transport policies and urban environments are often hostile towards pedestrians and cyclists (Foley et al., 2022, Randall et al., 2023). These factors combined have made African cities notorious for poor accessibility, extreme congestion and low speed levels (Acheampong & Asabere, 2022; Andreasen & Møller-Jensen, 2017; Castro et al., 2022; Melbye et al., 2015; Møller-Jensen et al., 2012; Venter et al., 2021).

A growing body of literature examines accessibility and mobility challenges associated with the sprawling residential developments emerging in the peripheries of African cities. A number of qualitative studies illuminate the mobility constraints experienced by residents in peripheral areas of large, rapidly expanding African cities (Acheampong & Asabere, 2022; Adu-Gyamfi, 2020; Andreasen & Møller-Jensen, 2017; Chikengezha & Thebe, 2021; Lucas, 2011; Williams et al., 2022). Peripheral neighborhoods are often outside the reach of formal mass transit services and serviced mainly by informal passenger transport services provided by a range of private operators (Andreasen & Møller-Jensen, 2016; Andreasen & Møller-Jensen, 2017; Chikengezha & Thebe, 2021). Difficult and challenging road conditions may discourage private operators from servicing peripheral neighborhoods (Adu-Gyamfi, 2020). Interior access roads in peripheral areas are highly susceptible to the impacts of heavy precipitation, which causes inundation of low-lying road segments, retreat of transport services and significant damage to access roads (Andreasen et al., 2022). Peripheral location can intertwine with low socio-economic status and foster experiences of immobility and social exclusion for residents struggling to afford motorized transport on a regular basis. In the periphery of Harare, Zimbawe, transport costs are charaterized as prohibitive for low-income groups, whose salaries cannot cover commuting costs (Chikengezha & Thebe, 2021). Similarly, in socially deprived areas in the periphery of Tshwane, South Africa, "working for transport" encapsulates the notion that for many low paid jobs salaries are insufficient to cover travel costs (Lucas, 2011). The longer journeys and higher transport costs can undermine the financial viability of the lowest paid jobs for residents, who have relocated to state-supported housing sites in the periphery of Johannesburg (Williams et al., 2022). Most of the large travel surveys conducted in recent years offer limited insights on travel behavior in peripheral areas, because they are designed to be representative at the city level (Adetunji, 2013; Nyamai & Schramm, 2022; Salon & Gulyani, 2019; Tatah et al., 2022; Tatah et al., 2023). A notable exception is Poku-Boansi's (2021) travel survey conducted in affluent peripheral neighborhoods of Kumasi, Ghana, which illuminates that most economically active adults need to travel frequently outside their neighborhoods and over long distances for work purposes. Also notable is Lesteven et al. (2022), which illuminates the significance of informal passenger transport services for low-income residents in peripheral neighborhoods of Dakar, Senegal.

3. Material and methods

3.1. Study sites

The paper draws on mixed methods research conducted in 2021–2022 in 10 neighborhoods clustered around four locations in Accra's periphery (see neighborhood delineations in Fig. 1). The 10 neighborhoods represent a diverse collection of peripheral neighborhoods in Accra accommodating a wide range of urban residents of mixed socio-economic status. All are characterized by informal land acquisition processes and sprawling housing developments, primarily financed and organized by private individuals and households. Four are consolidated neighborhoods included in the built-up area of Accra in the late-1990s, while six are more newly developing areas incorporated in the 2000s. The neighborhoods differ in degree of consolidation, geo-

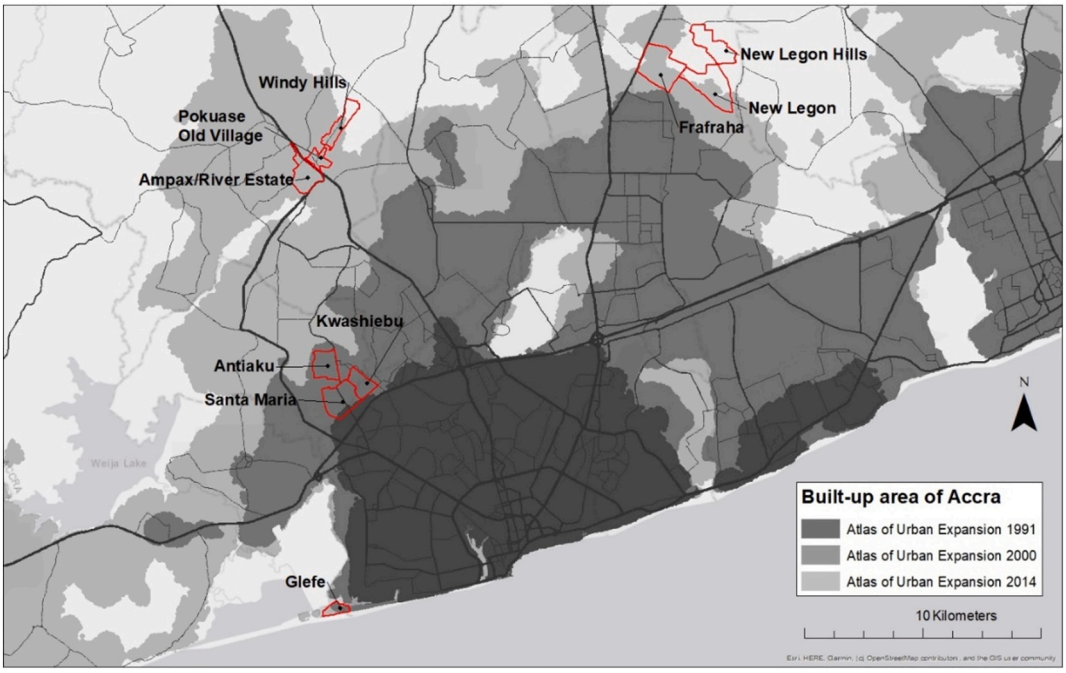

Fig. 1. Location of the 10 neighborhoods covered by the survey within Accra's historical extent.
Explanation: Red polygons indicate the delineation of the 10 neighborhoods covered by the survey.
Source: Atlas of Urban Expansion (http:// atlasofurbanexpansion.org/), vectorized end products for 1991, 2000 and 2014. Road network from OpenStreetMap.

physical characteristics, proximity to main roads and socio-economic composition of local populations.

3.2. Qualitative interviews

The paper draws on qualitative interviews conducted in November 2022 with economically active adults ($n = 48$) residing in the peripheral neighborhoods. The interviewees were selected purposefully from among the respondents of a large travel survey conducted in July–August 2021 (see details on this below). The selection of interviewees for follow-up interviews targeted survey respondents, who had indicated their willingness to participate in follow-up interviews and who had provided valid contact information. While the survey targeted all economically active adults, the selection for follow-up interviews targeted respondents, who were either head of household or his/her spouse, who were considered most likely to influence household decisions on residential location and intra-household travel arrangements. The selection of interviewees was informed by analysis of the survey data on travel behavior and sought to ensure inclusion of respondents with different work-related travel behavior, including frequent travelers, irregular and occassional travelers, travelers with multi-local activities and travelers with highly variable travel behavior. The selection process further sought to ensure diversity in terms of key socio-economic indicators, notably gender, age, and educational level. Interviewees include an almost equal representation of women (23) and men (25). Most are mature adults between 30 and 60 years (32), while some are younger adults aged 30 or below (10) and some are elderly people above 60 years (6). A semi-structured interview guide was used to explore the significance of everyday travel in peoples' livelihoods, their considerations concerning travel needs and residential location, their travel choices and preferences as well as adjustments in travel behavior over time. Interviews were conducted with the aid of Ghanaian research assistants, who facilitated continuous translation between English and Twi, Ga or Ewe for interviewees not proficient in English. All interviews were recorded and transcribed and, when necessary, translated from local languages to English. The interview material was analyzed in QSR Nvivo through an open coding process with the purpose of systematically analysing data for themes and concepts. Interviewees do not appear under their own names and recognisable details are altered to ensure anonymity.

3.3. Survey instrument and administration

The paper utilizes data from a travel survey conducted in the peripheral neighbourhooods in July–August 2021. The survey deployed the inclusion criteria for main respondents that they should be adult household members over the age of 18, who are economically active and undertake regular trips outside their neighbourhooods in relation to their income-generating activities. The survey was administered through in-person interviews by a team of trained enumerators led by researchers from the University of Ghana. Enumerators recorded answers in a digital survey questionnaire set up and administered in the SurveyXact online platform. The survey collected detailed information on travel behavior of main respondents ($n = 1053$) and other adult household members within the main respondents' households ($n = 1054$). The sample is characterized by an almost equal gender balance, both among main respondents and other adult household members, cf. Table 1. The age of respondents ranges from 18 to 98, with a mean age of 40 years for main respondents and 38 years for other adult household members. The majority have completed either junior or senior secondary school (56 %), tertiary education (25 %) or technical/vocational education (6 %).

The survey questionnaire was designed to record self-reported usual or normal travel behavior and focused on travel to destinations outside respondents' neighborhoods (as delineated in Fig. 1). Respondents were asked how often they travel outside their neighborhoods in relation to their income-generating activities, to which destinations they travel most freqently and what transport modes they will normally use. The questionnaire also included questions about out-of-neighborhood travel for other purposes beyond work, the main respondent's assessments of transport infrastructure and accessibility of their neighborhoods as well as basic socio-economic indicators such as age, gender and educational level. The timing of the survey means that it was conducted in the aftermath of the COVID-19 pandemic. Pandemic restrictions reduced mobility in other African cities (Borofsky & Günther, 2022; Porter et al., 2023). We consider it reasonable to assume that travel behavior to a large extent had returned to normal by July–August 2021, as it was over a year after the first and only lockdown in Accra was in effect in March–April 2020. However, we cannot rule out that there may be lingering effects of pandemic restrictions on travel behavior, such as working from home, using delivery services and conducting business by phone. The survey data has been analyzed in SPSS software to provide descriptive summaries of travel behavior, including the frequency of out-of-neighborhood travel for work and other purposes and the modal choices according to gender, socio-economic characteristics and neighborhoods.

Table 1
Socio-economic characteristics of survey respondents.

	Share of main respondents (n = 1053)	Share of other adult household members (n = 1054)	Share of all respondents (n = 2107)
Gender			
Male	48	51	49
Female	52	49	51
Age			
Below 30 years	21	33	27
30–60 years	72	58	66
Above 60 years	7	9	7
Relation to head of household			
Head of household	52	32	42
Spouse	26	25	26
Children or children in-law	11	21	16
Parent, sibling, parent in-law or otherwise related	7	18	12
Unrelated	4	4	4
Highest level of education completed			
No education received	6	5	6
Primary school	9	6	8
Junior secondary school	33	27	30
Senior secondary school	21	30	26
Technical/vocational training	5	6	6
Tertiary education	25	26	25
Employment status			
Employee	32	42	36
Employer	8	7	7
Self-employed (without employees)	55	45	51
Other (casual worker, contributing family member, apprentice etc.)	4	7	6

3.4. Sampling strategy

The survey was designed to be generalizable at the neighborhood level and deployed a spatial approach to simple random sampling. This approach was chosen as a viable and practically feasible strategy for random sampling in the absence of an up-to-date population register. The newest available census data at the time were from the 2010 census, which would have been a highly inaccurate sampling frame in the context of emerging peripheral neighborhoods that have attracted large volumes of new inhabitants in the intercensus period. Within each neighborhood, 300 random GPS points were generated in ArcGIS software and consecutively numbered. The team of enumerators successively located GPS points in field, identified the nearest building and invited the occupants to participate in the survey. The enumerators worked their way through the list of random GPS points until the target of at least 100 valid responses had been reached for each neighborhood. If the nearest building was occupied by multiple households, all the households were invited to participate in the survey and were surveyed as separate households, meaning that in some instances one GPS point would generate multiple valid responses. This may have the effect that tenants are slightly overrepresented in the survey, as rental houses often accommodate multiple households. If more than one present household member within a household fitted the survey's inclusion criteria, only one participated in the survey, with present household members deciding among themselves who would participate as main respondent. If no occupants were home on first visit, enumerators would re-visit the building a second time. Data collection was conducted both on normal weekdays and on weekends to maximize response rate. Across neighborhoods the team of enumerators visited and revisited between 120 and 200 GPS points to achieve the target of at least 100 valid responses, cf. Table 2. A total of 1478 GPS points were visited by enumerators to yield valid responses from 1053 main respondents and record information for 1054 other adult household members. As such, 71 % of GPS points visited by enumerators yielded valid responses. Of the remaining GPS points, 8 % pointed to buildings, where none of the occupants fitted the inclusion criteria, 9 % pointed to buildings, where occupants were not willing to participate or not at home on either first or second visits, and 12 % pointed to partially completed and unoccupied structures or to non-residential buildings like schools or shops.

3.5. Origin-destination analysis

The survey collected spatially explicit information on the most frequently visited destinations of both main respondents and other adult household members in relation to their income-generating activities. Destination data can be difficult to record accurately in a survey, where respondents are interviewed in their home, as local place names can be ambivalent and hard to pin to a map in the data processing stage. To obtain accurate and reliable destination data, enumerators used a gridded map of consecutively numbered 3 × 3 km cells overlaid on a map of Accra (see Fig. 2). Enumerators brought a laminated version of Fig. 2 in field and used it when recording destination data. Respondents were asked to which destination outside their neighborhoods they travel most frequently to in relation to their income-generating activities. Those who recorded a specific destination within Accra (n = 1533) were asked to provide locational data by recording the place name, the nearest landmark and the relevant grid cell number from the destination grid map. Remaining respondents either travel to many different destinations within Accra (n = 163), record a primary destination outside Accra (n = 120), provided inaccurate destination information (n = 26) or do not travel for work purposes (n = 265). Enumerators further recorded GPS coordinates of all respondents' homes on-site. Origin-Destination distances were established using GIS-based network analysis in ArcGIS software. The geocoded locations of all respondents constitute the origin dataset while the centroids of target destination cells constitute the destination dataset. The distances between origin and destination points represent the shortest possible route through a detailed digital road network obtained from OpenStreetMap.

4. Results

4.1. High mobility lifestyles in the context of unregulated residential sprawl

Emerging neighborhoods in Accra's periphery come into existence mainly through informal land transactions and incremental construction of houses financed and organized by private individuals and households. From the onset, there are very limited employment and commercial opportunities in emerging peripheral neighborhoods. Aspiring house-builders commonly target poorly accessible locations isolated from main roads, because this is where land is available and affordable. Grace is a former military officer, who has invested her pension savings in a nice house and a small shop in Antiaku: *"The goal was to find a place where I could lay my head. I didn't really consider other factors, like transport. When I bought this land in the 1990s, the whole place was bushy, the road was rocky and very bad, but I still went ahead and bought the land."*

Daily mobility is crucial for peoples' ability to work and provide for themselves and their families. Overall, 87 % of respondents travel outside their neighborhoods for work purposes, i.e. to visit places of employment, business, trade, or other income-generating activities. Over half (54 %) are *frequent travelers*, who travel out-of-neighborhood 4–7 times a week for work purposes cf. Fig. 3. The share of frequent travelers is equally high across neighborhoods (50–60 %), irrespective of the distance to central Accra. Frequent travelers are more likely to be male, have completed tertiary education and record their employment status as either employees or employers. A good example of a frequent

Table 2
Overview of GPS points and valid responses across neighborhoods.

	Valid responses recorded	Other adult household members recorded	None of the occupants fit inclusion criteria	Not at home/not willing to participate	Partially completed, unoccupied structure	Non-residential building	Total no. of GPS points visited
Santa Maria	109	105	9	10	6	3	137
Kwashiebu	102	101	9	19	6	8	144
Antiaku	100	98	5	22	5	7	139
Glefe	112	117	5	4	0	0	121
Frafraha	109	137	13	20	5	1	148
New Legon	101	121	18	9	3	0	131
New Legon Hills	106	99	14	14	28	2	164
Ampax/River Estate	101	89	12	20	25	9	167
Pokuase Old Village	106	93	10	5	3	12	136
Windy Hills	107	94	18	16	39	11	191
Total	**1053**	**1054**	**113**	**139**	**120**	**53**	**1478**

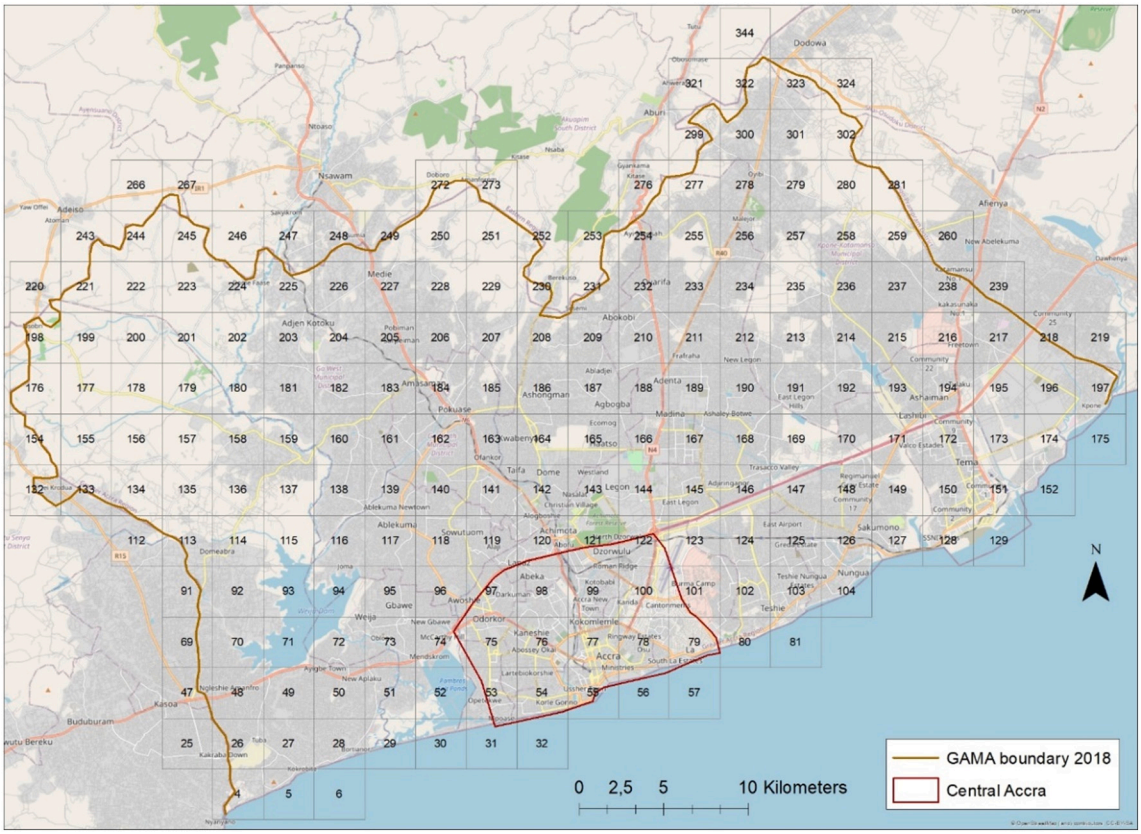

Fig. 2. Destination grid map of the Greater Accra Metropolitan Area overlaid with a grid of consecutively numbered 3 × 3 km cells.
Explanation: The destination grid map was used to collect spatially explicit information on the most frequently visited destinations of respondents in relation to their primary income-generating activities. As popular place names can be ambivalent and hard to pin to a map in the data processing stage, enumerators would record the place name, the nearest landmark and the relevant grid cell number of each destination recorded.

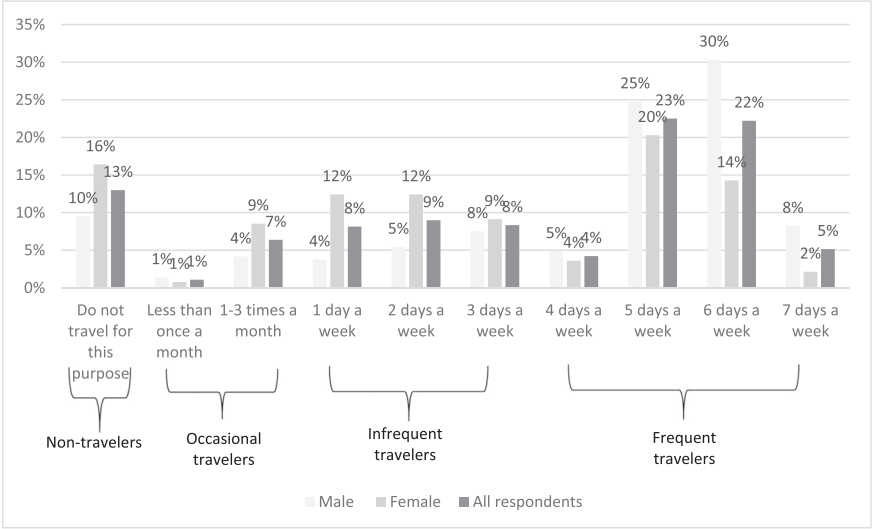

Fig. 3. Frequency of travel for work purposes according to gender*
* The relationship between gender and frequency of travel for work purposes is statistically significant ($X^2 = 214.2$, $p < 0.001$).

traveler is Francis, who is a marketing agent for a pharmaceutical company. Together with wife, he has built a nice 3-bedroom house in Frafraha, where they live with their three children. Francis commutes daily Monday-Friday to his office in Kokomlemle in central Accra. Like many frequent travelers, who travel during rush hours, Francis complains about the grinding daily commute: *"These days, the problem is that as early as 5:30, by the time you drive to the main road, there is already traffic, and that traffic stays even up to 10 to 10.30 AM. So from here, let's say from Frafraha to Accra central, I can spend like 3 hours on the road."* Occupations among frequent travelers re-interviewed in 2022 include many well-educated urban professionals like Francis, within sectors such as insurance, banking, engineering, health and public

administration, but also many in mid- and low-skill jobs such as mechanics, security guards, taxi drivers, shop assistants and waiters.

A quarter (25 %) of respondents are *infrequent travelers*, who travel 1–3 times a week for work purposes, while another 8 % are *occasional travelers*, who travel 1–3 times a month. Infrequent and occasional travelers are more likely to be female, self-employed and have lower levels of education. The higher share of women among infrequent and occasional travelers reflects household arrangements concerning work, travel, and childcare. Many women balance trading activities and small businesses with care responsibilities, while their husbands travel more frequently and spend a larger part of their days away from home. A good example of this is Agnes, who is a self-employed trader living in a rented house in Antiaku with her husband and their three children. Her husband works as a taxi driver with long days on the roads. Agnes spends more time at home and typically travels twice a week to Makola market in central Accra to buy large quantities of consumable goods, such as biscuits, sodas and candy. She organizes for the goods to be transported home and resells to her network of shop owners within Antiaku. Like many traders, she travels to market very early in morning and highlights security risks as a main challenge for her everyday travel: *"You need to leave home early due to traffic, but it's not very safe leaving the house very early, because of robbers in the area. I for instance have someone who comes to pick me up from home, whenever I want to leave the house very early. The men can go alone, but not the women, because they know us to be market women and have money on us all the time."*

The remaining 13 % of respondents do not travel outside their neighborhood for work purposes, because they are unemployed (7 %), under education (1 %) or work at home/close to home (5 %). The non-travelers are all recorded among other adult household members due to the inclusion criteria for main respondents. Households, where no adult members travel outside their neighborhood for work purposes, were not included in the survey due to the inclusion criteria. This applies to only 8 % of the GPS points visited by enumerators, cf. Table 2.

Beyond work, most respondents also travel regularly outside their neighborhoods for many other purposes, cf. Fig. 4. While local service and retail sectors emerge as local populations grow, many residents still prefer to frequent large markets in central Accra offering a wider variety of goods and more competitive prices. Two-thirds (67 %) travel outside their neighborhoods to purchase household necessities, with almost half (47 %) doing so every week. Daily travel is further necessitated by the insufficient provision of health and education services in peripheral neighborhoods, as schools and health clinics are few and far apart and struggle to meet demand from growing local populations. The vast majority (81 %) travel outside their neighborhoods to access health services. Almost one-third (29 %) of households have children attending school outside their neighborhoods, and 12 % of adults travel outside their neighborhoods to pick up or drop off children at school or daycare several times a week. Participation in religious activities further fuels much out-of-neighborhood travel. Three-quarters of all respondents (74 %) travel to places of worship outside their neighborhoods, with most (67 %) doing so at least once a week. This mainly reflects personal preferences, rather than lack of places of worship within peripheral neighborhoods. Despite having lived in Frafraha in 10 years, Peter still prefers to attend his church in Adenta: *"It is something that you've been in the church for 30 years. You grew up in the church with your family. There's a church close by [his house], which is the same church, but because I've been there all my life and bonded with everybody there, I still prefer to go there."*

4.2. Dispersed destinations and directions of travel from peripheral neighborhoods

Residents in peripheral neighborhoods travel to dispersed destinations across Accra in relation to their income-generating activities. Spatially explicit destination data are used to illustrate the predominant destinations and directions of travel for work purposes from peripheral neighborhoods. Fig. 5 illustrates the destinations that respondents travel to most frequently for work purposes, specifically for the 85 % of respondents who travel most frequently to a specific destination within Accra. Remaining respondents travel to destinations outside Accra (6 %) or were unable to pinpoint a specific destination (9 %), because they travel to many different destinations within Accra. The latter includes for example drivers, construction workers, craftsmen, and itinerant traders, who service customers and clients across the city.

The spatial analysis reveals that much travel for work purposes is directed towards destinations in central Accra. Over half (54 %) of those pinpointing a specific destination within Accra record a destination in central Accra grid cells (as delineated in Fig. 2). One-quarter (25 %) record a destination in the most central grid cell no. 55, where Accra's largest market, Makola, is located. Those travelling to central areas are more likely to be female, self-employed, and infrequent or occasional travelers, likely reflecting the attraction of large bulk goods markets in central Accra for self-employed traders and small business owners. Accra is often highlighted as a monocentric city, where commercial activities, administrative functions and educational institutions are highly

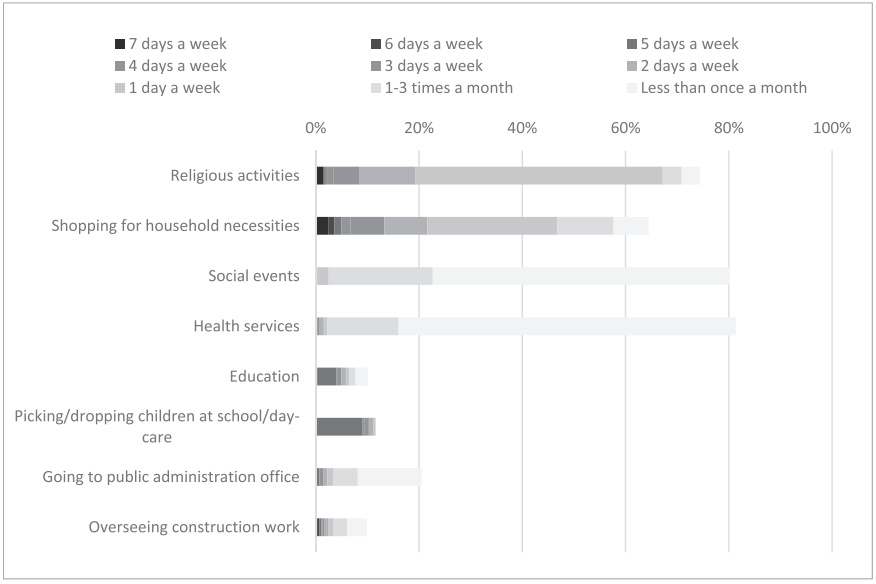

Fig. 4. Frequency of travel for other purposes (beyond work).

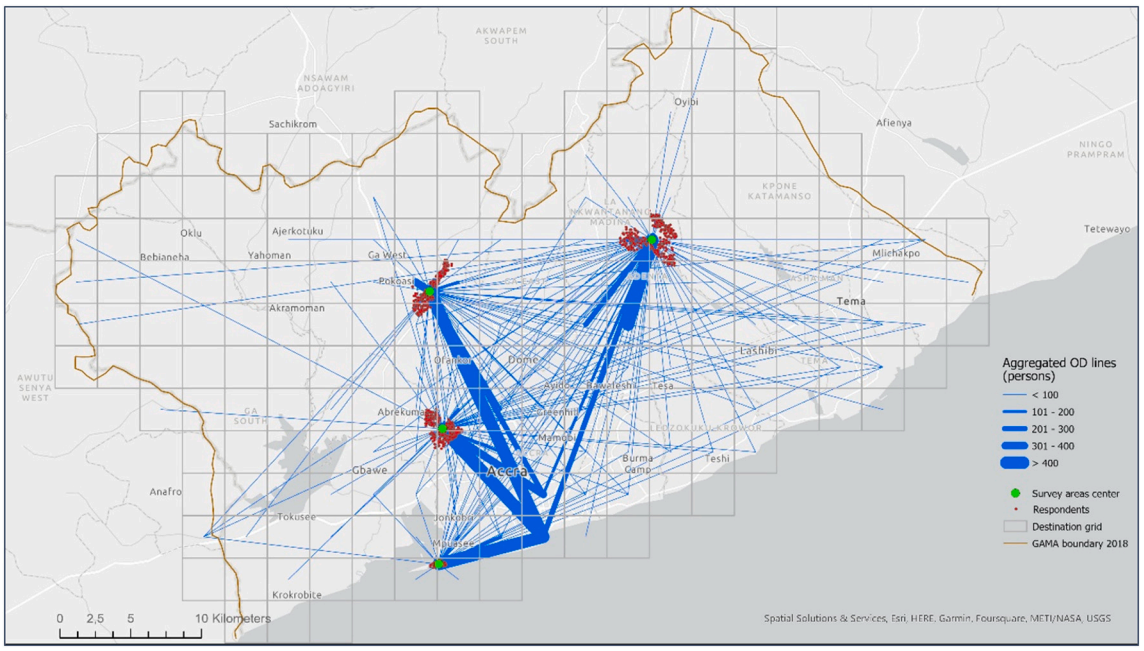

Fig. 5. Origin-destination map illustrating the most frequently visited destinations of work.
Explanation: The origin-destination map illustrates the most frequently visited work destinations of respondents, who travel most frequently to specific destinations within Accra ($n = 1533$). The figure does not include respondents who travel to many different destinations with Accra ($n = 163$), record destinations outside Accra ($n = 120$), do not travel for work purposes ($n = 265$) or provided inadequate destination information (n = 26). In this figure, all origin points for each cluster of neighborhoods (green points) have been aggregated to a single point so that the origin-destination lines more clearly visualize the commuting pattern from each cluster. The width of the lines indicates the number of respondents from each cluster targeting a specific destination grid cell.

concentrated in central areas (Esson et al., 2016; Møller-Jensen et al., 2012).

In that light, it is surprising that a significant share of respondents (46 %) travel to more dispersed destinations outside central Accra. Dispersed destinations are recorded by a higher share of respondents in newly developing neighborhoods, cf. Fig. 6. This is partly explained by the significance of "decentral centralities" in the form of larger markets outside central Accra. In the neighborhoods clustered northeast of the center (Frafraha, New Legon and New Legon Hills), only 27 % of respondents record destinations in central Accra, while an equal share (31 %) record destinations in grid cell no. 166 or 167, where Madina market and surrounding commercial areas are located. Likewise, in the neighborhoods clustered northwest of the center (Ampax/River Estate, Pokuase Old Village and Windy Hills), a significant share (13 %) record destinations in grid cell no. 184, where Pokuase commercial areas are located.

It is also important to note that many have more complex travel behavior than commuting between their home and a single work destination. One-third (32 %) of main respondents record a secondary work destination, because their economic activities are conducted in multiple locations and/or they are engaged in multiple economic activities. From the qualitative testimony, it is also evident that many conduct their economic activities in multiple locations. For example Clement, who commutes daily from his home in Frafraha to his auto repair shop in Adenta, wil typically also make 3–4 round trips every week to Kaneshie market in central Accra to acquire spare parts.

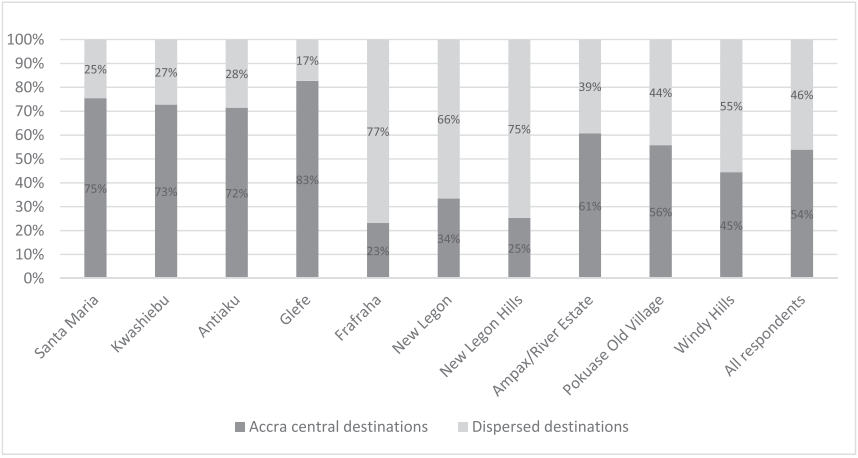

Fig. 6. Share of respondents* travelling most frequently to destinations in Accra central vs. more dispersed destinations across neighborhoods**
** Computed as the share of respondents, who were able to pinpoint a specific destination within Accra (n = 1533).*
** The relationship between neighborhoods and the share of respondents pinpointing central vs. dispersed destinations is statistically significant ($X^2 = 278.4$, $p < 0.001$).

4.3. Long distances travelled from peripheral neighborhoods

The spatial analysis of destinations reveals that many economically adults travel over relatively long distances for work purposes. Respondents have an average distance of 13.6 km – measured in road network length – between their home and their primary destination of work. While most (65 %) have <15 km, many (26 %) have longer distances of 15–25 km and some (9 %) even >25 km. The average distance is longer for travelers from newly developing neighborhoods (13–16 km), compared to consolidated neighborhoods (10–12 km), cf. Fig. 7. On average, male respondents tend to travel slightly longer distances (14.2 km) than female respondents (13.1 km). Respondents with tertiary education travel longer distances (14.8 km) compared to all other groups. Importantly, as described in the materials and methods section, these are computed rather than actual travel distances and constitute the shortest possible route between the home locations and the centroid of target destination grid cells. In practice, actual travel distances can easily be longer, for example if travelers use a different route, engage in trip-chaining practices, or conduct their economic activities in multiple locations.

While we have not attempted to quantify travel time, it is likely that many economically active adults spend a considerable number of hours in transit. Residents settle in peripheral neighborhoods, aware that everyday travel will consume a substantial part of their time and detract from their life quality, leisure and family time. Frequent travelers commonly complain about the many hours spent in transit daily. Congestion further adds an element of unpredictability, which often increases the time spent in transit, when travelers seek to account for potential delays in their planning. Many carefully plan their travel to avoid congestion, as explained by Kwai, a church leader undertaking long commutes from his house in Frafraha to his church branch at Kasoa Toll Both and the church's head office near Korle Bu: *"I move towards Korle Bu on Tuesdays and Wednesdays and Kasoa on Fridays and Sundays, but when I go, I do not come home early. For traffic reasons… When I go, I would rather work longer. If you leave [the office] early, in 2 hours' time, you may not be home. By 9 or 10 PM you can be sure that the cars have all gone to sleep."*

4.4. Travel choices constrained by infrastructural deficits in peripheral neighborhoods

Emerging residential developments in Accra's periphery are accompanied by highly fragmented and insufficient provision of transport infrastructure. A majority of main respondents (62 %) highlight the poor conditions of neighborhood roads as the most significant challenge for their daily travels. Peripheral neighborhoods commonly remain serviced by a limited number of rough dirt or gravel roads, while traffic volumes and service areas increase significantly over time. Peter owns a graphic design business near Madina and built a house in Frafraha around 2012: *"At that time, with the money I had, this was the place I could afford. But I'm mobile, and the road was virtually empty back then, so you hit the road and just a few minutes you are gone, until recently when the congestion started."* Interior roads are gradually widened and improved over time, but improvements are limited by the economic capacity of local landowners and their ability to lobby municipal authorities for road improvements. All neighborhoods remain outside the network of the large busses operated by Metro Mass Transit, the public transportation company in Accra. Demand from growing local populations, along with gradual road improvements, have attracted a range of privately operated, low-capacity vehicles offering passenger transport services, predominantly minibuses (known popularly as trotros), shared taxis and motorcycles (known as okadas).

The fragmented provision of transport infrastructure and services means that travelers from peripheral areas have rather limited options concerning their modes of transportation. The vast majority of economically active adults (78 %) use trotros when travelling outside their neighborhoods for work purposes, cf. Fig. 8. Trotros are the most widely available and most affordable option, but also widely perceived as unreliable and uncomfortable. Many residents complain that trotros are insufficient in supply and operate infrequently in peripheral neighborhoods. During off-peak hours it can be hard to find a trotro in peripheral neighborhoods, while in peak hours operators will struggle to meet demand, as explained by a male student living in Santa Maria: *"Because everyone is going to work and there is pressure when I stand here, I may get a trotro to Circle, but I will have to stand at the bus stop for long. Sometimes when I stand for like 15 minutes and I am not getting a trotro, I start walking."* Trotro users commonly endure long waiting times, queuing, spontaneous route changes, crowding and reckless driving, as trotro operators seek to maximize the number of paying passengers and minimize travel time. This fosters a strong preference for private cars among those who can afford this. Joseph recently lost his job in a managerial position, which came with fuel costs covered, and is hard-pressed to return to trotro usage for his everyday travel: *"With the trotro it takes too much of your time, because you can't take a shorter route. You spend most of your day and some of your productive hours in traffic. It takes a toll on your body. They tend to overload the trotros with passengers. There is poor ventilation too. It is safer and healthier to have your own car, but if you can't afford your own car, you only risk your life in a trotro."*

Travelers from peripheral areas also use a range other para-transit services, including shared taxis (8 %), motorcycle taxis (6 %) and

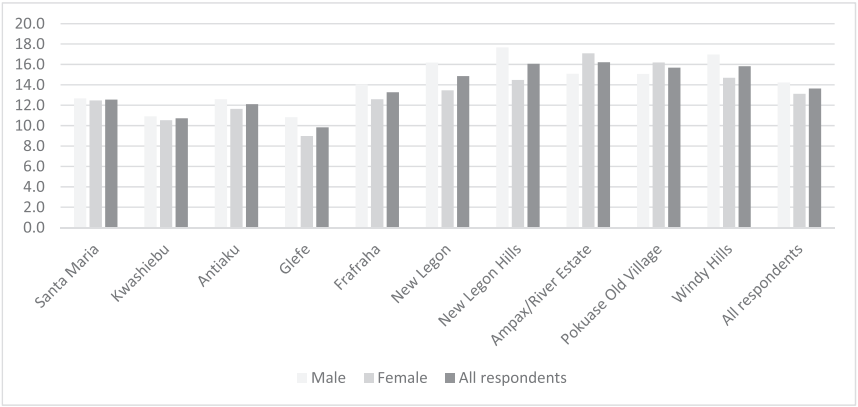

Fig. 7. Average travel distance (km) between home and primary destination of work according to gender* and neighborhood**
Explanation: Travel distances reflect the shortest possible route through the road network between the respondents' homes and the centroids of the destination cells.
* Difference in average travel distance between male and female respondents is statistically significant ($t = 2.517$, $p = 0.012$).
** Difference in average travel distance between neighborhoods is statistically significant ($F = 11.762$, $p < 0.001$).

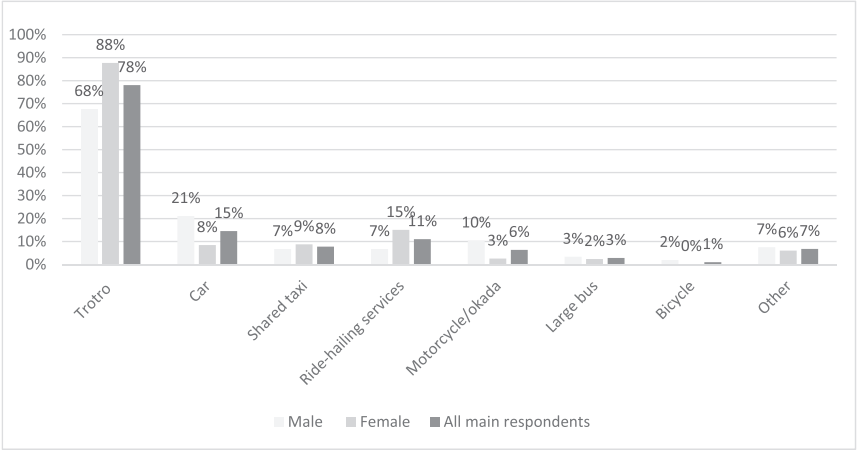

Fig. 8. Transport modes used for travel to work according to gender*

Explanation: The survey collected detailed information on transport mode choices of main respondents (n = 1053). Some respondents use more than one mode, so percentages will sum to >100 %.

* The relationship between mode choice and gender is statistically significant only for the following modes; trotro ($X^2 = 59.6$, $p < 0.001$), car ($X^2 = 32.0$, $p < 0.001$), ride-hailing services ($X^2 = 12.4$, $p < 0.001$), motorcycle/okada ($X^2 = 22.4$, $p < 0.001$) and bicycles ($X^2 = 11.8$, $p < 0.001$).

ride-hailing services like Uber and Bolt (11 %), cf. Fig. 8. These are more expensive options, which complement the trotro network, taking over where trotro routes end, offering services at off-peak hours and allowing more space for goods transport (Adu-Gyamfi, 2020). Multimodality is quite prevalent; one-third (31 %) use more than one transport mode and the most common mode combinations are trotros with other paratransit services. Cars are used by a small share (15 %) characterized by relatively affluence. A high share of car users (60 %) has completed tertiary education, while very few car users are found among those with primary or no education. Few (3 %) use the large busses provided by the public transportation company Metro Mass Transit, and these are used mostly by those who record a primary destination of work outside Accra. Active modes, like cycling and walking, are used by few, which is unsurprising considering the long distances travelled. Mode choice is highly gendered, with male respondents more likely to use cars and motorcycles, while female respondents are more likely to use trotros and ride-hailing services.

4.5. *High mobility lifestyles under pressure in changing socio-economic conditions*

Travelling frequently and over relatively long distances has become increasingly costly in changing socio-economic conditions marked by inflationary pressures and rising transport costs. Travel surveys provide a snapshot of travel behavior at a specific point in time. The survey was conducted before the *"full-blown macroeconomic crisis"* unfolding in Ghana during 2022 that sent consumer inflation rates through the roof (World Bank, 2023). By December 2022, the year-on-year inflation rate was 67 % for the Greater Accra Region as a whole, and 71 % specifically for transport goods and services (GSS, 2023).

The rising transport costs was a significant source of frustration and anxieties for those re-interviewed in November 2022. Many complained about exorbitant fuel prices and trotro fares doubling or tripling. It was clear that transport costs were increasingly weighing down on household budgets and this had elicited various adjustments in travel behavior. Joshua is an engineer employed at a governmental agency and commutes five days a week from his house in Kwashiebu to the office in central Accra: *"This week we had a divisional meeting and a colleague suggested to my boss that we should consider a shift system, where we take turns working from home. Because fuel is expensive, and it does not match up to our salary at all. During COVID we practiced something like that"*. Many frequent travelers re-interviewed in 2022 applied different strategies to reduce their travel costs, such as car-pooling, fuel-efficient driving, carefully planning multi-purpose trips and changing to cheaper transport modes. Many of the car users re-interviewed in 2022 were using their cars less to save on fuel. Benjamin, a teaching assistant at a higher education institution in Tesano, explained:*"Recently, I have not been using my car because of the fuel prices; I have parked it. Nowadays, if I am not travelling with the family, I do not go with my car. For work, I go alone, so I take the trotro, though the costs [of trotro fares] have also increased recently."*

Rising transport costs pressure the livelihoods of many self-employed traders and small business owners, who often operate on narrow profit margins. Most traders and small business owners re-interviewed in 2022 had reduced their travel for work since the survey to manage transport costs. Stella, a food vendor providing hot meals for school children in Santa Maria, now buys her supplies from local retail shops, instead of travelling to central markets. Agnes, the trader supplying small retail shops with consumables in Antiaku, will either use delivery services or buy provisions in larger quantities when making trips to Makola Market:*"I used to travel a lot, but it has reduced now. Some of the things can be done electronically, without having to travel. Frequent travels also waste money, so I only travel when necessary. The drivers now charge more, and the profit on the items is small, so travelling a lot won't help."* Some traders and small business owners can manage rising transport costs by flexibly adjusting the organization of their activities and associated trips through bulk buying practices, local suppliers, and delivery services. Others have seen their profits and business models eroded by rising transport costs. Maria, a self-employed trader in Santa Maria, had just closed her business, when re-interviewed in 2022*: "Previously I used to sell plastic packs and bags and some other things, and I realized that the cost of transportation, in going and coming, bringing the goods, and knowing how much I invest, I ended up not getting anything."*

Rising transport costs also affect travel for other purposes beyond work. Many of those re-interviewed in 2022 explain that they seek to limit non-essential travel, especially in relation to participating in social events and religious activities and visiting friends and family. Some had chosen to join a religious community within their neighborhoods to reduce travel, while others had chosen to be less active in their communities. Monica, a homemaker and shop owner in New Legon Hills, has become much more selective with participation in religious activities: "*Previously I used to go for religious activities like going to the mosque, funerals, naming ceremonies, weddings and so on. Now I don't go like I used to, because I think the transport fare can be used for something at home. So, if I will go and get worried, then I would rather stay at home and save the money for something else."*

5. Discussion

The research illuminates the "high mobility lifestyles" lead by residents in Accra's peripheral neighborhoods, distinguished by a high share of adults travelling regularly outside their neighborhoods, over long distances (10+ km) and mainly using motorized transport. High mobility lifestyles are in many ways a predictable consequence of rapid urban expansion and unregulated residential sprawl, necessitated by the largely residential nature of emerging developments in the periphery, the monocentric structure of Accra, and the insufficient provision of commercial facilities and health and education services in peripheral neighborhoods. High mobility lifestyles are, however, also constrained by the fragmented and insufficient provision of transport infrastructure associated with unregulated urban expansion processes. The infrastructural deficits in peripheral neighborhoods, the long distances travelled and the severe congestion in Accra's transport system combine to make daily travel arduous, strenuous, and time-consuming, with frequent travelers commonly spending an considerable number of hours in transit daily.

The high mobility lifestyles observed in Accra's peripheral neighborhoods are to some extent comparable to travel behavior observed in other large African cities in recent decades (Amoh-Gyimah & Aidoo, 2013; Nyamai & Schramm, 2022; Poku-Boansi, 2021;Tatah et al., 2022 ; Tatah et al., 2023). It is difficult to compare results across travel surveys due to differences in methodologies and measurements. For example, our study focuses on out-of-neighborhood travel and records usual or normal behavior, while studies applying 24-h travel diaries record actual travel behavior on a specific day and include all trips irrespective of distance (Lesteven et al., 2022; Tatah et al., 2022; Tatah et al., 2023). Nonetheless, the travel frequencies recorded in Accra, especially for frequent travelers, seem roughly comparable to the approx. 2 daily trips recorded in Yaoundé and Nairobi (Tatah et al., 2022; Tatah et al., 2023). What is perhaps specific for peripheral neighborhoods is the relatively long distances travelled. The average distance of 13.6 km between home and primary work destination in Accra is similar to the average travel distance of 15.4 km recorded in Poku-Boansi's (2021) travel survey in peripheral neighborhoods of Kumasi. While we have not attempted to quantify travel time, the qualitative testimony suggests that many residents in Accra's peripheral neighborhoods will spend considerably more time in transit daily than the 77 min recorded in Yaoundé (Tatah et al., 2022) and 110 min in Nairobi (Tatah et al., 2023). The high share of paratransit users in Accra is comparable to estimates of paratransit usage in Yaoundé (Tatah et al., 2022) and Kumasi (Amoh-Gyimah & Aidoo, 2013), though higher than in Nairobi, where walking is more common (Tatah et al., 2023). The low share of car users in Accra's peripheral neighborhoods (15 %) is comparable to 11–12 % in Yaoundé and Nairobi (Tatah et al., 2022, Tatah et al., 2023) and 21 % in Kumasi (Amoh-Gyimah & Aidoo, 2013), though considerably lower than the 76 % recorded in Kumasi's affluent peripheral neighborhoods (Poku-Boansi, 2021). The research further highlights socio-economic and gendered differences in travel behavior among residents in Accra's peripheral neighborhoods. Male respondents travel more frequently, over slightly longer distances and are more likely to use cars and motorcycles, while female respondents are more likely to use trotros and ride-hailing services. Higher socio-economic status is associated with more frequent travel, longer distances travelled and higher likelihood of using private cars. These findings are consistent with findings of many other travel surveys (Bryceson et al., 2003; Olvera et al., 2003; Salon & Aligula, 2012; Salon & Gulyani, 2010; Tatah et al., 2022; Tatah et al., 2023).

The research highlights that high mobility lifestyles have come under significant pressure in changing socio-economic conditions characterized by inflationary pressures and rising transport costs. The high levels of mobility recorded in our travel survey are likely conditioned by favorable socioeconomic conditions of recent decades and stand in stark contrast to the much lower levels of mobility recorded in travel surveys from the 1990s and early 2000s (Bryceson et al., 2003; Olvera et al., 2003; Olvera et al., 2013; Salon & Aligula, 2012; Salon & Gulyani, 2010). For residents in Accra's peripheral neighborhoods, the rising transport costs was a significant source of frustration and anxieties, which had already elicited significant adjustments in travel behavior, including reducing travel frequency, limiting non-essential travel and decreasing car usage. This aligns in concerning ways with existing research emphasizing that peripheral location can entwine with low socio-economic status and foster experiences of immobility and social exclusion (Chikengezha & Thebe, 2021; Lucas, 2011; Williams et al., 2022). As such, unregulated urban expansion processes may foster high mobility lifestyles, when unfolding in favorable socio-economic conditions, but could potentially lead to processes of socio-spatial exclusion, when a growing share of residents in peripheral neighborhoods struggle to afford rising transport costs.

6. Conclusions

This paper has offered a detailed examination of travel behavior among urbanites in Accra's expanding peripheral neighborhoods. The research illuminates how their travel choices and preferences are conditioned and constrained in a wider context of rapid urban expansion, unregulated residential sprawl, infrastructural deficits, severe congestion and changing socio-economic conditions. The paper proposes "high mobility lifestyles" as a metaphor to capture key aspects of travel behavior in the peripheries, distinguished by a high share of adults travelling regularly outside their neighborhoods, over relatively long distances (10+ km) and mainly using motorized transport. The research further explores how travelers navigate the opportunities and constraints associated with living in the peripheries and illuminates how infrastructural deficits, long distances, severe congestion and rising transport costs make high mobility lifestyles exceedingly strenuous, time-consuming, and costly. High mobility lifestyles are not only unsustainable from an environmental perspective, but also from an economic and social perspective considering the many hours spent in transit and the rising transport costs.

In-depth understanding of travel behavior, embedded in contextual conditions, can provide insights on how travel choices may potentially be changed and how transport systems may be made more sustainable and inclusive. This research draws attention to the pervasive infrastructural deficits and the significant investments needed to improve accessibility in emerging peripheral neighborhoods. However, it would be environmentally unsustainable and socially exclusionary if such investments were made primarily with private cars in mind. Other scholars have criticized that transport planning in African cities remains entrenched in a modernist agenda oriented towards large-scale infrastructure and prioritization of private cars (Acheampong et al., 2022; Bruun & Behrens, 2016; Nyamai & Schramm, 2022; Randall et al., 2023; Sietchiping et al., 2012). This research highlights that cars are used only by a small share of relatively affluent urbanites, while the vast majority rely on paratransit services, especially minibuses. It is also well known that expansion of roads can attract more cars and worsen traffic congestion (Sietchiping et al., 2012). There is therefore an urgent need to promote more sustainable modes of transport, especially considering the rising rates of car ownership and the strong preference for car ownership among those who can afford.

Transit-oriented investments have potential to be environmentally sustainable, socially inclusive and benefit a much higher share of urban populations. While private cars and paratransit services have overlapping interests when it comes to road conditions, other measures could specifically target improved operation of paratransit services, including priority lanes, clearly designating separate spaces for picking up and dropping passengers, enforcing vehicle maintenance standards, and regulating overcrowding and reckless driving. Expansion of formal mass transit services with higher passenger capacity into peripheral neighborhoods would have potential to be more environmentally sustainable, as well as socially inclusive if tickets remain affordable. While

paratransit services are widely perceived as unreliable, uncomfortable, and unsafe, formal mass transit services could potentially offer competitive services with higher comfort and security, which would also attract those who would otherwise aspire to private car ownership. In recent years, some African cities, with the aid of development partners, have invested in mass transit services, such as Bus Rapid Transit and Light Rail (Tembe et al., 2019). Unfortunately, the Bus Rapid Transit system, known popularly as Aayalolo, introduced in Accra in late 2016 had a very short and tumultuous operation period characterized by suspension of services and recurrent strikes (Awuni, 2019).

The research also points to the need to address diverse travel needs and accessibility towards dispersed locations across the city. As a unique feature, we have utilized spatially explicit destination data to map the destinations and directions of travel from peripheral neighborhoods. While much travel for work purposes is directed towards central Accra, destinations are more dispersed than anticipated considering the monocentric structure of the city. Furthermore, significant daily mobility is related to other purposes, such as participation in religious activities, shopping for household necessities and access to health and education services. These more diverse travel needs are not easily addressed through mass transit services along main radial roads, but rather point to the need for connecting lines and complimentary sub-systems of paratransit services.

Alongside investments in improvement of accessibility, it would also be pertinent to consider measures to reduce the need for frequent and long-distance travel from peripheral neighborhoods. Promotion of more mixed land uses and development of "decentral centralities" in the form of larger markets and commercial areas outside central Accra, could potentially redirect some of the large volumes of travel directed towards central areas. Expanding the availability and capacity of public schools and health clinics in emerging peripheral neighborhoods also has potential to reduce some of the travel needs. Such measures may also encourage more use of active transport modes, which are ruled out by the long distances travelled currently for most purposes.

Overall, the scale and pace of urban expansion across African cities makes it pertinent to understand the specificities of travel behavior in emerging peripheral areas and how travel choices and preferences are constrained by the wider spatial and social contexts. Insights from the research have relevance for urban and national authorities and development partners working to realize the visions of SDG target 11.2 of *"safe, affordable, accessible and sustainable transport systems for all."* While the results cannot be directly extrapolated to other cities, insights from the research will likely have relevance for African cities managing a similar combination of challenges of unregulated residential sprawl, overstretched transport systems, declining mass transit services, rising vehicle ownership rates and severe congestion.

CRediT authorship contribution statement

Manja Hoppe Andreasen: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Jytte Agergaard:** Writing – review & editing, Methodology, Investigation, Conceptualization. **Martin Oteng-Ababio:** Writing – review & editing, Project administration, Methodology, Funding acquisition, Conceptualization. **Lasse Møller-Jensen:** Writing – review & editing, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

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.

Acknowledgements

This research is funded by a grant awarded by the Danish Ministry of Foreign Affairs (Danida/DFC/FFU).

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