6th Transport Research Arena April 18-21, 2016

Exploring children's travel to school in upgraded informal settlements: a qualitative case study of Ezbet El-Haggana

Ahmed El-Dorghamy [a],*, Ahmed Ibrahem Mosa [b]

[a]Institute of Geography, Humboldt University, Berlin
[b]MENA Centre of Excellence, International Association for Public Transport (UITP)

Abstract

The majority of residential settlements in Greater Cairo are informal, yet little is known about travel behavior within its informal settlements. The present paper explores aspects of travel behavior in one of Egypt's largest and most dense informal settlements, Ezbet El-Haggana, through a qualitative study of children's travel to school. The key research question was: *How do children interact with transport options to access schools in a dense informal settlement in Egypt?* Ten Focus Group Discussions (FGDs) for this research were conducted, 4 with mothers, 5 with children, and 1 with transport service providers. Design of FGDs leveraged existing behavioral theories commonly used in exploring travel behavior and also included photo-elicitation. Qualitative data was also complimented with field observations and interviews with community leaders and government officials. Findings highlighted the high degree of children's independent mobility (CIM) and the diversity of modes of transport used and multitude of trip-to-school arrangements facilitated by community collaboration and entrepreneurial initiatives standing in contrast to current mainstream knowledge about trips to school in formal urban areas. Another distinct feature is prevalence of strong socio-cultural factors strongly inhibiting the consideration of cycling as a mode of transport, more so for older females, but also for all other segments. Implications for accompanying culturally-sensitive gender-specific soft measures that are needed together with the planned hard interventions are discussed in order to (a) maintain existing elements of sustainable travel behavior observed today (mode choices and efficient trip planning) sustaining their relatively low carbon footprint, and (b) mainstream underutilized modes such as cycling and Walking School Buses (WSB), and (c) inhibit adoption of unsustainable travel behavior in the future as found in the formal counterpart of the city that informal settlements are converging with.

* Corresponding author.
    E-mail address: ahmed.dorghamy@gmail.com

1. Introduction

Informal settlements in Greater Cairo are characterized by high population density. Streets are predominantly narrow and unpaved, while dependence on walking as a mode of transport is high (Sims 2010). Many residents in informal settlements could often not afford private school buses so children rather travel to school in a multitude of patterns other than those found in privileged areas. However, no studies have been made on these travel patterns in order to understand children's and parents' perception about the various options available and their ability to use them. Such understanding would be substantially informative to the planning and design of transport systems and the supportive soft measures to better cater to different segments of society including the understudied poor areas.

More than two thirds of Greater Cairo's inhabitants reside in informal settlements and car ownership is significantly low compared to developed countries (Dorghamy, 2013). Despite being renowned for its traffic problems, Egypt's rate of car ownership remains among the lowest worldwide at 44 cars per 1000 inhabitants in 2013 (Dorghamy, 2013). In the meantime, dependence on the highly subsidized public transport and on walking is favourably high. Cycling in specific is however low despite the dense and mixed-use nature of the urban environment and the flat topography of the City (Puttrowait, 2014). Car ownership rate is rapidly increasing in Egypt, and together with the global trend of continuous urban sprawl, more individuals are adopting non-sustainable travel behaviour as private motorized transport becomes affordable to them (Dorghamy, 2013). It is of interest to planners in this context to understand how to maintain the sustainable travel behaviour that is already found today and requires attention to maintain, such as walking and using public transport. It is also of interest to understand deficiencies in sustainable travel behaviour, such as absence of cycling as a common mode of transport and increasing car dependence. Similar conditions in cities of other developing countries are often correlated with high dependence on cycling as one of the rationally chosen modes (e.g. Shengxiao and Pegnjun 2015, UNHABITAT, 2013).

The present study investigates one segment of the disadvantaged communities in informal settlement in Egypt; specifically school children. The choice of one specific segment allows for in-depth exploration of the nature of travel behaviour and to explore the segment that is most likely to be subject to behavioral change interventions to promote sustainable mobility. A dense informal settlement in the east fringe of Greater Cairo is chosen as a case study area, being amongst the largest and most dense settlements in Egypt; Ezbet El-Haggana.

In this context it is hypothesized that exploring children's travel behaviour in Haggana can reveal distinctions that are unique to dense informal settlements in order to inform planners and policy makers when planning transport-related hard interventions catering to disadvantaged communities in developing countries. It is also hypothesized that the ongoing hard interventions, most typically road pavement, when void of locally-tailored soft measures, such as culturally-sensitive training and awareness, will eventually induce unsustainable travel behaviour that mimics that of the rest of Cairo. The aim of this paper is therefore to explore these hypothesis through the study of children's trips to school in Haggana as a case study and analysing observations that can help predict future trends.

2. Children's mobility and disadvantaged communities

Children's mobility has been subject to much research in the recent years, with much of the research focusing on developed countries (see e.g. Kittä et al. 2015, Mitra and Buliung, 2015, Curtis et al., 2015, Westman et al. 2013, Fyhri et al. 2011, Fyhri and Hjorthol 2009, Christie et al. 2011). A key area of concern in the west, has been the observed decline in active travel (cycling and walking), such as reduced Active Travel to School (ATS) among children, as well as the prevalence of sedentary lifestyles and obesity, which have motivated many studies on the topic (Fyhri et al. 2011, Buliung et al. 2012). Furthermore the extent to which Children's Independent Mobility

(CIM) (travel without accompaniment of an adult) prevails, which is closely linked to ATS, has also been observably in decline in various western nations in what one study described as an eminent loss of the "last free-range children" (Kittä et al. 2015). But children's travel behavior is different in developing countries in this respect, especially in poorer areas where children greatly depend on using formal and informal transport services and walking (Salon and Gulyani 2010, Porter et al. 2014).

Stewart et al. (2012) conducted an extensive review and synthesis of quantitative and qualitative research on ATS, and found eight common factors that influenced ATS: distance to school, parental fear of traffic and crime, family schedule constraints, values, school characteristics, neighborhood and family resources, culture, and weather. This synthesis may help in addressing the issue holistically. For example, some studies might find that despite having shorter trips to schools in certain dense neighborhoods, ATS may be low due to another overshadowing factor such as fear of crime (see e.g. Mackett, 2013), although short distances to schools are usually among the most influencing factors for ATS (Mitra and Buliung 2015, Curtis et al. 2015, Fyhri and Hjorthol 2009).

Children in developing countries have also been subject to substantial research in this respect, although more focused on matters associated with disadvantaged communities such as poverty-related barriers that challenge children's mobility, as well as gender and cultural aspects (Amoako-Sakyi and Owusu 2012, Porter, 2012, Salon and Gulyani 2010, Pojani and Boussaw 2014).

One distinct transport challenge in disadvantaged communities is related to the fact that availability of schools within informal settlements is often limited (UNICEF, 2013). Children therefore often need to travel to schools outside their settlement, thereby having greater interaction with poorly planned streets and transport systems. This highlights the role that improved transport infrastructure and planning may play in improving accessibility to education. Similar linkages would also be found with regards to access to employment, medical care, leisure, maintenance activities and other needs of society.

3. Overview of the study area Ezbet El-Haggana

Ezbet El-Haggana is a large informal settlement that lies in an enclosed area in an east fringe of Cairo, with a total area of approx. 620 acres. It is enclosed in the sense that its surrounding land plots are owned and occupied by the Egyptian military and therefore limit the geographical expansion of the settlement, and contribute to its characteristic high density. Haggana is amongst the largest informal settlements in Egypt with a population arguably close to one million citizens (El-Mouelhi, 2014). Lack of reliable census data covering the area continues however to cause significant uncertainty about the population size of the area, with official census data shown to be erroneously orders of magnitude less than expert estimates (Sabry, 2009). Such discrepancy leads to an underestimation of the necessary infrastructure necessary to serve the area. Haggana has been however experiencing fragmented phases of interventions to improve its basic infrastructure over the past years, which have been to a great extent carried out by the local community, mostly since the 1970s when the rapid growth started (Sims, 2010). Interventions are both external (e.g. governments, donors, etc), and internal through community self-help (Noura Wahby 2013, Bremer 2014). They include provision of water supply, pavement of road segments, provision of public transport and improving access to main roads, among other interventions.

4. Study methodology

There have been no previous studies on transportation and travel behavior in Haggana, and therefore the present study has been exploratory in nature. The key research question was: *How do children interact with transport options to access schools in a dense informal settlement in Egypt?*

Three sub-questions are explored:
1. What options for traveling to school do children have and use in Haggana?
2. What are parents' and children's perceptions of the transportation options?
3. How would children react to interventions that promote active travel as either primary means or intermediate means of transport?

The research has been based on qualitative analysis of focus group discussions (FGDs) and semi-structured interviews. FGDs for this research were conducted with mothers (4 focus groups) and children (5 focus groups), and transport service providers (1 focus group). Three focus groups were conducted in December 2014, and six were conducted in October-September 2015. All focus groups ranged from 5–11 persons per group, except for one focus group with mothers that consisted of 4 mothers, which was however compensated with the depth of the discussions by virtue of the smaller number. Durations of FGDs ranged from 1.5–2 hours, and involved photo elicitation at the end to elicit comments about hypothetical scenarios of urban upgrades and travel behaviour change at the end of the discussions, and also to explain basic concepts of sustainable travel behaviour to be discussed. To enhance children's engagement, they were provided with art tools half way through the discussions and asked to map the settlement and present their results in teams, including explanation of their trip to school and use of transport services. Furthermore, semi-structured interviews with community leaders and public officials were conducted, including the Minister of Urban Renewal and Informal Settlements of Egypt, and the project manager a Bus Rapid Transit (BRT) pilot project in the General Organization for Physical Planning (GOPP), a pilot project that is serving one of the main entrances to Haggana.

Guidance in social analysis techniques by Krueger et al. (2001) was used in planning for and conducting the FGDs. Krueger at al. (2001) notes the importance of tuning the level of analysis conducted to the necessity required by the problem at hand, where in some cases full verbatim transcription and coding of transcripts is necessary while in other cases analysis based on notes may be sufficient and instrumental in gaining insight and identifying common themes, which was the approach used in the present study in addition to transcripts of full audio recordings of discussions. Clifton & Handy (2003) advocate qualitative methods in travel behaviour research especially when research is targeting contexts that are unfamiliar to the researcher or lacking background information in the literature. In such cases, quantitative research may be confining and might fail to provide certain insights that could alter the understanding of the subject.

With regards to the sample participating in the FGDs in Haggana, recruitment was found to be most effective through local Nongovernmental Organizations (NGOs). Numerous local NGOs are interspersed throughout the area to provide diverse charity and developmental services to residents and have developed trust with the local community over time. It is notable that there are no registries of residents, no house numbers, and no presence of police security throughout Haggana or any physical presence of governmental authority. Locals therefore largely depend on NGOs to communicate their status to the outer world and to access developmental services. Three NGOs that are at different distances from the oldest public transport station of Km-4.5 (i.e. at different depths into Haggana) were selected to conduct the FGDs in. The participants represented a diverse convenience sample from residents in each area consisting of school children and mothers of school children. Participants' and parents' consent to participation was administered through the respective NGO as the local common practice. The three NGOs were Al-Shehab Institution for Promotion and Comprehensive Development, Emaret El-Ensan Foundation, and Caritas Egypt.

Notable features in the sampled mothers are that a majority of them are either illiterate or semi-literate, while all the children were literate. Most children own a mobile phone and most mobile phones belonging to children are smart phones and used to access internet as the primary source of internet. Gender distribution among children was roughly even; 51% girls, 49% boys.

The questions in the FGDs were structured around the constructs of the Theory of Planned Behavior (TPB) in order to ensure exploring the various constructs of behaviour: attitudes, subjective norms, perceived behavioural control, and behavioural intention (Ajzen, 1991). It has been most instrumental in guiding discussions about gender and intergenerational differences in mode choices. Furthermore, questions related to frequent trips and decisions aimed at understanding habitual behaviour as well were posed, which is central to exploring the role of habit formation in explaining actual travel behaviour and predicting future behaviour (Gärling and Axhausen 2003, Verplanken and Aarts, 1997, Murtagh 2011). Further qualitative data was also gathered through reconnaissance surveys of Haggana for visual observations.

5. Results

5.1. Transport services and infrastructure in the study area

Being surrounded by land owned by the military, Haggana has a limited number of entrances and exits due to this enclosure. Almost all of its east side perimeter is surrounded with a brick wall and a large part of the west side is similarly surrounded with a wall separating it from military facilities. It is also partially surrounded by formal housing mostly in the south and southeast sides with varying degrees of physical barriers to access the city's street network and public transport services. Although the vast majority of streets inside Haggana are unpaved, some segments of its main streets have been recently paved by the government and are being utilized more by motorized vehicles. However, continuous construction works on roadsides as well as repeated civil works for infrastructure provision greatly damage the quality of these paved stretches. Unlike in formal settlements, the internal streets are paved with no sidewalks. Whether paved or not, most streets are shared by residents, vendors, and passerby as public space for various uses beyond motorized and non-motorized transport. Uses may include playing and socializing and as space for commercial activities or other negotiated uses of space such as storage or temporary workspace, etc.

Regarding the modes of internal transport, there are no routes for public transport within Haggana or even passing through despite vast area occupied by the settlement. The area is characterized by high dependence on walking and widespread use of motorized three-wheelers (auto-rickshaws or *Tuktuks*), which easily traverse narrow unpaved streets, as well as private pickup trucks used for informal transport service. These pickup trucks are normally operating in commercial activity such as transport of goods as their primary function, but during commuters' rush hours they operate as makeshift paratransit vehicles for an additional source of revenue. Due to this dual function, the pickup trucks are neither equipped nor retrofitted for passenger transport and are therefore characterized by their uncomfortable service compared to other paratransit modes. Passengers must climb onto the back of the truck and sit on the edge of the side walls and endure a stressful drive over bumpy roads. However, there is demand for this service due to the lack of alternatives. The alternative elsewhere would typically be 14-passenger microbuses but they are less tolerant to the unfriendly terrain of the unpaved roads and are therefore seldom used to provide transport services in Haggana. In the few areas where motorized vehicles are common, the vehicle types mostly include private cars, various sizes of trucks, taxis, tuktuks, and motorcycles. The taxis are found in the streets not because they are servicing the area but mainly because the drivers are either residents of the area returning with their vehicle or they are driving to maintenance workshops for repairs. Bicycle use for commuting is uncommon, but some use of bicycles among young children for play is notable as well as minimal use for commercial activity such as delivery services at pharmacies. Furthermore, the use of motorcycles for informal transport service is also uncommon or non-existent in Haggana although it is common in some governorates in Egypt and can serve areas with unfriendly terrain and narrow streets.

The main points of access to formal public transport are at four separate locations around Haggana, and they constitute the main entrances to the settlement. They are characterized by a sprawl of informal street vendors who serve the commuters, and by informal stops off different modes of transport, namely the pickup trucks, tuktuks, vans, and microbuses, and they nucleate around formal bus stops and terminals that connect to the formal city.

5.2. Trips to local schools

For children attending the primary schools inside Haggana, the only modes reported have been either walking or using the Tuktuk, and none of those in the FGDs use bicycles. The concept of Walking School Buses (WSB) is unheard of and it is common for children not to be accompanied by adults, especially if both parents are working. Walking trips are generally found as being pleasant, while Tuktuks are praised for their practicality and availability but criticized for their high cost and the driving behavior that is seen as reckless by many. Reckless driving is greatly attributed to the young age of the drivers who are often young children of ages roughly in the range of 10-15 years old, well below the legal age for driving a motorized vehicle in Egypt, which is 18 years old. This was also confirmed through field observations. Tuktuks are also seen as relatively expensive. For children using the Tuktuk individually, the minimum fare is 5 EGP, which is five times the cost of a ticket on the public bus operated

by the Cairo Transport Authority (CTA) outside Haggana at a subsidized fixed fare of 1 EGP for all distances. The Tuktuk fares increase at 5 EGP increments within Haggana and can reach up to 15 EGP if traveling from end to end. There are no alternatives to the Tuktuks for door-to-door service, but the way Tuktuks are used may vary. Many children share the use of the Tuktuk with neighbouring children or siblings and thereby splitting the fare, and in other cases an arrangement is made by parents so that a certain tuktuk with a driver known to the parents is used as a shuttle service to drive the children to school and/or back from school. It is therefore common to find Tuktuks carrying more children than its design capacity.

5.3. Trips to city-wide schools

For children attending schools outside Haggana, they mostly use combinations of formal and informal transport services and walking. The use of private cars is uncommon if ever used since the vast majority of residents do not own cars. Only one person from all participants had a private car in the household, which was nevertheless not used to chauffer children to school. Cycling has also been noted as a mode that is never used for transport to school nor as an intermediate mode of transport to other modes, and is generally discarded as an option by parents. This is discussed more thoroughly later in this paper. Motorcycles are seen among young men and households in general as social markers. They are not however part of the common modes used for the trips to schools.

To reach the public bus stations on the fringes of Haggana, the common modes are walking, tuktuk (individually or collectively), and the informal pickup trucks that cater to the peak demand in the morning and evening. Many children may alternate between choices, and therefore have a degree of liberty in planning their trip other than the plan dictated by parents. The most recurring mention of discomfort in transport services was in the discussion of the pickup trucks. They are however used by many residents due to their low fare of 2LE. They are also practical for some commuters as they travel at relatively high speed through the wide main streets of Haggana to a few internal informal stops known to the locals and back to the main bus stations at the entrance, and they can conveniently stop along the way for on-demand boarding and alighting. Children however do not commonly use pickup trucks as part of their trip although the option is available. All FGD participants have reported not to use them, and field observations suggest that in the infrequent cases were children are found using pickup trucks, they are accompanied by adults. A recurring theme in discussing this mode was fear of safety and lack of comfort since there are no seats. At the bus stations at the entrances to Haggana, children choose between using microbuses and public buses. Children are most commonly traveling to schools using public transport without the accompaniment of an adult, except in an initial training phase.

Another distinct mode of transport frequently used in Haggana, although more common to the younger children in primary and early preparatory school is the so-called *Dawra*, meaning 'cycle'. A Dawra is the closest mode to a private school bus since it is the same in function, but informal. It is a common paratransit service provided using a 14-seat microbus or a 7-seat van. They are vehicles that normally operate throughout the day for collective transport or other commercial activity, but are additionally providing a service for parents in certain difficult-to-reach neighborhoods such as Haggana to provide safe door-to-door transport service for their children. It is provided at a monthly fee comparable or more expensive to alternative costs of public transport, but safer. There have also been observations of other modes of transport to school noted in field observations and interception interviews but not mentioned in the FGDs. The other modes were car pooling in private cars, and carpooling in taxis, where the car or taxi driver is one of the parents or local residents offering the service as an additional source of revenue, i.e. cars and taxi's operating as a Dawra. Most modes of either the Dawra or carpool arrangements are operated significantly above seated capacity, but are found acceptable in terms of comfort.

5.4. Reaction to expected upgrade interventions

When eliciting comments about improvements in the transport services and the urban environment, the most recurring theme in all suggestions for improvement has been related to waste management (a very pronounced intuitive response), and secondly, to the need to pave internal roads. Poor management of solid waste is one of the major problems in Haggana since it is fully or partially blocking many streets and pathways and also causing local air pollution due to deliberate open burning of waste or spontaneous ignition that occurs with accumulation. Earlier

public concerns in Haggana over its history had been related to more basic needs such as water supply and sewage, which might have overshadowed other concerns. However, with gradual upgrades in the urban environment, the two topics of waste management and pavement of roads appear to be among the next key concerns to come to the attention of the local community for both adults and youth. It is also believed by the residents that after road pavement there will be possibility to have microbuses (which are seen as more fragile than pickup trucks and avoid unpaved roads) start providing services in the internal streets in Haggana. Another priority concern expressed in all FGDs conducted with mothers in specific is the need to upgrade and expand the capacity of the existing primary school in Haggana and additionally provide local public schools of preparatory and secondary levels, which would greatly lift a burden off of resident families, especially those having many children, in terms of both economic burdens and safety concerns and exhaustion of children who use multiple modes of transport for school trips.

With regards to foreseeable interventions discussed, many insights were gained through the discussions and photo elicitation. The foreseeable interventions explained were specifically hard interventions of paving streets, phasing in of Bus Rapid Transit reaching the west entrance of Haggana, and upgrading bus stations to better cater to cycling as an additional feeder mode, as well as soft interventions to promote cycling and sustainable travel behavior. All interventions were explained in layman language and through a brief presentation of explicative photographs. It was observed that participants throughout all focus groups of mothers and children showed enthusiasm toward discussions about road pavement as a priority issue, but they do not show enthusiasm toward discussions about upgrades in bus systems in terms of quality of busses, bus stations, and intermodal integration, with most of them expressing satisfaction with the existing state in general or not commenting. Such discussions repeatedly elicit comments about perceived priority issues that should rather be discussed, such as waste management. Field observations over one year have also confirmed the gradual increase in parked cars increasingly occupying the limited car space available as well as the new buildings being built in the southern richer part of Haggana which have been built with underground garages unlike the multi-story buildings built earlier, indicating the growing demand for cars among new residents as well. Observations about expected acceleration of car ownership rates were acknowledged by participants, especially mothers who have been living in Haggana for several years and have observed the trend of car ownership and use over a longer period of time, but the discussions presented the first experience for all of them to contemplate the environmental implications and implications on their limited public space, i.e. a first *problem awareness* experience in this respect, and it therefore stimulated more internal thought rather than discussion. The topic of cycling however, has drawn significant engagement of participants especially when discussing intergenerational and gender differences, as well as the attitudes and norms related to cycling, and the same attention has been received from community leaders interviewed due to apparent cultural sensitivities linked to the topic.

5.5. Cycling as an option in Haggana

Among the modes of transport discussed, and through the discussions of sustainable travel behavior, the topic that was found to be most controversial was cycling, to the extent that with each FGD more time was deliberately given to further delve into the topic and elicit participants' attitudes and perceptions related to cycling and the strongly present gender aspect observed. It was advised by community leaders to avoid asking the direct question to women why they would not cycle since it is seen as inappropriate to ask that. Therefore the questions directed to mothers was delivered indirectly, such as through contemplating the possibilities for their girls to consider cycling as an option and possibility to find it an acceptable practice in the future generations in Haggana, and photographs of other Egyptian women cycling was used, including women of similar clothing and appearance. Photographs were collected from news paper articles and online new posts to ensure that the pictures used are already public.

The vast majority of participants of both genders saw cycling for older girls (at the age of preparatory school and above) to be inappropriate, and there was also consensus that cycling for mothers is highly inappropriate or seen as impossible. When talking about different age groups and comparing to higher class areas in Greater Cairo being significantly different in culture, one participant casually noted that a mother cycling in Haggana is "unthinkable of course" while others laughed in agreement with the seemingly obvious statement. Another notable feature in the discussions were the debates about whether it is inappropriate or not for fathers to commute by bicycle, with recurring themes related to the social image brought up. In-depth discussions aimed to explore why there would be

no intention for older females to consider cycling as an option, it was notable that once the topic was dissected into the separate constructs of behavior intention, namely separating questions about personal attitudes, perceived subjective norms (with reference to perceived opinions of spouses, neighbors, etc), and perceived behavioral control (with reference to owning a bicycle and ability to cycle), it was notable that answers varied between participants and some participants even varied their responses throughout the discussions, indicating the volatility of perceptions and attitudes revealed through both introspection about the topic and group thinking, or possibly an experience of cognitive dissonance. Due to the mixed opinions elicited through this discussion and an observable subtle confusion and intimidation among participants, it was difficult to conclude what the dominant underlying factors were and whether or not some participants were intimidated to fully share their detailed feedback, especially that some of the more vocal participants asserted their opinions with moral undertones. Concern over girls safety from verbal harassment from other boys in the street was a common concern immediately and intuitively expressed by most mothers, girls and boys, when asked about girls considering cycling in Haggana. However, the fact that most feedback revealed that families would still find cycling inappropriate for girls in other hypothetical neighborhoods in Egypt that are safe from harassment, shows that the findings of the FGDs are still inconclusive in this regard. Another important finding was that a similar view of inappropriateness applied to girls and women considering riding motorcycles or motor scooters as drivers, while riding as passengers was found normal by the vast majority. Discussions were however interspersed with occasional spoken reflections from various participants about expectations that culture and behavior can indeed change with time and about stories of girls and women of the community that have stood out from the rest as they challenged social norms, such as one women who was frequently mentioned that started driving a van as a *Dawra* service for school children after her husband, the original driver, had passed away. Other reflections were about other behavioral change that were seen as practical such as girls of the present day wearing pants, which they concede is more appropriate for the city life, yet mothers often cannot imagine themselves wearing pants. Most of the participant girls however were wearing pants rather than the traditional full-length dress more frequently worn in rural areas. Discussions about cycling was clearly controversial and was the topic that was most frequently associated with diverse social, cultural, and behavioral themes in the discussions and also associated with mobility of women as drivers of motorized and non-motorized vehicles and local norms and traditions unique to the informal settlement.

6. Conclusions

Haggana is an interesting research ground for travel behavior in informal settlements of the future since it is characteristically dense, especially given the limitations to its geographic expansion, while its development is rapidly increasing as its population increases and as it becomes better networked with public transport services at its entrances and better serviced with basic infrastructure. The study of children's trips to school has been helpful not only in revealing distinct differences with research findings in other countries or urban settings, but also in gaining insight on cultural and socio-economic aspects that may affect travel behavior in the case study area beyond the context of school trips. The high degree of children's independent mobility, the diversity of modes of transport used and multitude of trip-to-school arrangements facilitated by community collaboration and entrepreneurial initiatives are all revealed features that stand in contrast to current mainstream knowledge about trips to school in urban areas. The high degree of dependence on walking, public transport and informal collective transport services, although mainly due to economic constraints, describe travel behavior that is more sustainable compared to other urban settings elsewhere where car dependence is high (e.g. Lang et al. 2011, Fyhri et al. 2011, Kittä et al. 2015).

However, strong gender and intergenerational differences in attitudes towards the consideration of cycling as a mode of transport is revealed, discouraging its consideration despite acknowledgment of its economic utility and despite the high costs of Tuktuks, the main mode of internal transport other than walking. There is controversy surrounding cycling for either gender and different ages, as well as its strong association with social and cultural norms. It is here that an example of lack of cognitive appropriation of a mode of transport is quite elaborate, and the notion of motility becomes relevant in studying this aspect of travel behavior. The underlying factors influencing this mindset and behavior are therefore worthy of further research. The theme of cycling can also be used as a proxy to study other gender issues related to travel behavior and accessibility as well.

Although car ownership is very low, it is observably increasing and cars are rapidly occupying the limited road space available. Adults also already adopt modes of transport viewed as sustainable relative to the rest of the city, namely walking, public transport and various means of ride sharing, yet mainly motivated by economic rationale and unaware of the virtues of such travel behavior from the environmental, health, and social perspectives. Such lack of awareness may render the residents prone to change toward less sustainable travel behavior when the opportunity arises to buy a car or to offset walking with other motorized means of transport once affordable. Furthermore, lack of awareness about the impact of car dependence may result in having residents abandon their rights for public space, right of way as pedestrians, and clean air, which can otherwise be negotiated within the community if awareness is there and if perceived social norms allow and a sense of self efficacy towards such action is established. Presently residents may not be viewing the externalities that affect them or likely to threaten them in the future as a violation to their rights but rather as a normal and inevitable development that is happening with time as the settlement develops. Such findings are valuable for informing policy makers and planners, as well as local NGOs, about the role that soft interventions could have in shaping the future travel behavior of informal settlements as they evolve. Findings also stress the importance of behavioral change interventions that need to be designed in consultation with local stakeholders, such as locally tailored programs to promote cycling as well as proactive measures to maintain other elements of travel behavior seen as sustainable such as walking and use of collective transport and efficient trip planning, which need to accompany any hard intervention, be it paving roads, upgrading public transport systems or building sufficient local schools within the settlement. Techniques used in the present research may also be employed in stakeholder consultations necessary to design effective and culturally-sensitive gender-specific soft interventions that can address the perceptions and attitudes of the targeted local community for their own health and environmental and economic benefit.

References

Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50, 179–211.

Al-Shehab Institute., 2006. Social study of the social, economic and educational causes of dropping out school in Ezbet El-Haggana. Available at www.shehabinstitute.org.

Amoako-Sakyi, R.O. and Owusu, A., 2011. Moving on two wheels: A comprehensive study on bicycle behaviour among Ghanaian children. SBHA 76(1):107–125.

Bremer, J., 2014. Community-led infrastructure development in informal areas in urban Egypt: A case study, Habitat International, 44, 258–267.

Buliung R., Sultana, S., Faulkner, G., 2012. Guest editorial: special section on child and youth mobility – current research and nascent themes. Journal of Transport Geography 20, 31–33.

Christie, N., Kimberlee, R., Towner, E., Rodgers, S., Ward, H., Sleney, J., Lyons, R., 2011. Children Aged 9–14 Living in Disadvantaged Areas in England: Opportunities and Barriers for Cycling. Journal of Transport Geography 19 (4) 943–949.

Clifton, K., Handy, S., 2003. Qualitative methods in travel behaviour research. In: Jones, D., Stopher, P., Eds., Transport Survey Quality and Innovation. Elsevier Science, Ltd., Oxford, UK.

Curtis, B., Babb, C., Olaru, D., 2015. Built environment and children's travel to school. Transport Policy 42, 21–33.

Dorghamy, A., 2013. Fuel Economy and CO2 Emissions of Light-Duty Vehicles in Egypt. Center for Environment and Development for the Arab Region and Europe, CEDARE. Available at: www3.cedare.int/images/gfei_egypt_report_jan-28_final__english.pdf

El-Mouelhi, H., 2014. Culture and Informal Urban Development: The Case of Cairo's Ashwa'eyat, Informal Settlements. Doctoral dissertation. Technical University of Berlin, Berlin, Germany.

Fyhri, A., Hjorthol, R., 2009. Children's independent mobility to school, friends and leisure activities. Journal of Transport Geography, 17(5), 377–384.

Fyhri, A., Hjorthol, R., Mackett, R. L., Fotel, T. N., Kyttä, M., 2011. Children's active travel and independent mobility in four countries: Development, social contributing trends and measures. Transport Policy, 18, 703–710

Gärling, T, Axhausing, K. W., 2003. Introduction: Habitual Travel Choice. Transportation. 30: 1–11.

Kittä, M., Hirvonen, J., Rudner, J., Pirjola, I, Laatikainen, T., 2015. The last free-range children? Children's independent mobility in Finland in the 1990s and 2010s. Journal of Transport Geography, 47, 1–12.

Krueger, R., Casey, M. A., Donner, J., Kirsch, S., Maack, J. N. 2001. "Social Analysis: Selected Tools and Techniques." Social Development Paper no. 36, available from the Social Development Department, the World Bank, Washington, D.C.

Lang, D., Collins, D., Kearns, R., 2011. Understanding modal choice for the trip to school. Journal of Transport Geography, 19, 509–214.

Mackett, R. L., 2013. Children's travel behaviour and its health implications. Transport Policy, 26, 66–72.

Mitra, R., Buliung, R. N., 2015. Exploring differences in school travel mode choice behaviour between children and youth. Transport Policy, 42, 4–11.

Murtagh, S., Rowe, A. D., Elliot, M. A., McMinn, D., Nelson, N. M., 2011. Predicting active school travel: The role of planned behavior and habit strength. International Journal of Behavioral Nutrition and Physical Activity, 9:65.

Porter, G, Hampshire, K. R., Abane, A., 2011. Children's Mobility in Ghana: an overview of methods and findings from the Ghana Research Study SBHA 76 (1):1–14.

Puttrowait, E., 2014. Encouraging Bicycling as a Means of Sustainable Urban Transportation in Cairo. Unpublished Masters Thesis, University of Stuttgart, Germany.

Sabry, S., 2009. Egypt's Informal Areas: Inaccurate and Contradictory Data. In R. Kipper and M. Fischer, Ed., Cairo's Informal Areas Between Urban Challenges and Hidden Potentials: Facts, Voices, Visions. GIZ. Available at: http://www2.gtz.de/dokumente/bib-2009/gtz2009-
-0424en-cairo-informal-areas.pdf

Salon, D., Gulyani S., 2010. Mobility, Poverty, and Gender: Travel 'Choices' of Slum Residents in Nairobi, Kenya. Transport Reviews, 30 (5), 641–657.

Shengxiao, L., Pegnjun, Z., 2015. The determinants of commuting mode choice among school children in Beijing. Journal of Transport Geography, 46, 112–121.

Sims, D, 2010. City on the Move: A Complementary Informality? Understanding Cairo: The Logic of a City Out of Control, pp 227–250. Cairo: The American University in Cairo Press.

Stewart, O., Moudon, A. V., Claybrooke, C., 2012. Common ground: Eight factors that influence walking and biking to school. Transport Policy, 24, 240–248.

fUNHABITAT (United Nations Human Settlements Programme), 2013. Planning and design for sustainable urban mobility: Policy directions. Global report on human settlements 2013. New York.

UNICEF (United Nations Children's Fund), 2014. Children in Egypt: a statistical digest, June 2014, UNICEF Egypt, Cairo, Egypt.

UNICEF (United Nations Children's Fund), 2013. Multidimensional Child Poverty in Slums and Unplanned Areas in Egypt, UNICEF Egypt and ISDF, Cairo.

Verplanken, B., Aarts, H., 1997. Habit, information acquisition, and the process of making travel mode choices. European Journal of Social Psychology, Vol. 27, 539–56.

Wahby, N., 2013. Government and Community Efforts in Upgrading Infrastructure in Informal Areas: The Case of Izbit ElHaggana. A Thesis Submitted to the Public Policy and Administration Department in partial fulfillment of the requirements of the degree of Master of Arts.

Westman, J., Johansson, M., Olsson, L. E., Mårtensson, F., Friman, M., 2013. Children's affective experience of every-day travel. Journal of Transport Geography, 29, 95–102.