Towards a Ride-hailing Services Dependency in Nairobi? Uses, users and regulation

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Summary: On-demand Ride-Hailing services (RHs) now play an increasing role within many cities around the world. RHs might increase traffic congestion, vehicle ownership and access inequalities. RHs pose significant challenges for policymakers, and addressing these issues requires detailed information about RHs use. But research on RHs services, especially in African cities, remains scarce. In this respect, this research presents original data on the use and users of RHs in Kenya's capital, Nairobi, based on the results of an ad hoc survey designed by the author. This paper provides insights into who the users of RHs are, and their motivations for using RHs. Results show that RHs are extensively used in Nairobi (across all socio-economic groups, on a regular basis and way more for work-related trips than in many Western countries). In Nairobi, where only a minority of urban dweller have access to an individual motorized mode of transport, using RHs is gradually becoming necessary to access urban amenities. Nairobi's inhabitants are facing a growing RHs dependency, which calls in return to public regulation.

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Introduction

On-demand Ride-Hailing services (RHs) are digital applications that match potential riders with drivers in real time. Their success is largely linked to their ability to take advantage of the widespread adoption of smartphones to provide an affordable, convenient and point-to-point mobility service able to compete with the transit and taxi industry.

RHs have grown rapidly over recent years (Shaheen & Cohen, 2018) and they now play an increasing role within many cities around the world (Young & Farber, 2019), including in the Global South. But research on the usage and impacts of RHs remains scarce, especially in African cities (Das & Ngobeni, 2017; Boutueil & Aguiléra, 2018; Boutueil & Lesteven, 2018). RHs might have substantial effects on traffic congestion, vehicle ownership, transit ridership and transport equity. Thus, the rapid adoption of RHs poses significant challenges for policymakers and addressing these issues requires more detailed information about RHs' use.

In this respect, the first objective of this research is descriptive. It presents original data on the use and users of RHs in Kenya's capital, Nairobi,[1] based on the results of an *ad hoc* survey designed by the author.

In the first section, we introduce the main challenges faced by the transport and urban system of Nairobi, and the recent expansion process of RHs. The second section introduces the result of the literature review, while the third section presents the methodology and the survey on which this research is based. In the last section we present the main results and conclude with discussions on policy implications and suggestions for future research.

Nairobi's mobility system facing the ride-hailing services expansion

Nairobi is a region experiencing massive change, first of all in terms of demography and urban development, but also regarding the massive expansion of RHs.

Traffic congestion and access inequalities in Nairobi, a mobility system under pressure

Nairobi is a fast-growing, mono-centric and highly segregated city: it faces urban sprawl while employment remains concentrated in the city core (Cira *et al.,* 2016). Dependency on motorized transport is increasing with private motorization on the rise, the lengthening of daily commuting trips[2] and increased contrasts in terms of population density and the spatial distribution of jobs (Nairobi City County, 2014). Nairobi is nowadays among the most congested cities in Africa and it also has, according to the World Bank, one of the

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[1] Nairobi has been selected as a case study for this research because according to Boutueil and Aguilera (2018) it is the African capital city with the greatest number of ride-hailing companies in Africa as of March 2018.

[2] The lengthening of the average commuting distance has increased from 0.8 km in 1970 to more than 30 km in 2010 (Omwenga, 2011).

world's longest average journey-to-work times[3] (Rajé, 2018; Cira *et al.*, 2016), which should worsen with the expected reinforcement in car use and household's car ownership rate (Cira *et al.*, 2016; JICA, 2018)

For employment access, using motorized mode of transportation is more and more necessary for urban dwellers. A majority of commuting trips (63%) are done with paratransit services, locally known as "*matatu*"[4] (Mutongi, 2020), while 24% are done by walking and circa 13% are done by car (Salon & Aligula, 2012). The *matatu*'s network therefore provides an essential transportation service for the efficiency of economic activities within the city.

Nonetheless, growing dependency on motorized transport is indeed all the more problematic because the matatu network only partially reduces access inequalities. *Matatu* are indeed not accessible spatially or financially to a majority of Nairobi's inhabitants. Indeed, a large majority of poor urban dwellers cannot even afford access to *matatu* services for their daily commuting trips and are bound to walk or cycle, even over long distances (Salon & Aligula, 2012). Since *matatu* operators receive no subsidies from public authorities, they are operating with the concern of maximizing their profit. For these reasons, fares tend to be high, and vary according to the route, the condition and aspect of the vehicle and even the weather. Moreover, the network is structured according to profit-*oriented* concern. As a result, many areas within the city are not covered by *matatu* (Salon & Aligula, 2012) and *matatu* are mostly used by middle and to some extent low-income groups[5]; since circa 65% of adults in Nairobi are not able to afford matatu services for their daily commute on a daily basis, even though half of commuting trips are over 9 km (Salon and Gulyani 2010, Klopp 2012).

This situation results in a significant accessibility gap. Many services, amenities and facilities, such as schools and hospitals, even public parks, are inaccessible to 36%, 16% and 25% of the population respectively (Cira *et al*, 2016). Accessibility to employment, which varies greatly according to the mode of transport used, is also much higher for motorized individuals[6] (see Figure 1).

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[3] Commuting speeds have strongly decreased in recent years: in 2004, a JICA study gave an average of 37 km/hour, while according to the World Bank, the commuting speeds in 2011 was only 14 km/hour, and less than 8 km/hour during the peak hours, due to congestion and because a majority of home-to-work trips are made by foot (Salon & Gulyani, 2019). Several surveys indicate an average home-to-work time close to 50 minutes, but according to Salon and Gulyani (2019) the median home-to-work time in Nairobi is only 30 minutes. This result suggests that most Nairobi residents are solving their transportation problems by limiting their commutes to short distances, off-peak hours, or both.

[4] The *matatu* fleet is composed of midi-bus and mini-bus (14, 25 and 33-seater vehicles) which are privately run by individuals owning most of the time less than two vehicles. Generally, vehicles are old, in bad condition and offering poor level of security and comfort.

[5] According to Salon and Gulyani (2019): "In Nairobi, higher incomes, education, age, and distance to Nairobi's city center are associated with more matatu use. In contrast [...] residence in an informal settlement has a negative relationship with matatu use."

[6] The total share of employment accessible in Nairobi by car is 31%, 58% and 77% for, respectively, 30, 45 and 60 minutes of travel time. *Matatu* users have access to 4%, 10% and 20% of jobs for 30, 45 and 60 minutes of travel time respectively (JICA 2013, 2014; Cira et al., page 108).

Table 4.2: Average share (percentage) of Nairobi's employment opportunities accessible within a given timeframe, by transport mode used and congestion status

	Cars		*Matatu*s + walking	Walking only
	Uncongested	Congested	Congested	Uncongested/Con-gested
< 30 mins	57	31	4	3
< 45 mins	85	58	10	7
< 60 mins	96	77	20	11

Figure 1 : Access inequalities according to transportation's modes (JICA, 2018)

The RHs expansion in Nairobi fed by an income-based logic regulation

Of the more than 700 cities around the world where the U.S. RHs' company Uber was present as of February 2018, close to 50% were cities in developing countries, including 15 in Africa. On the African continent, Boutueil and Aguilera (2018) reveal both the growing foothold of major international apps and the proliferation of locally-developed apps.

In Kenya, RHs are experiencing strong growth (Kippra, 2015; Kent & Dowling, 2016; Lesteven & Boutueil, 2018). First, major RHs companies such as Uber and Bolt appeared in mid-2015 and started to spread widely before the end of 2016. Also, locally-developed apps such as Mondo Ride, Little Cab, or An-Nisa emerged in Kenya from 2017. In 2018, Uber, Taxify and Little Cab were all together used by circa 10,000 to 15,000 drivers. In Kenya, RHs companies provide a varied spectrum of service, from low-cost to premium offers both for car and Moto-taxi services (Boda-Boda in Kiswahili). As an example, Uber has created an original and unique low-cost offer in Nairobi, called "Chap-Chap" ("hurry-hurry" in Kiswahili).

The National Transport Safety Authority[7] (NTSA) requires that RHs' drivers get a Public Service Vehicle (PSV) license to operate their service. Each license granted represents an additional source of revenue for the NTSA, which for this reason does not limit the number of licenses granted to RHs drivers. This income-based logic, which predominates over the regulation of the sector, results in an uncontrolled growth in the number of RHs drivers in Nairobi, which contributes to the precariousness of many drivers. From their side, RHs companies have every interest in having a large number of drivers operating on their platform at all times to provide a fast and low-cost service. Indeed, the more drivers there are, the lower the price of the rides are, which in turn reinforces the attractiveness of the service for users. The evolution of prices according to the interplay of supply and demand is to the disadvantage of the drivers who are more and more numerous to share a market that is still emerging.

In addition, the vast majority of drivers do not own the vehicle they drive. Following the exact same "target system" that rules the *matatu* sector, most RHs drivers rent their vehicle from an owner who sets a weekly rent to be paid for the use of their vehicle. As the increase in the number of drivers result in an exacerbated competition that leads to a constant reduction in fares, more and more drivers are unable to meet the target set by the owners and many of them are in debt. Although many drivers are dropping out, the large pool of

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[7] The NTSA is a Kenyan government agency in charge of issuing Public Service Vehicle (PSV) licenses for all road and sea-based public transport modes nationwide.

unemployed young people ensures that RHs companies have a sufficient turnover to maintain a constant level of supply. As a result, RHs in Nairobi are very numerous and many trips done through RHs are relatively cheap, especially when compared to trips done by *matatu* which often requires to get on board several buses successively and each time pay a fare.

Literature review

Research on the usage and impacts of RHs services, especially in African cities, remains scarce. Boutueil and Aguilera (2018) show that RHs may help to meet an unmet mobility demand and increase overall accessibility in cities were mobility supply is insufficient. On the other hand, the effects of such services both in terms of inequality of access (among different categories of population) and in terms of traffic congestion remain unclear. RHs would mostly serve the needs of a growing middle- and upper-class market in developing countries (Schechtner & Hanson, 2017). Boutueil and Aguilera (2018) also believe that in developing cities, where mobility services are more developed than private car ownership, RHs might help resist the rapid rise in private car ownership and use (Boutueil & Lesteven, 2018; Sengers & Raven, 2014).

RHs raise specific opportunities and challenges for the mobility systems in Western and developing countries, which are characterized by different trends in terms of travel demand, infrastructure and mobility services provision, car ownership and transit ridership. But as little research has been carried out on RHs in developing countries, data collected from studies dealing with RHs services in Western countries are used here in order to compare them with data in Nairobi, and to identify to what extent RHs' uses and users are specifics in Nairobi.

Research on Western countries has investigated the extent of RHs expansion (Clewlow & Mishra, 2017; Wigginton *et al.*, 2018; Shaheen & Cohen, 2018), their potential effects on congestion, access equity and their related public policies issues and regulation (6-t, 2015; SanFranCountyTA, 2017; Das & Ngobeni, 2017; Brown *et al.*, 2018; Barrios *et al.*, 2019; Yanocha & Mason, 2019). An important part of the literature has looked at the profile of RHs' users (Rayle *et al.*, 2014; Pew Research Center, 2018; Henao, 2017; Gehrke *et al.*, 2018), or at the effects of RHs on taxis (Çetin & Deakin, 2020; Young & Farber, 2019) and publics transport services (Babar & Burtch, 2017; Murphy & Colin. 2016; Murphy & Felgon, 2016).

The above works invite us to analyse our data by paying attention to: (i) access inequalities; (ii) travel patterns and transit ridership; (iii) car ownership and car dependency (Dupuy, 1999).

Methodology

The survey

The intercept survey on which this research is based was carried out in spring 2019. 421 complete survey forms were collected through face-to-face interviews in 22 spots in

Nairobi,[8] identified through four key informants' interviews, office research and our own observations (Figure 2). We conducted the survey in different areas of the Nairobi as it allowed us to access both informal workers and low incomes workers from the formal sector (Industrial Area, Makadara, Woodley estate, Kibera, Embakasi, Pangani), but also urban dwellers belonging to the middle class or with high incomes (CBD, Westlands, Kitisuru, Kangemi).

Data and demographic respondents

Data collected were compared with data issued from Kenya's national census of 2009 and from several surveys conducted more recently by the World Bank (Cira et al., 2016) and the Japan International Cooperation Agency (JICA, 2018). They are consistent with these earlier data in terms of pyramid of ages, gender repartition, private motorization rate, and modal share (see Table 5 in appendices for details). Nevertheless, data available in Nairobi regarding the population and mobility practices are not accurate enough to allow us to assert that our sample is representative of the whole population of the metropolis. However, we have collected way more than thirty (30) responses from many different subgroups of the surveyed population (gender, age, occupation, monthly incomes, mobility practices), which allow us to get an approximate idea of the average behaviour of the population in Nairobi for each of these subgroups (see Table 5 in appendices for details).
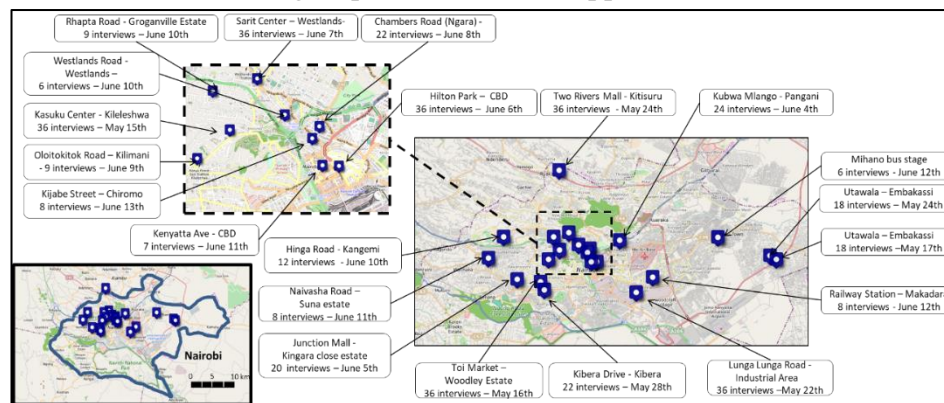

Figure 2: Location, date and number of forms collected in 22 spots in Nairobi (Author, 2020)

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[8] With two research assistants from the University of Nairobi we have conducted 22 days of fieldwork from May 15th to June 13th 2019. Surveyors were instructed to intercept every day a balanced number of individuals, depending on their approximate age and gender. The survey form had 58 questions. As a first step, participants were asked about their social identity, household equipment, daily commuting trips characteristics and if they already used RHs. If they answered that they never used RHs, they were asked why and about their intention of use. If they stated having already used RHs, they were asked to describe precisely their last RHS' trip : trip date and time of the day, trip origin and destination, trip purpose, duration and cost of trip, previous and alternative modal choice, and the reason explaining why they chose RHs rather than another mode of transport.

Results

In the following section, we discuss key findings from the intercept survey including user demographics, trip characteristics, and reasons for using RHs.

Who RHs' users are?

Basic demographic

RHs tend to be used more by women, educated and employed individuals, younger than 49 years old. Nonetheless, we can find RHs user across all socio-economic groups; they are not only a luxury good dedicated to wealthy people, as it is shown in the following section.

Table 1: RHs' users and non-users social and demographic data (Author, 2020)

How often do you use RHs?					
Frequency of RHs' use	**Men**	**Women**			
Never	59%	55%			
Occasionally	18%	18%			
Regularly	23%	27%			
	18-24	**25-34**	**35-49**	**49 & more**	
Never	56%	55%	55%	70%	
Occasionally	19%	20%	14%	18%	
Regularly	26%	24%	30%	13%	
	Students	**Employees**	**Business Owner**	**Self Employed**	**Unemployed**
Never	30%	46%	56%	67%	82%
Occasionally	36%	19%	17%	15%	12%
Regularly	33%	35%	26%	18%	6%
	Primary	**Secondary**	**Mid-level college**	**Bachelor degree & more**	
Never	94%	72%	49%	27%	
Occasionally	2%	17%	20%	26%	
Regularly	4%	11%	30%	47%	

Occasionally means once per month or less; Regularly means more than once in a month.

RHs' users and their monthly incomes

The Figure 3 shows that RHs are used by all incomes' city dwellers, but four different groups can be identified according to their level and regularity of RHs' use (blue circles in Table 3).

Figure 1: RHs' uses according to monthly incomes (Author, 2020)
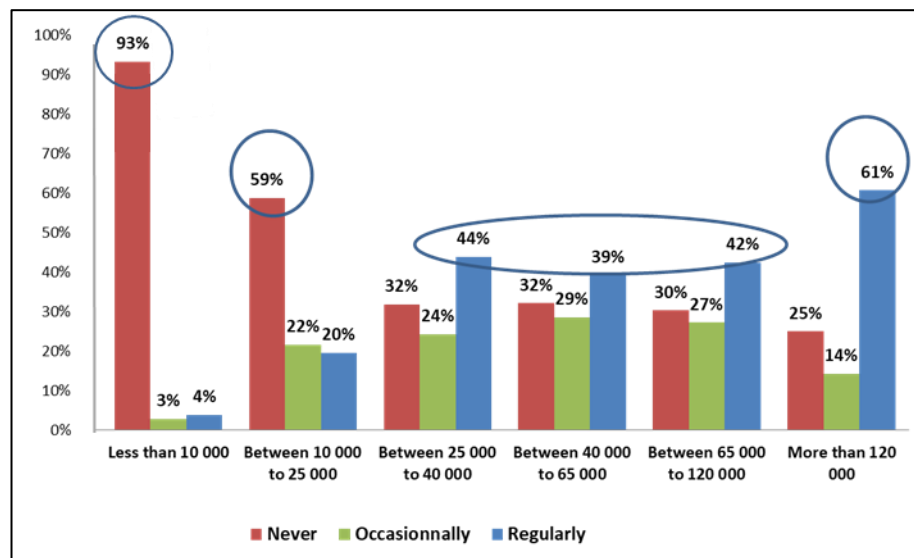
Occasionally means once per month or less; Regularly means more than once in a month.

Only 7% of city dwellers earning less than 10,000 Kenyan Shilling (KSH[9]) per month have already used RHs. Even if a large majority of this very low-income group remains deprived of these services, a relatively important amount of them use occasionally or regularly RHs. Also, 41% of individuals with monthly incomes ranging from 10,000 KSH to 25,000 KSH have access to RHs, and 20% of them on a regular basis. These results reflect that RHs are extensively used by low incomes individual in Nairobi, and in this sense that they are not a luxury good only.[10]

The Figure 3 shows also quite obviously the relative homogenous behaviour and lifestyle of what we could call the broad "middle class" in Nairobi[11]: in average, 70% of individual earning from 25,000 KSH to 120,000 KHS per month have already used RHs, and circa 30% stated that they used it more than once in a month.

Lastly, 61% of respondents belonging to the groups earning more than 120,000 KHS per month stated that they use RHs more than once in a month. For this group, RHs really are a mode of transport used on a daily basis.

Frequency of RHs' use

The Figure 4 shows that RHs' users in Nairobi are using these services on a regular basis, way more than RHs' users in many Western cities. This result reflects the major role played
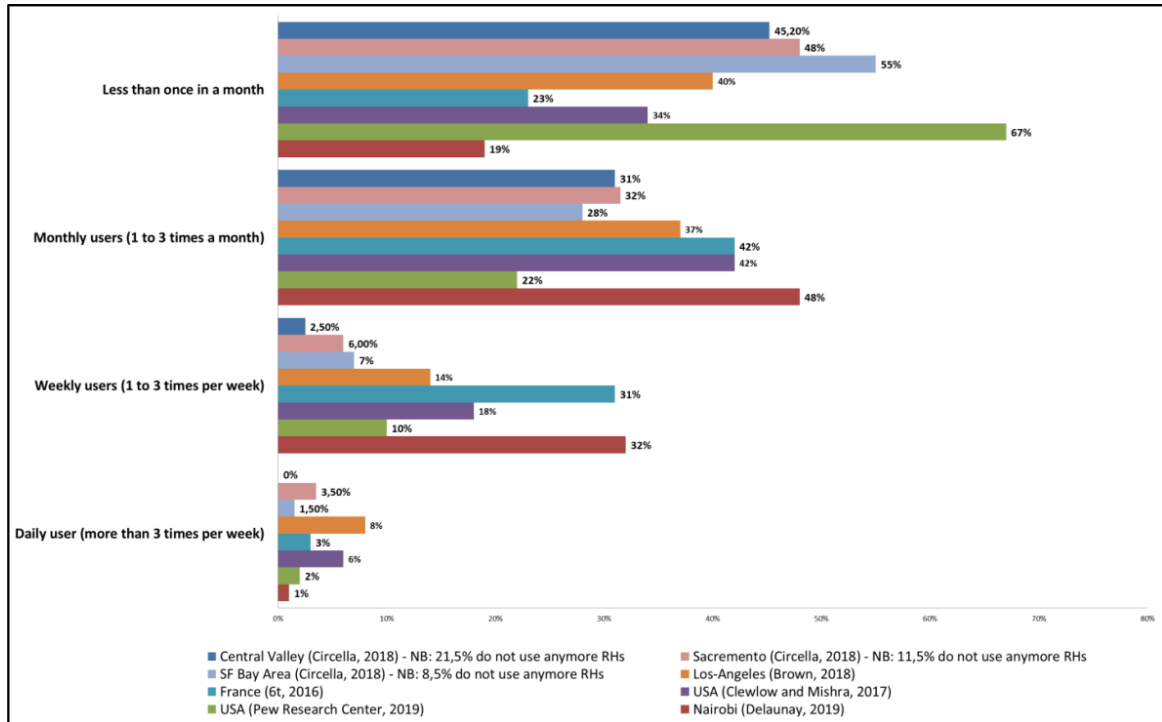
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[9] On November 2020, 1,000 KES was equivalent to 9 USD.

[10] According to our data, the average and median cost of RHs trips made by respondent were respectively 553 and 420 KSH. In average it is ten times higher than a trip made by using *matatu*.

[11] In 2015, according to the Institute of Economic Affairs, the middle class in Kenya was constituted of those earning 75,000 KSH to 100,000 KSH and this group accounted for 30% of Kenya's population. It is important to bear in mind that scholarly works are discussing the use and relevance of the category of middle class in Kenya and more generally in African countries. See for Kenya: Maupeu (2012) and Thibon (2020).

by RHs in Nairobi, and might illustrate the growing car dependency of Nairobi's urban dwellers, in a context where a large majority of them do not own a private car and therefore need to use RHs occasionally to access to urban amenities.

Figure 2: International comparisons: RHs frequency of use (Author, 2020)

Legend:
- Central Valley (Circella, 2018) - NB: 21,5% do not use anymore RHs
- Sacremento (Circella, 2018) - NB: 11,5% do not use anymore RHs
- SF Bay Area (Circella, 2018) - NB: 8,5% do not use anymore RHs
- Los-Angeles (Brown, 2018)
- France (6t, 2016)
- USA (Clewlow and Mishra, 2017)
- USA (Pew Research Center, 2019)
- Nairobi (Delaunay, 2019)

Trips purpose and car ownership

The following section provides insight into the use of RHs, car ownership and the purpose of trips.

RHs trips purpose

RHs in Nairobi are twice more used for work-related journeys than in other cities (see Table 2). A large majority of work-to-home RHs trips are made by women and a majority of them earn less than 40, 000 KSH per month. Many individuals use RHs for professional purposes (mostly male), when they need to carry luggage and equipment, or when an unexpected job occurs. In a context of growing car dependency, workers (formal and informal sector) need to get occasional access to a car through RHs to conduct their professional activities.

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Table 2: RHs trips purpose with international comparison (Author, 2020)

Trip purpose	Nairobi (Delaunay, 2019)	France (6-t, 2016)	San Francisco, U.S (Shaheen & Rayle, 2014)
Access to airport, railway	7%	21%	4%
Work-related trips	**31%**	**15%**	**16%**
Leisure / Social activities	46%	60%	67%
Healthcare	8%	2%	13%
Errands / shopping	8%	2%	

Car ownership and driving

Table 3 shows that in average, individuals living in a household owning a car and those who daily commute by car tend to use much more and more often RHs than those who do not own nor do not use a car to commute (Table 3 and Table 4). These results are not consistent with previous research led in Western countries. In the United States, for instance, Conway (2018), Clewlow and Mishra (2017), Murphy and Felgon (2016) found on the contrary that vehicle ownership has a negative relationship with RHs' use: those who own more cars are less likely to need the RHs. The same is true in France as shown by 6t (2016).

Table 3: RHs use and household's car ownership (Author, 2020)

Frequency of use	No cars	One car	Two cars & more
Never	65%	32%	28%
Occasionally	16%	25%	28%
Often	19%	42%	45%

Occasionally means once per month or less; Regularly means more than once in a month.

Table 4: RHs use and commute by car (Author, 2020)

Frequency of use	Commute by car	Don't commute by car
Never	33%	71%
Occasionally	29%	12%
Often	37%	17%

Occasionally means once per month or less; Regularly means more than once in a month.

Thus, in Nairobi RHs are extensively used by individuals who already have potential access to a private car. This finding raises two hypotheses: Are RHs improving access to motorized mode of transport for individuals who already have access to a private car? Do RHs complete or compete with private car, and do they reduce the need of owning a private car?

Conclusion: Growing ride-hailing dependency call for public regulation

In Nairobi, RHs tend to be used more by women, educated and employed individuals, younger than 49 years old. Nonetheless, results show that individuals belonging to all socio-economic groups are using RHs on a regular basis, even among the low- and middle-income groups. RHs are also way more used for work-related trips and on daily-basis than in Western countries. As only a minority of urban dweller have access to an individual motorised mode of transport, using RHs is gradually becoming a necessary requirement to access urban amenities and job, to such an extent that we could argue that Nairobi is facing a growing ride-hailing dependency.

RHs might help resist the rapid rise in private car ownership and use. They compete with private car for those who can afford access to individual modes of transportation, and they complete local transit services by providing a tailor-made, secure and door-to-door mobility service. This trend can largely benefit Nairobi's urban system since RHs can put downward pressure on car ownership and lead to a reduction in the number of registered private vehicle and of the average number of vehicles in circulation per day. RHs in Nairobi may help leapfrog the process of development of the automobile system by allowing skipping the stage of individual car ownership and directly stepping up to the sharing stage.

Nevertheless, we must bear in mind that this model can only works in a context of particularly unequal economy characterised by mass unemployment. Ride-hailing sector currently plays the role of a refuge sector of the Kenyan economy. The emerging "sharing stage" of the automobile system allowed by RHs in Nairobi relies heavily on the precariousness of many drivers competing for the market. The working condition of RHs' drivers is an important issue. Currently, the Kenyan government does not limit the number of licenses granted to RHs drivers, which results in the uncontrolled growth of RHs drivers in Nairobi and contributes to their precariousness.

An interesting option of regulation of the sector to explore is to consider the implementation of Public Private Partnerships with local or international Transportation Network Companies such as those currently implemented in Kampala, Uganda, with Safe Boda, in Brazzaville, DRC, with Heecth, and in several cities in India with Uber. These transportation network companies are trying to secure their investments by initiating original forms of collaboration with local authorities. Through these partnerships with digital companies, local municipalities guarantee them exclusive rights to operate on their territory. In return for this monopoly, the companies undertake, for example, to respect a tariff schedule, to register and train drivers or to transmit their data. In the long term, local government could issue calls for tenders that would put those different Transportation Network Companies in competition with each other. Those companies would then no longer compete on the market, but compete for the market and obtain public monopoly conditioned to their ability to carry out the technical inspection of vehicles, train, register and manage drivers, but also to their ability to provide the drivers protective equipment, social protection and even a minimum guaranteed income.

Acknowledgments

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Appendices

Table 5: Demographic of survey's respondents (Author, 2020)

	Item	Nb	%
Gender	Male	217	52%
	Female	204	48%
Status	Tourist	5	1%
	Work resident	8	2%
	Kenyan Citizen	408	97%
Age	Under 18 years old	5	1%
	18 to 24	97	23%
	25 to 34	181	43%
	35 to 49	92	22%
	50 to 64	38	9%
	65 and above	8	2%
Occupation	Business owner (Entrepreneur, Convenience store, …)	98	23%
	Employee of the private sector	107	25%
	Employee of the public sector	16	4%
	Self-employed	118	28%
	Student (Primary or secondary Education)	1	0%
	Student (Higher Education)	32	8%
	Retired	3	1%
	Housewife	8	2%
	Unemployed	38	9%
Education	Primary	50	12%
	Secondary	149	35%
	Mid-level college	118	28%
	Bachelor's degree	95	23%
	Master's degree	9	2%
	Doctor of philosophy / of medicine	0	0%
Motorbike ownership	No motorbike in the household	397	94%
	One motorbike in the household	21	5%
	Two and motorbike cars in the household	3	1%
Car ownership	No car in the household	324	77%
	One car in the household	68	16%
	Two and more cars in the household	29	7%
Monthly Incomes	No income	64	15%
	Less than 10,000	105	25%
	Between 10,000 to 25,000	97	23%
	Between 25,000 to 40,000	66	16%
	Between 40,000 to 65,000	28	7%
	Between 65,000 to 120,000	33	8%
	Between 120,000 to 200,000	11	3%
	More than 200,000	17	4%