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Article

Why the Car Is Not Always King in Global South Cities: Evidence From Ulaanbaatar

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Abstract
Access to a private car has established itself as a critical control on mobility and access to opportunities for residents living in a diverse range of settings, globally. Across cities of the Global South, the benefits of private car access are often intensified by the absence of viable alternative modes of travel. This article explores the influence of private car access and mobility in relation to residents living in "ger district" areas of Ulaanbaatar, Mongolia's capital city. These peri-urban areas are informally created when rural migrants set up home on the edge of the city, initially using mobile felt dwellings called "ger" that become augmented or replaced by permanent structures over time. An absence of forward planning as well as unmade roads and hilly topography mean that the ger districts are often poorly served by public transport, while the low density of the built environment also means that informal transport services can be limited in coverage and relatively expensive. This article utilises a database of household questionnaires collected in 2020 to compare mobility patterns and accessibility between car-owning and non-car-owning households in three case study ger districts, capturing seasonal differences between the extreme cold of the wintertime and warmer summer conditions. The findings not only reveal stark mobility and access differences in relation to car ownership but also discrepancies between car ownership and actual car use for important and routine journeys. This indicates that despite a lack of public transport available, many households opt to use what public transport they can. This pattern provides a potentially important basis for future policies that aim to limit car use in order to reduce traffic congestion and broaden access to the city for non-car-owning households by providing more accessible public transport.

Keywords
car ownership; car use; Global South; informal settlements; mobility; Mongolia; private car; public transport

Issue
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1. Introduction

Across many cities of the so-called Global South, rapid inward migration and urbanisation continue to overwhelm the capacity of urban governments to provide basic access to services and opportunities, as well as access to mobility services that allow citizens the ability full participation across the different facets of urban life (Castañeda, 2020). Such a situation appears to be evident in Ulaanbaatar, Mongolia's capital, where the largely unplanned ger districts have ballooned in the decades following the country's embrace of economic liberalisation in 1991 and the allowing of free movement to move to the capital after the end of socialism. This shift triggered an influx of migration from the countryside, giving rise to rapid population growth within the ger districts and movement within the city as people sought areas to set up land plots on the city's outer limits. Today, the ger districts house over half of Ulaanbaatar's residents or almost one-third of Mongolia's entire population.

In contrast to the high-density informal settlements found in other Global South cities, a 2002 law entitling each Mongolian household to a 0.07 ha plot of land has allowed the ger districts to grow in a low-density, sprawling, peri-urban fashion (Terbish et al., 2022), an urban pattern that lengthens travel distances and makes

public transport services inefficient to operate. New residents arriving from the countryside typically establish home by setting up a "ger," or collapsible felt dwelling used by Mongolia's mobile pastoralists, on vacant land and establish boundaries by enclosing their plot with a high fence to form "hashaa." Over time, depending on the economic opportunities of different households, hashaa can become built out with new buildings that augment or replace the ger as living accommodation or for micro-enterprises such as retail outlets or car repair garages. This means that the older ger district areas closer to main roads and formally planned areas of the city typically have the greatest building density and the most diverse land uses. Additionally, earlier research undertaken by Hamiduddin et al. (2021) showed that being located closer to the main roads brought superior access to public transport services. By definition, therefore, newer households tend to live in areas of the ger districts situated away from both public transport services and the mixed land uses associated with the more established ger district areas.

By global standards, permanent settlement is a relatively recent concept in Mongolia, where livelihoods were traditionally based on nomadic pastoralism. Permanent settlement began to emerge from the 1920s, after the adoption of communism, leading to the successive expansion of formally planned urban development through waves of Soviet-style urban planning through to the 1970s and, since the collapse of communism in 1989, to market-oriented speculative schemes (Boldbaatar et al., 2014). Today, Ulaanbaatar features a relatively dense core of formally planned city development that has become shrouded by the much lower-density peri-urbanism of the ger areas. The city's estimated 1.5 million inhabitants are served by a transport system that is dominated by buses and cars. The bus system forms the backbone of the city's public transport system, consisting of a total of 138 bus lines, divided into main, express, feeder, and seasonal summer house routes operated by approximately 800 vehicles (Mott MacDonald, 2019). In addition, a number of shorter and dedicated electric trolley bus lines operate within the inner city. Private minibuses or "mickrobus" form a patchwork of local services in different areas of the city (Plueckhahn & Bayartsetseg, 2018), plugging the gaps in the bus network or providing local services between the neighbourhood and main bus line, although restrictions applied by the municipal authority has attempted to reduce congestion at bus stops caused by mickrobuses. Lastly, taxis provide the foundational plank of the transport system with eleven licensed taxi companies operating approximately 600 vehicles across the city (Mott MacDonald, 2019), a markedly insufficient fleet for a city of 1.5 million residents (My Mongolia Travel, 2023). Car-owning residents make up the shortfall by providing informal taxi services in their own private cars—hailing a ride in a private car is a common aspect of life in the city. Across the ger areas, share-taxis can be found operating along fixed routes within some neighbourhoods, typically bringing residents from peripheral areas to central areas close to main bus routes.

At the present time, the existing literature on mobility and access across Ulaanbaatar is extremely sparse and largely confined to consultancy or NGO studies on travel patterns across the overall population or in reference to specific aspects of life, such as access to healthcare (e.g., Kim et al., 2023) or addressing air pollution (Ariunsaikhan et al., 2020; Aschmann, 2019) or transport management (e.g., Gantulga et al., 2022). However, the existing literature reveals a fine balance between the overall use of the car and the use of public transport for journeys across the city. According to Khurelbaatar (2018), 51% of all journeys made in Ulaanbaatar are undertaken using public transport, compared to 42% by private car and 5% by taxi. However, this analysis of modal share does not provide a breakdown of route type and no specific data on mickrobus ridership or comment on whether private car transport included travel on a paid-passenger basis. *The Economist* reports that approximately 60% of automobiles in Ulaanbaatar are hybrid vehicles that can better cope with the extreme cold of the winter ("Everyone in Mongolia drives a Prius," 2018). Second-hand vehicles imported from Japan can be purchased for as little as $2,000 owing to stringent and expensive vehicle testing the Japanese government requires on vehicles more than three years old. However, although the cost threshold for vehicle ownership is low by any standards, average fuel costs of approximately $1.5/L (Global Petrol Prices, 2023) add a considerable cost burden for households on modest incomes. Since 2016, the municipal government has attempted to limit the use of private cars on weekdays from 8 am to 8 pm through a number plate rationing system ("Average salary in Mongolia is 394 USD," 2017) similar to schemes introduced across cities of Latin America and Asia (Han et al., 2010). In principle, private vehicles are excluded from using the city's roads on one weekday per week.

This article builds on the previous work of the author by, firstly, presenting a more detailed analysis of car ownership and use among ger district residents, secondly, by examining access and mobility patterns between car owners and non-owners, and, thirdly, reflecting on how existing disparities between car owners and non-owners might be addressed with respect to Ulaanbaatar's specific context and challenges. The research questions guiding this article are:

- RQ1: Who are the car users of Ulaanbaatar's ger districts?
- RQ2: What access and mobility advantages do car users have over non-car users?
- RQ3: How might access and mobility disadvantages experienced by households without access to a private car be reduced?

1.1. Car Use and Development

Although there is a broad and consistent association between household income and car ownership across international data sets, the relationship is rarely linear. Research by Dargay and Hanly (2007) depicts an uneven S-shaped curve, with slow growth in vehicle ownership among low-income households, accelerating through middle earners and slowing again as saturation in vehicle ownership is achieved among higher-income households. For example, in the UK, Stokes (2015) observes that 56% of households in the lowest quintile have cars compared to 94% in the highest two quintiles, whereas 89% in the middle quintile are car owners. The pattern can be readily observed across countries of the Global South (Dargay & Hanly, 2007) and indicates the importance of the private car as a household spending priority globally. In Mongolia, a detailed analysis of vehicle ownership in relation to income is not yet available, but aggregate data from the Asian Development Bank (2009) shows that motorisation has generally increased with national economic growth, with a surge in the first decade of this century that accompanied an economic boom and more available credit. In line with many emerging cities (Gakenheimer & Dimitriou, 2011), motorisation and urban growth in Ulaanbaatar have out-paced the development of the city's transport infrastructure, leading to chronic levels of traffic congestion and the absence of viable alternatives to road-based transport and lengthy commutes relative to the comparatively small scale of the city (Hamiduddin & Plueckhahn, 2021). Indeed, the authors found that the car drivers experienced very slow driving speeds as low as 8 km/h on their route from an outer ger district to the inner city—only double the average walking pace and slower than typical cycling speeds. Yet, as Haustein (2021) notes, the full utility value of the private car for a household can be difficult to capture. In Ulaanbaatar's ger districts, many carless households face the prospect of lengthy walks on unlit dirt tracks to access public transport services that are confined to the major roads (Terbish & Rawsthorne, 2016). During Mongolia's long and harsh winter, travel by foot or bicycle is both arduous and potentially treacherous—a greater consideration for many car users against the disbenefit of being stuck in traffic congestion.

Precise car ownership data is not publicly available for Ulaanbaatar's ger districts, but recent research by Hamiduddin et al. (2021) in three ger districts found that between one-third and a half of households owned a car. Furthermore, earlier research conducted on one of the ger districts by the author (Hamiduddin & Plueckhahn, 2021) found that residents who commuted by bus had an average overall journey time of 56 minutes in each direction, compared to 35 minutes by car. This particular ger district had no bus services into the city. Instead, residents living close to neighbourhood fixed share-taxi routes had the option of taking this informal transport service to a drop-off point close to a bus stop, while those living away from the route typically faced a walk of up to 1.5 km from their home to a bus stop. The research highlighted the specific issue of first/last journey stage access to the strategic urban transport network faced by many ger district residents.

1.2. Improving Non-Car Accessibility

Many Global South cities have embarked on programmes to improve city-wide access for non-car users. Most interventions focus on cost-effective improvements to public transport, through new bus rapid transit (BRT) schemes, other light rapid transit systems, or the deployment of innovative approaches such as cable car systems to overcome physical constraints. Such interventions may be accompanied by land-use strategies such as transit-oriented development or "smart growth" corridors that aim to support ridership by densifying populations within a walkable catchment area (Cervero, 1998; Papa & Bertolini, 2015). Whilst BRT schemes have become particularly popular because of their relatively low cost and technological simplicity, they are notably more complex and expensive to retrofit into mature urban areas, where the need to avoid extensive clearance and reconstruction may restrict a scheme to established arterial routes. This is the case with Ulaanbaatar's now long-proposed BRT system (Figure 1), which would aim to create dedicated busway routes and metro-style stations on key arterial roads. Some preparatory aspects ahead of the technical implementation of the BRT system have now been completed. These have included the introduction of smartcard ticketing accompanied by the introduction of a new public-private partnership service agreement, a development that led to some disruption to bus services and a temporary loss of ridership during roll-out (Gerilla-Teknomo, 2017). Despite delays to the full introduction of the BRT system, the Mongolian government recently reaffirmed its commitment to beginning the technical implementation of the project (The UB Post, 2023).

In theory, the strategic BRT system would be augmented by non-BRT feeder services of smaller, local buses on existing and improved roads. In their practical application, these schemes face significant and myriad challenges. Perhaps the greatest of these is the scale of interventions required to integrate all areas of the city into the system, and the resources, expertise and institutional capacity required to achieve this. The existing, much-delayed plan would leave significant areas of the existing ger districts outside of the standard 400 m walking catchment and does not appear to make provision for the growth of the ger districts, which has continued over the decade since the Ulaanbaatar BRT plan was initially published.

A striking feature of the Ulaanbaatar transport system, compared to other low-middle income cities of Asia, is that it is very heavily focused on more formal transport modes and larger vehicles. Share-taxi and

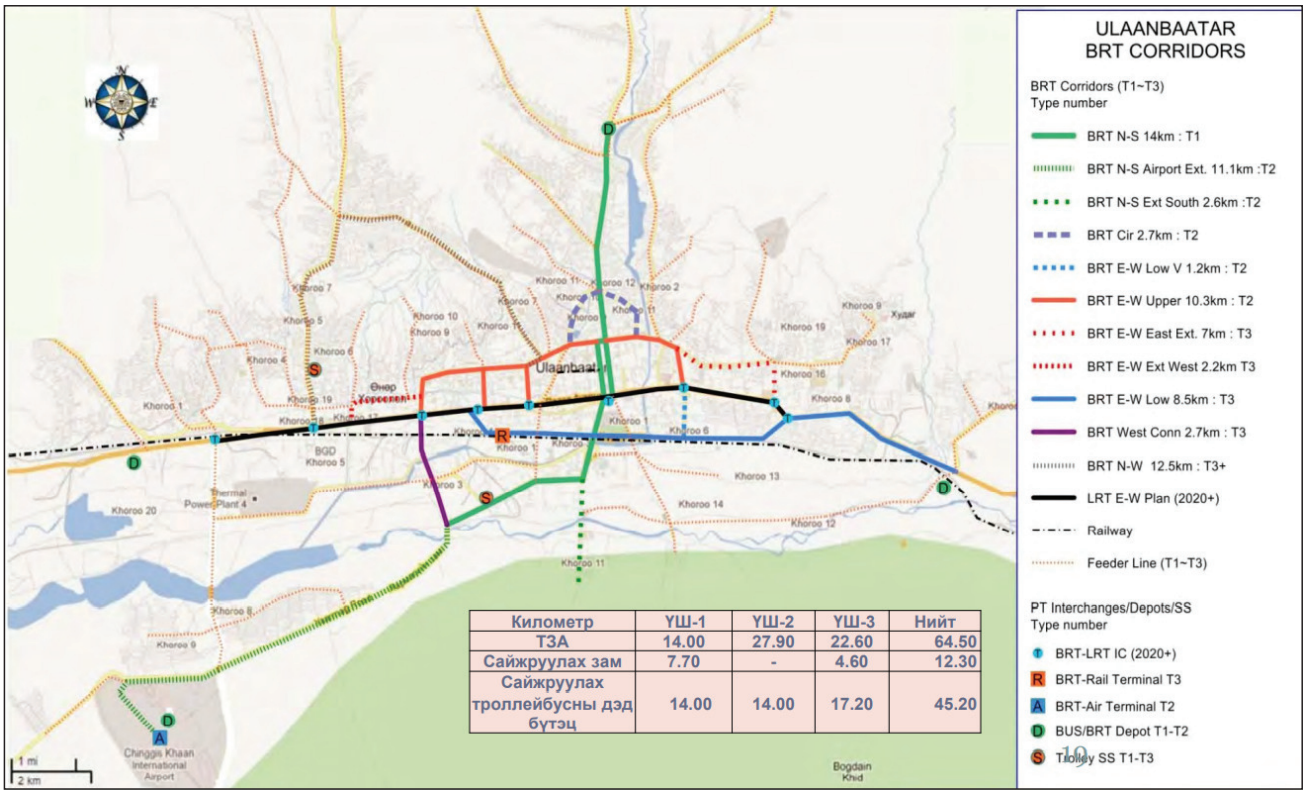

Figure 1. Ulaanbaatar's proposed BRT system. Note: LRT stands for "light rapid transit." Source: Tsevegjav (2014).

mickrobus services operate in some areas of the city, and a black market exists for the transportation of passengers in private cars, a practice common during the socialist period. Otherwise, Ulaanbaatar has few motorbikes or three-wheeled auto-rickshaw vehicles that provide cost-effective on-demand services in other Asian cities. Motorbikes, in particular, are not suitable vehicles given the difficult terrain, exceedingly cold winters, and the poor state of the roads encountered in many areas of the city. This means that difficulties in accessing public transport from the ger districts are likely to persist in spite of developments in the strategic transport network.

The above question of how access for non-car users can be improved is reflected upon later in this article, in Section 4. Following the methodology presented in Section 2, the article turns to two questions that guide the empirical research: Firstly, who are the car users of Ulaanbaatar's ger districts? Secondly, what access and mobility advantages do car users have over non-car users?

2. Methodology

The empirical research consisted of two rounds of a household travel survey undertaken in three ger district study sites across the north of the city, representing a range of access and mobility conditions as described by (Hamiduddin et al., 2021). The three study sites were as follows: the 18th Khoroo of Sukhbaatar District (SBD-18), the ninth Khoroo of Bayanzurkh District (BZD-9), and the 31st Khoroo of Songinokhairkhan District (SKD-31). The travel survey was advertised on the social media platform Facebook, using specific groups for each of the three communities. Participants were offered a 1,500 MNT ($0.5) phone voucher incentive to complete a questionnaire remotely by phone interview. Due to the Covid-19 pandemic, all surveys were undertaken remotely by phone, potentially limiting the range of participants to those who had internet access and membership in Facebook and to those willing to participate remotely. The nature of the survey itself, with its focus on work-related travel, overwhelmingly attracted responses from residents in employment. A total of 957 travel surveys were collected across the three study sites from two rounds of data collection. The first survey round was undertaken in March 2020 to capture winter travel patterns (n = 498), while the second data collection round took place in September 2020 to capture summertime patterns of life (n = 459). The survey was modified slightly for the second round of data collection to include household income. Broadly, the survey covered four different topic areas: (a) personal characteristics, including time spent at the address and car access; (b) travel patterns, including a breakdown of journey stages and travel times; (c) travel limitations, including neighbourhood barriers to access and mobility; and (d) neighbourhood life, including social activities and ride-sharing. Approximately 160 responses were obtained from each of the three sampling sites to provide an overall sample of approximately 480 responses from each survey round,

giving an aggregated 95% confidence level with a 4.3% overall margin of error.

The overall population of each study site is given below in Table 1, together with district-level indicators from a recent UN and Swiss Development Agency study (International Organization for Migration, 2022a, 2022b, 2022c, 2022d) giving unemployment rates and the relative proportion of minors and elderly residents living across the overall district in order to provide a general characterisation of the demographic balance across each of the study sites. Table 1 also shows the proportion of respondents from the author's survey who have lived at their address for more than 10 years, indicating that more than 45% or more residents had lived at their address for more than 10 years across the three study sites, a threefold increase over the course of a decade (Caldieron & Miller, 2013). Long-term residents across the three districts are likely to have moved to the city during the waves of high rural-urban migration experienced earlier in this century (Xu et al., 2021), a process that was discouraged more recently through the imposition of official restrictions on newcomers to Ulaanbaatar between 2017 and 2020 (Schoening, 2020).

3. Findings

This section is structured in accordance with the three research questions, RQ1, RQ2, and RQ3.

3.1. The Car Users

Data from the second household travel survey (n = 459), which captured both household income and car ownership, shows a broadly positive correlation between income and car ownership overall (Table 2). However, the income categories selected for the survey are not sufficiently granular to reveal detailed sensitivity between household income and car ownership, particularly among lower-income households. In 2019, the average monthly salary in Ulaanbaatar was reportedly 966,000 MNT or $394, with the lowest regular salary recorded at 420,000 MNT or $120 (GogGo Mongolia, 2017). The survey findings show, surprisingly, that almost half of those deemed to be on a below-average household income of 1 million MNT or below owned a car. It is possible that a restructured survey with tighter income categories would reveal a greater variability of car ownership with income. Alternatively, however, this finding could also be attributed to significant variabilities in household income, with reported annual income representing the anticipated income of that year (during the Covid-19 pandemic), whereas earnings may have been substantially higher in previous years, perhaps when a vehicle was purchased outright. It is possible that for some households that are long-term residents of the city, vehicle ownership is a legacy of more prosperous times, particularly Mongolia's pre-2014 economic boom that fuelled growth across different economic sectors including construction. As discussed in the next section, car ownership not only improves access to employment opportunities across the city, including for those employed in manual trades but is also one of the few viable ways for urban households to reach family members that have remained in the countryside.

The survey data also showed that households that had more recently moved into their current address were less likely to be car owners (Table 3), with car ownership rates approximately 10% lower among households resident at their address for five years or fewer compared to those resident at their address for more than six years. Furthermore, the survey found that two-thirds of households who had been residents at their address for less than one year had moved directly to their address from the countryside. This adds weight to the evidence reported elsewhere in the literature (cf. Barbary, 2019; Mayer, 2015) that rural migrants tend to be less affluent than long-term urban residents, reflecting both the economic opportunities of the city,

Table 1. Population and employment characteristics of the three study sites.

Study site (Khoroo)	Study site (Khoroo) population	Unemployment rate	Population aged under 18 years of age	Population aged over 65 years of age	Respondents at current address for more than 10 years
SKD-31	7,200	30%	34%	5%	51%
BZD-9	14,400	33%	34%	6%	45%
SBD-18	10,100	33%	32%	7%	48%

Sources: Author's own survey data; International Organization for Migration (2022a, 2022b, 2022c).

Table 2. Income and car ownership.

Household income (MNT)	Proportion of respondents (%)	Car ownership level (%)
Higher (>2 million)	4	88
Upper medium (1.5–2 million)	12	60
Lower medium (1–1.5 million)	27	59
Lower (<1 million)	57	47

on the one hand, and the fluctuating environmental and economic conditions facing traditional pastoralists in the countryside, on the other (International Organization for Migration, 2022d). An increasingly prominent factor is the increasing amount of livestock lost to *dzud* conditions in the countryside—a very dry summer followed by an extremely harsh winter. These events appear to be increasing with climate change (Mayer, 2015). Field et al. (2012, p. 502) note in their IPCC report: "The most critical consequences of *dzud* are increased poverty and mass migration from rural to urban and from remote to central regions….Many migrants travel from Western Mongolia to the capital city Ulaanbaatar."

Mapping of the surveyed households showed a tendency for newer households to be located in the more peripheral areas of the ger districts and away from public transport routes and the mixed land uses and amenities associated with the more mature and centrally located areas. Newer households tended to be located towards the furthest reaches of the sub-district and away from transport routes, including the informal share-taxi services and were more likely to be without a car. Furthermore, the later introduction of a transport trial also revealed that some of the tracks that homes had been established along had not been surveyed and were therefore not represented officially on maps, with homes not registered on the Mongolian official addressing system. This posed a further and significant barrier to access to neighbourhood transport services including taxis, which are more difficult to obtain when residents do not possess an official home address.

3.2. Access and Mobility Compared

The travel survey asked households to describe the stages of their work commute. Despite the different built environment characteristics of the three survey neighbourhoods, the majority of all commutes by public transport began with a walk to the bus stop, an aggregated summary of findings of which are presented below in Table 4. The superior road infrastructure across SBD-18 has meant there has been more extensive development of bus routes through the neighbourhood and therefore almost an equal number of residents were able to catch the bus within a convenient distance from their homes as those who had to walk a considerable distance. Informal transport in the form of share taxis featured as the first journey stage for roughly a fifth of public transport commutes in the two sub-districts of SKD-31 and SBD-18, whereas in the outermost of the three neighbourhoods, BZD-9, three-quarters of commutes began with a walk, with no other mode of transport representing a significant share of the first journey stage.

Thereafter, for the second stage of the journey, the vast majority of commuters from each of the three sub-districts transferred onto a bus (Table 4). SKD-31 is a slight exception with significant proportions of commuters continuing their journey either on foot (15%) or by share taxi (19%). This pattern is almost certainly associated with the distribution of employment-intensive mixed land uses in the formally planned area of the city immediately adjacent to the southerly access point of SKD-31. Logically, therefore, a resident travelling by share-taxi from deep within the sub-district would travel to the drop-off point on the southern edge and continue by foot, while a resident living in close proximity to the southerly edge of the sub-district would walk to the share-taxi stand to take a vehicle to employment a greater distance away.

Residents were also asked about the cost of their work commute. The research found that the 500 MNT cost of a relatively short journey in an informal shared taxi tended to be the same price as a single ticket for a longer bus trip. Journeys by share taxi are therefore expensive as a relative share of the overall commute. However, as Table 5 shows, it is those in the lowest income bracket that represent the greater proportion of share-taxi users (11%). Many share-taxi users combine a

Table 3. Duration at current address and car ownership.

Years at address	Moved from the countryside (%)	Car ownership (%)
<1 year	66	46
1–5 years	50	47
6–10 years	51	57
>10 years	44	56

Table 4. Showing journey-to-work modal share averaged across the three study sites.

First journey stage		Second journey stage	
Own car	18%	Own car	—
Taxi	6%	Taxi	8%
Walk	56%	Walk	10%
Bus	18%	Bus	69%
Mickrobus	1%	Mickrobus	7%
Other	—	Other	4%

Table 5. Income and informal taxi ridership.

Income (MNT)	Informal taxi ridership (%)
<1 million	11
1–1.5 million	6
1.5–2 million	4
>2 million	0

first-stage neighbourhood journey by share taxi with a longer journey by bus, at an overall cost of 1,000 MNT per commute journey or 40,000 MNT per month for a resident making the commute in both directions. With the addition of other travel costs, such as for grocery shopping, accessing health facilities, education, and socialising, residents on a low monthly wage of 420,000 MNT would spend over 10% of their income on travel—a threshold associated with "transport poverty" in Global North countries such as the UK (Lucas, 2012).

A closer analysis of the journey to work by public transport (Table 6) shows that lower-income residents have slightly longer overall journey times compared to those on higher incomes, generated both by the longer walking distances of the lowest-income residents and a slightly longer onward second-stage bus connection, although Table 6 also illustrates the extremely long overall journey to work times experienced by all income groups because of Ulaanbaatar's chronic traffic congestion. Of those surveyed in the lowest income category (500,000–1 million MNT) and who began their journey to work by walking, approximately one-third (34%) reported a walk of longer than 15 minutes to access public transport, compared to 24% among those in the highest income category (more than 2 million MNT). As none of the highest-income residents uses share-taxis to access bus services, the implication from the data shown in Table 6 is that the small number of more affluent residents (n = 9 or 52% of most affluent residents) who use public transport for the work commute do so both because the bus stop is within easy reach and that the transport services themselves offer straightforward access. To underline this point, almost all (8 out of 9) of the most affluent residents owned a car within their household and the greater majority (7 out of 9) stated that they had access to their car whenever they needed it.

Higher levels of informal transport ridership among lower-income residents can be explained both by the tendency for these households to live outside of the walkable catchment for public transport and for car ownership to be lower. The spatial pattern can be observed below in relation to sub-districts SKB-31 and BZD-9 (Figure 2), where red indicates the location of households belonging to the lowest income category and green for those in the two highest income categories. Public transport stops are indicated in orange and the yellow line in SKB-31 indicates the share-taxi route. The maps show proportionately few higher income residents living in the furthest reaches of each sub-district. Expenditure on share taxis, therefore, appears to be an outcome of residential location, itself the product of underpinning economic and social factors discussed earlier that also have a bearing on car ownership.

The spatial distribution of commuting data (Figure 3) does not appear to show pronounced differences in the geographical distribution of employment between car drivers and public transport users overall. Two notable features of the data include, firstly, the lower level of car-based commuting into central Ulaanbaatar from the three neighbourhood study sites and, secondly, a tendency for more car-based commuting to employment localities in the south of the city away from the main transport routes, particularly during the summer months (Figure 3, bottom). Lower levels of car-based commuting into the city centre likely reflect the overall modal share patterns shown earlier in Table 4, and a reluctance on the part of a significant proportion of car owners to commute by car—a product of Ulaanbaatar's poor driving conditions and shortage of available parking in the downtown. The summertime distribution of employment, shown in the bottom part of Figure 3, supports similar observations made in a different study by Hamiduddin et al. (2021), which attributed these peripheral localities with employment in the construction of new residential developments that takes place largely during the warmer months of the year. Indeed, the higher car use found during the summer months likely reflects seasonal employment patterns. One of the most

Table 6. Income and journey-to-work travel.

Income (MNT)	First stage journey time: Min (n)		Second stage (bus) journey time: Min (n)	Overall journey time envelope (min)
	Walk	Share-taxi		
<1 million	12 (172)	10 (29)	45 (123)	**55–57**
1–1.5 million	11 (78)	10 (7)	45 (66)	**55–56**
1.5–2 million	9 (35)	20* (2)	41 (28)	**50–70***
>2 million	10 (11)	— (0)	43 (9)	**53**

Note: * Should be treated with caution due to the low response rate.

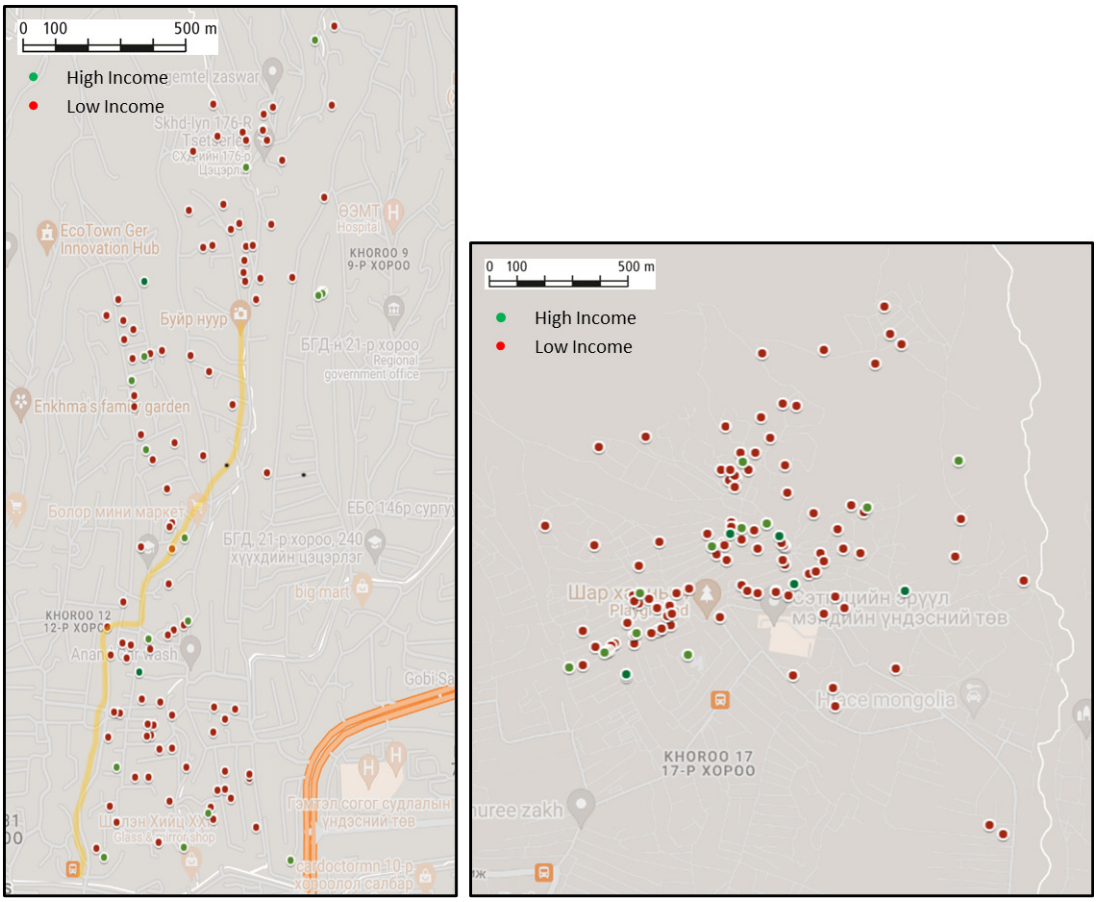

Figure 2. Disposition of low- and high-income households in SKD-31 (left) and BZD-9 (right).

significant differences between commuting by car and by public transport is in the very different journey times between the commutes.

The survey data revealed rather surprising differences between patterns of household car ownership and individual access and actual use for work commutes and other regular travel as illustrated by grocery shopping (Table 7). Just under half of households (47%) surveyed during the two survey campaigns reported that their household owned a car and, within those car-owning households, the greater majority (87%) of survey respondents reported that they had unrestricted access to the vehicle. However, fewer than half of respondents (44%) used the car that they claimed access to for the journey to work—an aggregate figure between the two survey data sets that showed only marginal differences between winter (47%) and summer (42%). The findings appear to support the earlier finding, in relation to Table 4, that a proportion of car owners use public transport for the work commute when there is relatively convenient access to public transport from the home and when transport services stop close to the workplace. In other words, household car ownership and access are not automatic predictors of car use for the journey to work, despite the superior convenience and comfort of the car, particularly during the harsh Mongolian winter. It is possible that specific factors such as congestion and difficulties in finding car parking close to the workplace may also present barriers to car use. However, such factors do not adequately explain the similar shortfall in car use for grocery shopping (53%) for those with unrestricted car access—an aspect of life that usually attracts higher levels of car use for those with access to a vehicle (Handy & Clifton, 2001). Reading across these findings (Table 7), it is more likely that car use is more generally constrained by broader factors such as vehicle operating costs in relation to household income and the utility benefits of using public transport, to read or socialise.

The data presented above in Table 7 provides some grounds for optimism for policymakers looking to constrain future car use in the city. It signals that half of car owners—the majority of whom are higher earners—are prepared to forgo using the car for regular journeys to work and for grocery shopping provided that there are convenient and affordable public transport alternatives. This condition presents very significant policy challenges that will be explored in Section 4 and not least because 82% of all survey respondents agreed that car ownership was important "for improving daily quality of life in Ulaanbaatar." However, existing car owners appeared much more emphatic in their agreement (93%) compared to non-car-owning households (74%). The data from the three study ger districts, therefore, indicates that approximately half of the car-owning households do

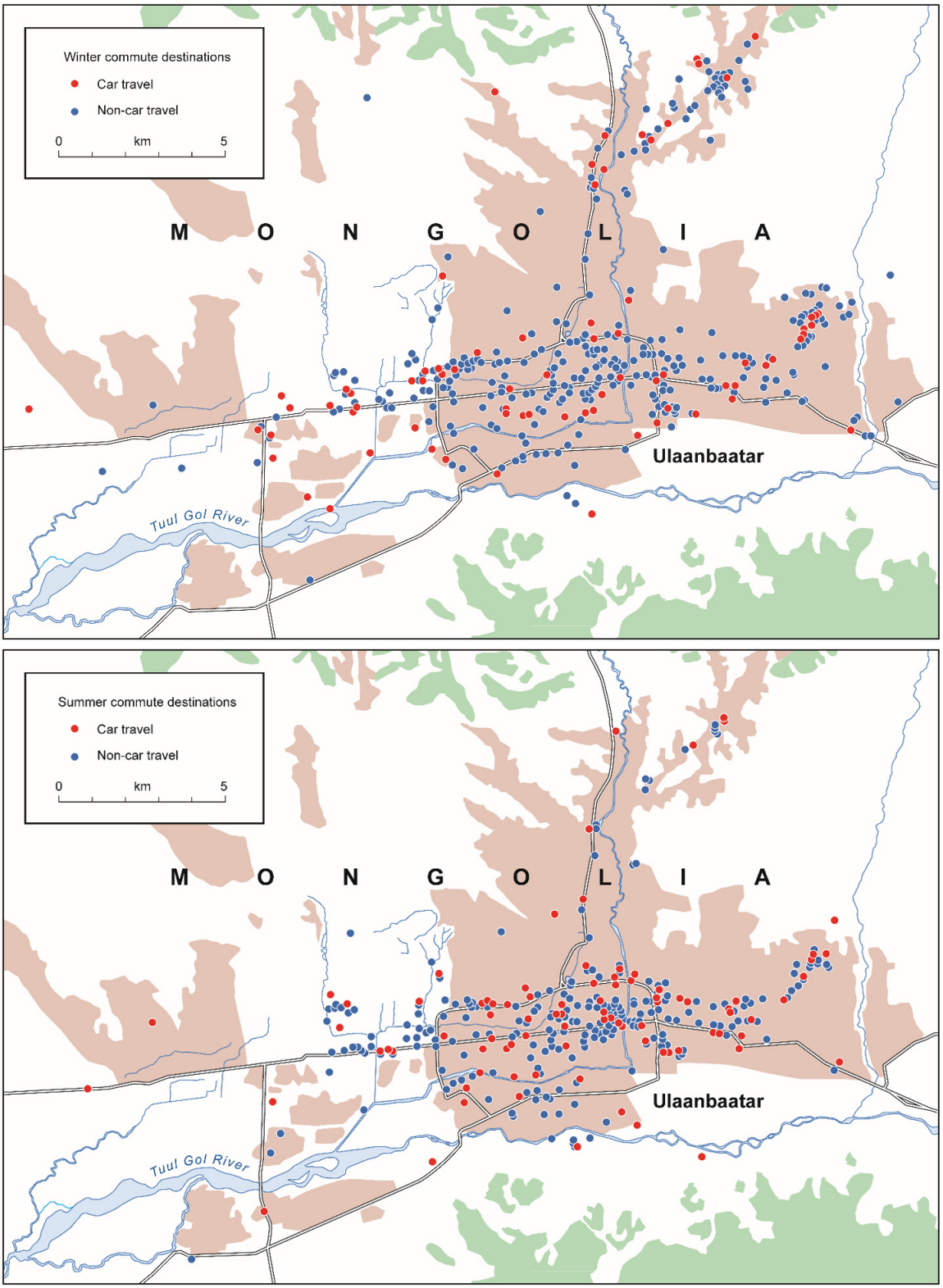

Figure 3. Commuting geography of car users in winter (top) and summer (bottom). Source: Courtesy of Sandra Mather based on author's survey data.

Table 7. Car ownership: Access and use.

Survey sample	Household car ownership	Unrestricted car access for commuting	Car for work commute	Car for grocery shopping
n = 957	47% (*n* = 453)	87% (*n* = 395)	44% (*n* = 174)	53% (*n* = 211)

not use their car for two of the most significant aspects of regular travel within the city and that a substantial minority of residents do not necessarily recognise car ownership as being important for improving their quality of life. These are headline findings that require significant exploration and unpacking to determine; however, they at least show some promise as areas for future policy to limit further rises in motorisation across the city.

4. Concluding Discussion

At the present time, and in common with many cities across the Global South, Ulaanbaatar has a public transport system that is remote for many residents living in the city's peripheral ger districts. The evidence presented earlier in this article shows that the least affluent residents living in the more distant areas of the ger districts experience higher levels of travel disadvantage because of longer walking distances or because of the need to take disproportionately expensive taxis to reach public transport services. Thus, although the city plans to upgrade its strategic public transport network through the introduction of a BRT system, existing proposals show only limited plans to create feeder services into the ger districts. In view of the myriad challenges that creating new transport infrastructure in the ger districts would entail, including terrain, land ownership, urban structure, and the overall scale of these areas in relation to the formally planned city, these limited plans might be considered realistic in terms of achievability. Yet, the plans also mean that residents located in more accessible areas of the ger districts closer to main roads and the transport services carried on them, are likely to experience improved access to the city. As the data shows, these households are likely to be more affluent with the highest levels of car ownership—even if only about half of car owners currently use their vehicle for the work commute. Therefore, although improvements to public transport may encourage more affluent, car-owning residents to keep their vehicles at home during the working week, representing a significant policy success in view of the city's acute air pollution and congestion problems, poorer residents will continue to experience mobility disadvantage that might encourage higher car ownership among non-car owning households as economic uplift and/or available credit allows.

There appears to be both a gap in existing policy and practical action in addressing access and mobility disadvantages among Ulaanbaatar's poorest and geographically peripheral households. To address the final research question regarding measures that could improve access and mobility amongst the most disadvantaged groups, access and mobility at the periphery presents a clear and present problem that needs urgent address if residents are to improve their livelihoods through access to the opportunities of the city, employers are able to access the widest possible labour market and to suppress latent motorisation and automobile use. It is evident from delays to the implementation of the BRT system that have now stretched for a decade, that urban authorities have limited capacity to act—even with the additional resources provided by external bodies such as the Asian Development Bank and the World Bank. Community-led initiatives provide an alternative point of approach, where there are sufficiently well-developed and supportive community networks and community leaders willing to organise activities or support community-led initiatives. Adilbish et al. (2022) demonstrate how citizen-led activities can strengthen social relations within ger district communities in ways that improve community resilience in different dimensions.

There are some examples of access- and mobility-focused "bottom-up" initiatives in Ulaanbaatar. For example, in SKD-31, the "C176" neighbourhood taxi scheme has brought together a number of taxi drivers who have set up a cooperative fund to support drivers in maintaining passenger transport services across the different areas of the district (see Hamiduddin et al., 2021). The cooperative fund effectively subsidises taxi services to outlying areas in order to maintain flat fares that are accessible for low-income households. Another initiative that aims to improve resident access to essential services within the same district focuses on the delivery of domestic solid fuel to households located away from fuel supply depots. This delivery trial follows the recent ban on the use of coal across Ulaanbaatar in a bid to improve air quality, but which also made domestic fuel less accessible to many households because it is available from a smaller number of state-approved distributors and it is retailed in 25 kg sacks that present considerable logistical difficulties to households without access to a car or alternative transport. The clean fuel trial aims to improve cost-effective access to domestic fuel for non-car-owning households by aggregating orders to create cost-effective wintertime delivery runs, using small flatbed vehicles used in the construction industry during the summer months to access areas that larger vehicles would struggle to negotiate. A limited trial conducted in February 2022 delivered 6.4 tons of clean fuel to 87 households over a two-week period and a more extended trial undertaken during the winter of 2022–2023 delivered a further 31 tons of the fuel.

The two examples above illustrate how community-based activities have begun to address critical aspects of ger district access and mobility. However, the further growth of mobility services that provide reliable access to the city's public transport network may be constrained by the existing range of vehicles available and how they are managed by policy managers. A striking feature of Ulaanbaatar in comparison with other middle- and lower-income cities is the rather limited range of vehicles in operation to provide a wide range of different transport services. Ulaanbaatar's transportation system is currently dominated by just two types of vehicles—buses and automobiles—with smaller mickrobuses providing important niche local transport operations in specific

areas of the city. The city transport authority has recently sought to restrict mickrobus operations in order to limit congestion at main city bus stops. However, other Global South cities such as Dar-es-Salaam demonstrate ways to accommodate local feeder services operated by smaller vehicles alongside trunk bus routes, by providing dedicated facilities in close vicinity to bus stops. This approach would help grow mickrobus operations into effective and integrated feeder services for the ger districts, in support of main bus routes. Due consideration could also be given to the operation of smaller, auto-rickshaw-style vehicles that provide ubiquitous demand-responsive transport services across cities of the Global South (Cervero & Golub, 2011; Itokawa, 2020) and that are able to cope with the dirt roads and steep terrain of informal settlement areas. Being relatively inexpensive to operate, they could also be well-suited to the relatively "thin" transport conditions presented by the low-density built form of the ger districts. This approach would be less radical or costly than current plans to build a 6 km cable car line to connect the centre of Ulaanbaatar with Bayankhushuu district ("Are cable cars the future of transport in UB," 2020). Although Ulaanbaatar is well-known for its harsh winter climate, which acts as a major constraint on the utility of certain modes including motorbikes, bikes, and other forms of micromobility during the wintertime, it is worth noting that auto-rickshaw vehicles have operated for a long time in regions such as Kashmir and Ladakh, where winter conditions are comparable.

To conclude, although the private car has not yet come to dominate journeys from ger districts into the centre of Ulaanbaatar, despite relatively high levels of reported household car ownership, this is likely to reflect a combination of factors including chronic road congestion, the lack of available car parking, and the relative cost of motoring. The separation of car ownership from actual car use can be viewed positively in so far as it is the outcome that policymakers globally are attempting to achieve through policies to limit or reduce infrastructure for private car travel, or to increase the cost of motoring. Less positively, Ulaanbaatar's situation also means that any alteration to the current balance of private car infrastructure and cost of motoring is likely simply to result in gridlock but with a greater number of vehicles using the city's roads. Ulaanbaatar's planned BRT and feeder system will undoubtedly help most residents to travel around the city more quickly, but the existing proposals also carry the risk that communities living in peripheral areas away from bus routes and feeder services may experience only marginal benefits and that without the "great leveller" of traffic congestion, the access and mobility gap between core and periphery will widen. Given the scale of Ulaanbaatar's transport challenges and the relative scale of the ger districts in proportion to the city's population, community-led initiatives may provide an important means for connecting residents living on the periphery to the core functions of the city.

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Conflict of Interests

The author declares no conflict of interests.

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