A Household Level Investigation into Personal Chauffeured Automobility

Purnima Kumari Chowdhury

purnimachowdhury@iitkgp.ac.in

Indian Institute of Technology Kharagpur https://orcid.org/0000-0003-4766-0834

Ronita Bardhan

University of Cambridge https://orcid.org/0000-0001-5336-4084

Tarak Nath Mazumder

Indian Institute of Technology Kharagpur

Research Article

Keywords: Personal chauffeur, Mobility behaviour, Cluster analysis, Household archetypes, Qualitative, Global South

Posted Date: March 6th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9002386/v1

Additional Declarations: The authors declare no competing interests.

Abstract

Personal chauffeured automobility is a widespread yet under-researched practice, particularly in cities of the Global South. This study presents the first systematic investigation of personal chauffeured car use and the motivations that sustain it as an everyday mobility practice. Based on semi-structured, in-depth interviews with personal chauffeured car users, the study integrates qualitative thick description with quantitative analysis to explain the need to choose personal chauffeur-driven cars. In total, twenty-eight distinct reasons emerged from open ended responses. Subsequent cluster analysis of these reasons reveals four broad motivational themes shaping personal chauffeured automobility: (i) physical or functional constraints, (ii) utility maximization, (iii) habitual comfort-related motivations, and (iv) habitually assisted mobility practices. These motivations cut across diverse household types, indicating that structurally different households may share similar underlying motivation for relying on chauffeur-driven travel. The analysis reveals that personal chauffeured automobility is strongly shaped by socioeconomic characteristics, including the presence of elderly household members aged above fifty-five years, households with school-going children, very high annual incomes, salaried and self-employed occupations, multiple car ownership, long car ownership duration exceeding 20 years, ownership of high-value cars, and high work-related car trips. Household archetypes developed from these motivational clusters further reveal how life-stage challenges, mobility needs, lived circumstances, habitual practices, lifestyle preferences, and socially embedded norms—shaped by prior generational experiences and social circles—are intertwined with everyday mobility decisions.

1. Introduction

There is ample research in global south on mobility choice of using a car due to the influence of multiple socioeconomic characteristics (Guerra, 2015; Jiang et al., 2017; Ma et al., 2018; Meena et al., 2021; Prabnasak & Taylor, 2009; Raditya et al., 2025; Srinivasan et al., 2007; Verma, 2015; Wu et al., 2020; Wu & Tang, 2019); presence of other competetive modes (Dash et al., 2013; Vasudevan et al., 2021), built environment factors (Ashik et al., 2024; Feng, 2017; Yang et al., 2021); psychological factors (Prawira F. Belgiawan & Schmocker, 2016; Prawira Fajarindra Belgiawan et al., 2017; Kim et al., 2020; Martins et al., 2020; Meena et al., 2021; Moody & Zhao, 2019; Wu & Tang, 2019; Zhao & Zhao, 2020); attitudinal factors (Kim et al., 2020; Verma et al., 2016; Vos & Alemi, 2020; Zhou & Wang, 2019). Despite wide research on private car use, there is no study capturing the behaviour of two categories of car owners in the Global South: (a) self-drivers and (b) owners who rely on a personal chauffeur. None of the disaggregate choice models on car use and ownership has taken into consideration that the two car owners may or may not have different behaviour.

1.1 Research Gap and motivation of the study

Personal chauffeured automobility refers to a mobility choice in which car-owning households employ a personal chauffeur to drive the car for household members. It is a very common mobility behaviour in the Global South. This mobility choice is largely absent in the Global North. In India, car owners across

diverse income groups employ personal chauffeurs (PC) at monthly salaries ranging from INR 8,000 to INR 15,000 (87USD – 163USD) depending on daily trip frequency, vehicle kilometres travelled, and additional services provided to the household. Far from being a rigid arrangement, chauffeur use is often fluid—households may hire drivers temporarily or share them within familial or neighbourhood networks. In many cases, the decision to employ a chauffeur is not incidental but integrated into the initial vehicle purchase, with households factoring in the recurring cost as part of car ownership itself.

Despite its visibility on the streets, this form of mobility remains statistically invisible. There is no systematic dataset capturing how many car-owning households rely on personal chauffeurs in India or across the Global South. Household travel surveys are scarce, and even where they exist, they overlook this practice. Administrative data—such as vehicle registration or insurance records—also fail to capture chauffeur employment. Parking systems do not distinguish between self-driven and chauffeur-driven cars, leaving the daily volume of such cars unrecorded. Nor do government systems track personal chauffeurs operating private cars, resulting in a lack of even basic information on their age, driving experience, or earnings. While many cab and taxi drivers are linked to unions or platform operators that maintain structured records, personal chauffeurs operate largely outside such systems. Their employment is typically informal, arranged through personal networks and referrals, making them effectively invisible in official data. Even in systems where such data could be captured—like digital traffic fines or toll payments—no information is recorded on whether a car is self-driven or chauffeur-driven. As a result, the scale and characteristics of household-level chauffeured car use remain largely undocumented in India.

There is a clear need to study personal chauffeured automobility, as it remains an overlooked yet significant form of car use that limits our understanding of everyday mobility behaviour. Existing research and disaggregate choice models often assume car users as a homogeneous group, overlooking such distinct practices and thereby simplifying reality. Recognising this form of automobility is crucial to capture behavioural diversity more accurately. It also has important implications for emission studies, as different user groups generate varying levels of vehicle kilometres travelled. Without accounting for these differences, policy interventions risk being misdirected. Studying this phenomenon is therefore necessary to develop more realistic models and design targeted, evidence-based transport and environmental policies.

This study is the first to systematically address this gap, drawing on semi-structured interviews with 126 users to uncover both the motivations behind chauffeured automobility and the profiles of those who adopt it. It is guided by the following research questions:

1. Why do car owners choose to rely on a personal chauffeur to access their own vehicles?
2. Which socioeconomic and household characteristics distinguish those who adopt chauffeured automobility?
3. What behavioural patterns and lived circumstances characterize households that choose chauffeured automobility?

This study combines qualitative depth with quantitative rigour to uncover why households rely on personal chauffeurs. Semi-structured interviews with car-owning households in Patna first captured a wide range of motivations through open-ended responses, alongside detailed socioeconomic data. Cluster analysis was then used to identify dominant motivation patterns and distinct household types separately. These clusters were further interpreted using over-representation analysis to highlight defining characteristics. Finally, both strands were integrated and enriched with qualitative insights to construct household archetypes, offering a clear, behaviourally grounded explanation of how lived realities shape the choice of chauffeured automobility.

The study is structured as follows: Section 2 reviews the literature on how to approach studies where there are no prior work and the importance of developing archetypes in understanding underexplored behaviours. Section 3 presents the study area and data used in the study. Section 4 presents the analysis approach in the study. Section 5 presents the analysis and the results obtained. Finally, Section 6 offers discussion, conclusions, and lastly future scope of work is presented in Section 7.

2. Theoretical foundation

2.1 Pragmatic approach to producing in depth behavioural insights

In the absence of both a strong theoretical foundation and prior empirical evidence on personal chauffeured automobility, —it is necessary to first undertake exploratory research capable of generating insights sufficient for hypothesis development. In such under-researched contexts, a pragmatic research design is essential to uncover patterns and build an initial evidence base (Evans et al., 2011). A pragmatic approach combines qualitative and quantitative methods in sequence, enabling a richer and more comprehensive understanding of complex, underexplored phenomena (Bryman, 2012c; Creswell, 2013). This approach is referred to as mixed-method (Creswell & Clark, 2018). Despite its advantages, its application in transport-related studies is still scarce. Few examples are: ((Jason) Cao et al., 2019; Clark et al., 2016; Heinonen et al., 2021; Hopkins et al., 2021; Jiron & Carrasco, 2020; Tiznado-Aitken et al., 2020).

A mixed-methods study in Greece illustrates this well: survey data (≈ 375 respondents per city) quantified mode-specific differences in travel satisfaction, while 14 qualitative interviews explained these patterns by revealing how public transport limitations and urban conditions shape lived travel experiences (Mouratidis et al., 2023). To fill the gaps in studies on behavioural drivers of car ownership, mixed-methods approaches have proven particularly effective in generating deeper insights. For instance, a study in Iceland used qualitative data to reveal psychosocial factors—such as social norms, status associated with cars, and stigma around public transport—embedded in Reykjavík's urban context, while the logistic regression tested how factors like residential location, socio-demographics, attitudes, and preferences shape ownership decisions (Heinonen et al., 2021). Together, the methods revealed residential self-selection, a phenomenon difficult to isolate through quantitative analysis alone.

Another study (König & Dreßler, 2021) demonstrates the strength of mixed-methods in capturing complex behavioural change. By combining 301 quantitative data with 15 qualitative insights, it was possible to track measurable shifts in mobility patterns in Northern Germany while also uncovering how individuals experienced and adapted to these changes during COVID-19. In another study, (Næss, 2020) demonstrates that incorporating qualitative insights helps avoid common quantitative pitfalls such as model misspecification by informing the selection and causal ordering of control variables.

A study in Concepción, Chile shows how combining quantitative and qualitative data can uncover the complex, context-dependent nature of everyday mobility strategies (Jiron & Carrasco, 2020). By capturing both measurable patterns and the underlying social and spatial dynamics, this approach reveals how travel decisions are shaped by overlapping factors—offering a far more nuanced understanding than single-method studies. (Tiznado-Aitken et al., 2020) also adopted mixed-methods research in Santiago de Chile that demonstrates how integrating qualitative travel experiences with quantitative accessibility indicators reveals dimensions of public transport accessibility that are overlooked in studies with purely quantitative analyses. Previous study by (Clark et al., 2016) used a mixed-methods approach to examine car aspirations among adolescents in New Zealand, based on data from 184 households to provide a causal explanation of changes in household car ownership over time. In another case, where socio-cultural background and built environment factors were examined to explain automobility in households with older adults, both qualitative and quantitative data were used. It proved helpful in understanding how the social and cultural contexts impact the travel patterns of older Chinese adults (Feng, 2017).

Overall, the literature shows that mixed-methods approaches are particularly powerful for studying everyday mobility strategies shaped by lived experiences and real-life circumstances. They allow researchers to move beyond what people *do* in travel behaviour to understand *why* they do it—capturing shifts in travel preferences driven by past experiences, and revealing how social norms, identity, and status influence mobility choices. As a result, mixed methods provide a richer, more grounded understanding of mobility behaviour—particularly in emerging research areas where purely model-driven studies may overlook important social and contextual realities.

2.2 Importance of creating archetypes in understanding underexplored behaviours

While socioeconomic context remains a relevant factor, an overreliance on such variables may obscure deeper motivations, values, and lived experiences that shape everyday decision-making. As several studies have demonstrated, transport behaviours are intricately embedded in daily life activities, lifestyle preferences, and routine participation in social and economic spheres (Acker et al., 2014; Acker & Witlox, 2010; Kitamura, 2009; Pas & Koppelman, 1986; Van Acker, 2015, 2017; Van Acker et al., 2016). Daily life experiences, therefore, provide a more powerful lens for understanding behaviour and habits, as they capture the routines, preferences, and choices enacted in lived contexts. Such an approach offers

dynamic, grounded insights into how individuals interact with environments, revealing dimensions of mobility behaviour that remain invisible in static socioeconomic analyses.

To better capture behavioural heterogeneity, archetypes have emerged as a valuable analytical approach in qualitative transport research. Archetypes facilitate the identification of recurring behavioural profiles that transcend socioeconomic categories, enabling systematic analysis of how and why specific mobility choices are made. Archetype classification supports the examination of culturally embedded practices by synthesising repeated behavioural patterns across heterogeneous user groups (J.Arnould & L.Price, 2000). Rooted in the concept of *ideal type* (Weber, 1904), archetypes enable researchers to interpret complex social phenomena through systematic comparison of cases or participants within qualitative datasets. This approach facilitates the identification of behavioural clusters, supporting deeper analysis of variation and comparability across household decision-making contexts. Archetype formation has also been shown to capture multiple layers of implicit and often unconscious behaviour at both individual and group levels (Sietz et al., 2019).

Prior research has widely applied archetype-based approaches to capture behavioural heterogeneity across different domains. For instance (Ben & Steemers, 2018; Ortiz & Bluyssen, 2019) employed household archetypes to examine occupant comfort and adaptive behaviours in residential buildings in the Netherlands, while (Heinrich et al., 2022) developed seven behavioural archetypes to explain patterns of domestic energy use in the UK, demonstrating how lifestyle and value orientations shape energy-related choices. Beyond household behaviour, archetype analysis has been used to identify recurring business model configurations in the connected car sector (Sterk et al., 2024). In the transport planning domain, (Navarro-Ligero & Valenzuela-Montes, 2022) developed scenario-based archetypes to analyse the evolving planning logic of Granada's Light Rail Transit (LRT) system. Drawing on survey data and planning documents, their study illustrates how archetypes can function as strategic analytical frameworks for interpreting institutional preferences and supporting integrated transport and urban development planning. Other research emphasises the value of everyday mobility narratives and anecdotal evidence in capturing the lived realities of travel behaviour that are often obscured by highly aggregated analytical approaches. By foregrounding users' perspectives on travel mode choice, such methods provide rich behavioural insights that may be overlooked in expert-driven or purely quantitative assessments of sustainable mobility (von Schönfeld et al., 2020).

A comparative study of thirty cities across Europe, Asia, Africa, and the Americas employed archetypes to classify transport solutions addressing common urban mobility challenges, thereby providing a structured framework for interpreting global transport systems (Thomson, 1977). Building on this foundation, (McIntosh et al., 2014) extended Thomson's typology by classifying 26 additional global cities using the same five archetypes. Using household travel survey data from Minneapolis, (Charleux, 2017) developed mobility archetypes to uncover latent patterns in travel mode choice, trip purpose, and daily mobility rhythms that remained obscured in conventional aggregate analyses. Through the application of clustering techniques and systematic archetype characterization, the study demonstrated how archetype-based analysis can capture heterogeneity in lived travel experiences across demographic

groups, offering a more human-centered interpretation of urban mobility. These contributions highlight the analytical potential of archetype formation for revealing behavioural diversity beyond standard quantitative representations.

Thus, we can see that archetype-based analysis offers several advantages for studying underexplored mobility behaviours. First, it enables the systematic identification of *behavioural heterogeneity* that extends beyond conventional socioeconomic classifications, allowing researchers to examine how and why mobility choices are made across diverse household contexts. Second, by synthesising recurring thick descriptions or original narratives of the respondents about any behaviour, archetypes help reveal culturally embedded, habitual, and often implicit decision-making processes that are typically obscured in highly aggregated or purely quantitative analyses.

3. Data

3.1 Case Study area: Patna, India

The study was conducted in the urban area of Patna, the capital of Bihar, which offers a compelling context for examining personal chauffeured car use. Over the past decade, the city has witnessed rapid growth in private motorisation, with car ownership rising from about 50 cars per 1,000 people in 2011 and projected to exceed 125 per 1,000 by 2025 (Ghate & Sundar, 2014).This growth has unfolded alongside an urban transport system that remains limited in scope and efficiency. With inadequate bus services and the absence of mass rapid transit options such as metro rail or BRT systems, households increasingly rely on private cars to meet their mobility needs (Tiwari & Sharma, 2016). This dependence is further intensified by structural constraints within the city. Road infrastructure covers only 5.9% of the urban land area, and most major corridors have right-of-way widths of less than 30 metres. Volume-to-capacity ratios on arterial roads frequently exceed one, reflecting persistent congestion and travel delays (CMP, 2009). Encroachments and widespread on-street parking further reduce the effective capacity of already constrained roads. In such a dense and infrastructure-limited urban environment, where viable alternatives to car use are scarce, everyday mobility decisions take on deeper social and practical significance. Patna therefore provides a particularly insightful setting to explore why households not only own cars but also continue to rely on personal chauffeurs.

3.2 Data collection approach

To achieve the research questions (See section 1.1), the first author conducted in-depth semi-structured interviews (Bryman, 2012b; Creswell, 2013; Creswell & Clark, 2018) with a purposively selected sample (Ahmad & Wilkins, 2025; Marshall, 1996) of car owners who are dependent on a personal chauffeur. The interview format typically comprised collection of socioeconomic data and open-ended questions designed to encourage interviewees to speak broadly about and around the need of a personal chauffeur, thereby allowing new ideas and insights to emerge that the researcher might not have otherwise anticipated.

A pilot study involving fifty car users was conducted prior to the main interviews to gain preliminary insights into the motivations for employing a personal chauffeur (PC). Insights from the pilot study revealed a key practical challenge: it was difficult to identify in advance which households actually employed PC. Consequently, participant recruitment was primarily undertaken in public and semi-public urban spaces where car users are more readily accessible, such as commercial areas, parking facilities, and other activity hubs. Participants were approached in on-street and off-street parking areas, near commercial establishments, educational institutions, healthcare facilities, fuel stations, and, in some cases, adjacent residential areas. This strategy helped minimise location-specific bias and facilitated access to a diverse cross-section of PC car users. All participants were approached directly by the first author of this study, the purpose of the study was clearly explained, and informed consent was obtained prior to audio recording. Interviews were conducted in Hindi which typically continued around 40 minutes, with some extending up to one hour.

The semi-structured interview consisted of two main sections. The first section collected quantitative data on the socioeconomic characteristics of PC car households. The second section comprised qualitative questions that explored the reasons prompting dependence on a PC, underlying motivations, and the perceived advantages of employing a driver.

3.2.1 Data collection: Quantitative data

The semi-structured interview captures detailed household-level socioeconomic characteristics, including age distribution, household composition, the presence of children and elderly members, the number of earning members, occupational profiles, and income categories. In addition, vehicle-related information was collected on car ownership levels, vehicle typology, and the price range of vehicles that households are currently able to afford. The study also records driving license ownership among household members, distinguishing between active and inactive license holders. Finally, travel behaviour data document trip-making patterns across modes, identifying trips undertaken using personal cars as well as those specifically assisted by a personal chauffeur. Description of the data is presented in Table 2.

3.2.2 Data collection: Open-ended questions

Emphasis was given to directing the participants to share their lived experiences or cite daily life incidents or a major incident that is associated with the need to rely on a personal chauffeur. The interview included questions like the following: “What is the use of the car in the household?” and “What was the main reason for depending on a full-time chauffeur? Did any specific change in your life trigger the need of a driver?” These were instrumental in capturing if any life course event influenced the role of car and driver within the household. Moreover, inquiries about “mobility needs” and “travel routines” such as “which of the trips within the households are carried out by a personal car with a driver?” were also done. It offers a broad view of how the presence of a driver fits into their daily life mobility requirements. Intergenerational continuities were also probed with questions like: “Did your parents or previous generations employ drivers?”.

3.3 Determination of sample size in carrying out interviews

Theoretical saturation is the yardstick for determining sample size in the case of interviews (Charmaz, 2006; Glaser & Strauss, 1967). Saturation refers to the point at which additional interviews no longer yield new information about the phenomenon under investigation and hence, carrying out more interviews with households needs to stop. Conducting interviews beyond this point risks unnecessarily expanding the dataset, thereby complicating theme or pattern identification (Bryant & Charmaz, 2007; Bryman, 2012a; Morse, 2007). Determining when saturation has been achieved, remains challenging (Guest et al., 2006; Malterud et al., 2016). Several strategies have been proposed to assess saturation (Hennink & Kaiser, 2022). In this study, a code frequency count approach was adopted, indicating that the reasons for relying on a personal chauffeur in Indian households were sufficiently comprehensive and that no new reasons or motivation emerged from subsequent interviews.

4. Methodology

4.1 Analysis approach

The study adopts a sequential mixed-methods approach to answer the central research question: *why do car users need a personal chauffeur.* In the first step, interview transcripts were transcribed daily in parallel with the field visits. Excel spreadsheet was maintained in which all reasons reported by each respondent were systematically listed by the first author. Respondents were not provided with a predefined list of reasons; instead, they articulated their motivations in their own language from their own lived realities. Emerging reasons were registered and reviewed daily at the end of the day. For instance, if a respondent stated that commuting becomes less stressful when travel is managed by a personal chauffeur (along with their broader lived experience explanation), this reason was recorded in the Excel sheet as R1 and coded as 1. If another respondent did not report this reason, it was coded as 0. This helped to determine whether any new reasons had emerged if yes then a new column would be added. In this way the entire spreadsheet was coded in binary based on which Table 1 was prepared. After the ninth interview, no new reasons were identified for a prolonged period; a new reason was recorded only during the seventy-third interview. Data collection was nonetheless continued for an additional 53 interviews to ensure robustness. As no further new reasons emerged during this phase, we stopped the interviews at 126 sample size.

As reasons were coded line by line from the transcripts each day, recurrent patterns began to emerge (Bryant & Charmaz, 2007). To further explore these patterns, we conducted a cluster analysis (Wagschal, 2016) – an unsupervised machine learning technique for classification on the reasons mined from the open ended responses. Cluster analysis was performed in Python. The analysis was performed in Python and helped reveal underlying themes and relationships among them, allowing individual reasons to be grouped into broader motivational themes. The aim was to identify dominant thematic constellations that explain why car users perceive a need for a personal chauffeur and what discourages them from self-driving. Figure 1 shows the methodological framework.

In the next step, we conducted a second cluster analysis at the household level. While the reasons were coded every day. All the interviewed households were given a nomenclature too. This analysis resulted in distinct household clusters that shared common motivational profiles for employing a personal chauffeur. In the subsequent step, we assessed the statistical robustness of the identified clusters. We conducted chi-square tests to examine whether significant differences existed between clusters across categorical variables, thereby confirming that the observed groupings were not due to random variation. We then applied hypergeometric p-value estimation to identify socioeconomic characteristics that were overrepresented within each cluster. The study uses a one-sided test in which a threshold of significance was determined at ($p \leq 0.05$) for both over-representation and under-representation. Finally, we developed household archetypes by integrating insights from the motivation (reason) clusters and household characteristics with thick qualitative descriptions. It was a triangulation process. We moved back and forth between the interview transcripts, the motivation (reason) clusters, and the prominent household characteristics to observe a coherent household profile. This profile helped explain why certain reason clusters appeared as they did, providing a grounded interpretation of why households choose to rely on a personal chauffeur.

5. Analysis and Results

5.1 Reasons for choosing personal chauffeured automobility

A total of twenty-eight distinct reasons for employing a personal chauffeur emerged from the semi-structured interviews (Table 1). Overall, the distribution of responses indicates that employing a personal chauffeur is primarily driven by stress reduction, travel management, and household time coordination, while safety concerns, gendered mobility roles, and structural constraints play secondary but reinforcing roles in shaping this reliance. The high prevalence of reasons related to operational ease and professional driving suggests that households view the chauffeur as an extension of their mobility system rather than merely a driver. At the same time, mid- and lower-frequency reasons reveal how this practice is embedded within broader household dynamics, including division of responsibilities, activity patterns, and occasional situational needs. Together, these patterns highlight that reliance on a personal chauffeur is shaped by a combination of everyday mobility management and context-specific household circumstances. While several reasons may appear similar at first glance, they were expressed in different contextual settings and reflected distinct lived experiences and decision-making logics. Therefore, documenting the full range of articulated reasons was considered essential to preserve contextual nuance.

Table 1
List of reasons behind the need for a personal chauffeur

Code	Reason	% of Households
R1	Commuting becomes less stressful when travel is managed by a personal chauffeur	88.10%
R2	Vehicle maintenance and upkeep are better managed by professionally trained chauffeurs with superior technical knowledge	79.40%
R3	Chauffeurs provide reliable, continuous assistance with household errands and light chores	69.80%
R4	Chauffeurs possess professional driving expertise, including better knowledge of traffic rules, road hierarchies, and informal driving practices	65.90%
R5	Chained trips are executed more efficiently when a chauffeur manages the vehicle between activities	60.30%
R6	Household time constraints make delegating driving responsibilities to a chauffeur more practical	46.80%
R7	Parking search and cruising in areas with limited parking supply are more effectively handled by chauffeurs	45.20%
R8	Female household members lack driving skills, making reliance on a chauffeur more practical	42.10%
R9	Driving after dark is perceived as uncomfortable and is therefore delegated to a personal chauffeur	42.10%
R10	Frequent long-distance or inter-district travel is more manageable when driving is handled by a chauffeur	31.00%
R11	Male household members show limited preference for driving and delegate this task to a chauffeur	30.20%
R12	Lack of confidence in self-driving leads households to rely on chauffeurs	30.20%
R13	Concerns about aggressive and rash driving behaviour are mitigated when a professional chauffeur is driving	30.20%
R14	Male worker in the household has to access the chain of work locations	27.00%
R15	Multiple simultaneous activities can be coordinated through chauffeur-managed vehicle use without owning multiple cars	23.80%
R16	Waiting time outside activity locations is reduced when a chauffeur manages vehicle movements	23.80%
R17	Escorting children to school and extracurricular activities is more dependable with a chauffeur	22.20%
R18	Male household members lack driving skills, increasing dependence on chauffeurs	22.20%

Code	Reason	% of Households
R19	Irregular work schedules and unexpected travel demands are more easily accommodated by a chauffeur	22.20%
R20	Female household members show low preference for driving and delegate driving to a chauffeur	19.80%
R21	Frequent phone calls, and texting basically need to stay connected online, making it difficult for members to focus on self-driving	19.00%
R22	Chauffeurs provide practical support for learning driving skills and vehicle maintenance	15.90%
R23	Medical-related trips are handled more smoothly when a chauffeur assists ill or elderly household members	13.50%
R24	Driver was kept due to residential location and built environment factors that hindered easy car use	10.30%
R25	Travel during odd hours or to less crowded locations feels safer when accompanied by a chauffeur	10.30%
R26	Limited mobility among household members necessitates dependable driving assistance from a chauffeur	10.30%
R27	Household members reside in geographically disadvantaged areas where there is a lack of suitable modes of travel	6.30%
R28	Temporary inability to self-drive following an accident makes chauffeur assistance essential	2.40%

5.2 Cluster Analysis of Reasons for Choosing Personal Chauffeured Automobility

To understand the broader motivations underlying personal chauffeured automobility, hierarchical clustering techniques were employed to move beyond analysing individual reasons in isolation and to reveal latent motivation. Each household representative articulated multiple reasons relevant to their decision, indicating that chauffeur reliance is shaped by a combination of factors rather than a single dominant motive. A preliminary review of the responses suggested that, despite variation at the individual level, there were clear thematic commonalities across households. The hierarchical clustering results reveal two broad motivational stems, which are further subdivided into distinct clusters labelled A, B, C, and D and differentiated by colour as shown in Fig. 2.

The reasons were grouped into mutually exclusive clusters, with each reason assigned to only one cluster to maintain thematic clarity. However, individual households often reported reasons spanning multiple clusters, indicating that multiple motivations can simultaneously shape the decision to rely on a personal chauffeur. The dendrograms display these groupings, with each cluster labelled to reflect its

dominant underlying theme and overall motivational logic. Each cluster presents a distinct motivation, based on which they are given labels described below.

a. Cluster 1 reasons: Physical or Functional Constraint-related reasons.

This motivational category reflects situations in which reliance on a personal chauffeur emerges from constraints that limit the feasibility of self-driving. Such constraints may be physical, health-related, age-related, or situational in nature. In these contexts, chauffeur assistance enables households to sustain everyday mobility, maintain autonomy in daily activities, and navigate travel demands that would otherwise be difficult to manage independently.
b. Cluster 2 reasons: Utility Maximization related reasons

It reflects a motivation to streamline everyday travel by delegating driving tasks in order to save time, reduce cognitive and physical effort, and maintain flexibility in the face of complex and unpredictable daily schedules. Households in this category value the reliability and readiness offered by a personal chauffeur, which allows them to coordinate multiple activities, respond quickly to changing travel demands, and sustain high levels of productivity without being constrained by the demands of self-driving.
c. Cluster 3 reasons: Habitually comfort-related reasons

The combination of the reasons in Cluster C reflects the role of habitual comfort and emotional ease in motivating households to employ a driver. This cluster signifies how households prioritise a relaxed commuting experience while factoring in the influence of long-standing habits, cultural norms, and prior exposure to driver assistance.
d. Cluster 4 reasons: Habitually Assisted related reasons

The clustered reasons emphasise the role of deeply ingrained habits, practical reliance, and a seamless lifestyle enabled by personal chauffeur use. This cluster of reasons reveals how individual incidents or isolated conveniences do not solely drive the decision to employ a driver but are instead shaped by routine reliance on external assistance for transportation, managing logistical challenges.

5.3 Socioeconomic characteristics of the households that choose personal chauffeur automobility

Table 2
Descriptive statistics of interviewed households and their characteristics

1	Household Characteristics	Count (Total N = 126)	Percent
	Household Size		
	Less than three	26	20%
	Three-four	54	42%
	More than five	46	37%
2	Households with school-going children	64	52%
3	Male elderly above 55 years old	72	57%
4	Female elderly above 55 years old	47	37%
5	Households with the elderly above 55 years	80	64%
6	Households with economically active above 55 years	48	38%
7	Household With Immobile Members	48	40%
8	Household annual income[1]		
	Medium	11	8%
	High	28	22%
	Very high	87	69%
9	Number of Earning Members		
	Single	45	36%
	Dual	59	47%
	Multiple	14	11%
	Pensioner	8	6%
10	Female earners	43	34%
11	Occupation Type categories:		
	Salaried	42	33%
	Self-employed	69	55%
	Salaried and self-employed both	6	5%
	Pensioner only	9	7%
12	Driving license male	115	92%

1	Household Characteristics	Count (Total N = 126)	Percent
	Household Size		
13	Driving license female	37	36%
14	Number of cars categories:		
	One car	76	60%
	Two car	43	34%
	More than two cars	7	6%
15	Duration of car ownership:		
	Less than 5 years	13	10%
	6 to 10 years	33	26%
	11 to 15 years	19	15%
	16 to 20years	21	17%
	More than 20 years	40	32%
16	Price of car categories:		
	Less than 5 lakhs	12	9%
	5 to 10 lakhs	66	52%
	10 to 15 lakhs	37	29%
	15 to 25 lakhs	6	5%
	Above 25 lakhs	5	4%
17	Car variant categories:		
	Hatchback only	57	45%
	Sedan only	4	3%
	Sports Utility Vehicle (SUV) only	10	8%
	Multi-utility vehicle (MUV) only	2	1%
	Luxury only (above 9 million)	1	1%
	Multiple variants (two SUV + SUV+ Luxury, SUV + MUV, SUV+ hatchback)	52	41%
18	Distance to school:		
	Less than 5 km	17	13%

1	Household Characteristics	Count (Total N = 126)	Percent
	Household Size		
	6 to 10 km	34	27%
	More than 10 km	15	12%
	Household with no school-going children	61	48%
19	Household with school trips by car	64	51%
20	Household with organized leisure activities by car	34	27%
21	Household with work trips by car	99	78%

[1] Medium Income = INR 2,73,000 - 8,46,000; High Income= INR 8,46,000 - 15,00,000; Very High Income= INR 15,00,000 above. The classification is based on the world bank income group classification for low-income countries.

5.4 Cluster analysis of the households that choose personal chauffeur automobility

Cluster analysis of households is presented Fig. 2. The hierarchical dendrogram reveals two broad stems, labelled Cluster X and Cluster Y, based on the primary cut indicated by the dotted line. The dotted line is manually drawn to indicate the cut-off points in the dendrogram, highlighting the two main groups formed by the clustering. For analytical clarity, Cluster X is further subdivided into two sub-groups, labelled Clusters AB and C. The AB branch is then disaggregated into Cluster A, which is further refined into sub-clusters A1 and A2. At a deeper level of the hierarchy, Cluster A2 is additionally subdivided (A2' and A2"), capturing finer distinctions in household profiles. Cluster Y is seen as a single cluster and labelled Cluster D. The findings indicate that reliance on personal chauffeured automobility spans a wide range of household types. Since we had given nomenclature to each sample when the interviews were done, we were able to capture what typologies of households are present in each cluster.

Table 3
Description of household clusters that choose driver assistance

No.	Household Characteristics	Cluster A			Cluster B	Cluster C	Cluster D
		A1	A2'	A2"			
		(N = 19)	(N = 21)	(N = 20)	(N = 21)	(N = 32)	(N = 13)
1	Household Size						
	Less than three	47%	5%	5%	10%	34%	15%
	Three-four	21%	57%	50%	48%	28%	69%
	Five or more	32%	38%	45%	43%	38%	15%
2	Households with school-going children	42%	71%	50%	67%	38%	42%
3	Male elderly above 55 years old	74%	43%	70%	38%	21%	46%
4	Female elderly above 55 years old	63%	33%	40%	29%	41%	8%
5	Households with the elderly above 55 years	37%	52%	65%	52%	72%	42%
6	Households with economically active individuals above 55 years	42%	43%	40%	71%	34%	25%
7	Household With Immobile Members	63%	24%	35%	48%	44%	23%
8	Household annual income[2]						
	Medium	11%	0%	5%	10%	9%	23%
	High	21%	5%	5%	24%	38%	38%
	Very high	68%	95%	90%	67%	53%	38%
9	Number of Earning Members						
	Single	32%	48%	45%	14%	31%	8%
	Dual	53%	38%	40%	62%	50%	31%
	Multiple	0%	14%	15%	24%	6%	54%
	Pensioner	16%	0%	0%	0%	13%	8%
10	Female earners	47%%	10%	10%	47%	28%	15%

No.	Household Characteristics	Cluster A			Cluster B	Cluster C	Cluster D
		A1	A2'	A2"			
11	Occupation Type						
	Salaried	37%	5%	25%	14%	20%	46%
	Self-employed	47%	95%	65%	76%	19%	38%
	Salaried and self-employed both	0%	0%	5%	10%	6%	8%
	Pensioner	16%	0%	5%	0%	13%	8%
12	Driving license male	89%	10%	95%	95%	53%	38%
13	Driving license female	42%	10	10%	52%	9%	23%
14	Number of cars						
	One	53%	33%	65%	48%	84%	77%
	Two	42%	57%	35%	43%	16%	15%
	More than two	5%	10%	0%	14%	0%	8%
15	Duration of car ownership						
	0 to 5 years	0%	10%	5%	5%	22%	15%
	6 to 10 years	16%	10%	10%	24%	44%	54%
	11 to 15 years	21%	10%	25%	5%	16%	15%
	16to 20years	21%	19%	20%	29%	9%	0%
	More than 20 years	42%	52%	40%	38%	9%	15%
16	Price of the car						
	Less than five lakhs	5%	0%	0%	14%	16%	38%
	5 to 10 lakhs	68%	33%	55%	29%	63%	62%
	10 to 15 lakhs	26%	48%	30%	43%	19%	0%
	15 to 25 lakhs	0%	10	0%	5%	3%	0%
	Above 25 lakhs	0%	0%	15%	10%	0%	0%
17	Car variant						
	Hatchback only	53%	19%	35%	24%	66%	75%
	Sedan only	0%	0%	0%	10%	6%	0%

No.	Household Characteristics	Cluster A			Cluster B	Cluster C	Cluster D
		A1	A2'	A2"			
	Sports Utility Vehicle (SUV) only	0%	10%	15%	5%	13%	0%
	Multi-utility vehicle (MUV) only	5%	5%	0%	0%	0%	0%
	Luxury only (above 9 million)	0%	0%	5%	0%	0%	0%
	Multiple variants (Two hatchbacks, Hatchback + SUV, Two SUVs, SUV + MUV etc)	42%	67%	45%	62%	16%	23%
18	Distance to school						
	Less than 5 km	26%	24%	5%	19%	0%	23%
	6 to 10 km	11%	38%	40%	29%	25%	15%
	More than 10 km	5%	14%	5%	24%	13%	8%
	No school-going children	58%	29%	50%	29%	63%	58%
19	School trips by car	42%	71%	50%	71%	38%	46%
20	Organised leisure activity trips by car	0%	48%	25%	52%	19%	15%
21	Work trips by car	47%	86%	95%	90%	63%	85%
22	Presence of a two-wheeler	84%	71%	90%	90%	96%	92%

[2] Medium Income = INR 2,73,000 - 8,46,000; High Income= INR 8,46,000 - 15,00,000 ; Very High Income= INR 15,00,000 above. The classification is based on the world bank income group classification for low income countries.

Table 4
Description of different household typologies under each cluster

Cluster	Dominant Household Types	Household Composition Breakdown (%) *This is same nomenclature which is elaborated in third paragraph of section 4.1*	Key Characterization
Cluster A1	Predominantly elderly households	• Older adults living alone without dependents: **47%** • Multigenerational families: **38%** • Older adults (late 50s) living with young adults: **16%**	Strongly age-driven household dominated by elderly residents
Cluster A2'	Mid-life stage households	• Parents (early/late 40s) with school-going children: **38%** • Multigenerational families: **29%** • Older adults (late 50s) with young adults: **19%** • Late 40s households with school-going members: **14%**	Households managing overlapping caregiving and multiple mobility patterns
Cluster A2"	Multigenerational households	• Multigenerational families with school-going and non-school-going children: **44%** • Elderly living with young adults: **33%** • Parents (late 40s) with adolescents eligible for driving license: **11%** • Parents (early 40s) with school-going children: **11%**	Well- off complex household structures with diverse and overlapping mobility needs
Cluster B	Mid-life and multigenerational households	• Couples (late 40s) with adolescent children: **38%** • Multigenerational families: **38%** • Young couples without children: **10%**	Transitional households balancing adolescent and intergenerational mobility
Cluster C	Predominantly ageing households	• Elderly living with young adults (20s): **31%** • Elderly couples / widowed individuals living alone: **22%**	Ageing households with varying degrees of intergenerational co-residence

Cluster	Dominant Household Types	Household Composition Breakdown (%) *This is same nomenclature which is elaborated in third paragraph of section 4.1*	Key Characterization
		• Multigenerational families: **13%** • Young couples without children: **9%**	
Cluster D	Elderly–young adult co-residence	• Older adults living with at least one young adult: **54%** • Young couples with children under age 10 years: **31%** • Elderly couples living alone: **15%**	Mixed-age households combining ageing and early family-stage needs

The Table 4 suggests that households with very different demographic compositions are grouped within the same clusters, indicating that the need for a personal chauffeur is not driven by household type alone. Instead, households at different life stages—elderly living alone, multigenerational families, and mid-life households with children and others can share similar underlying motivations for relying on a personal chauffeur. This implies that comparable mobility constraints, supervised travel needs, safety and comfort needs, risk perceptions or their attachment to a familiar norm may generate convergent preferences for personal chauffeur-driven automobility across otherwise dissimilar household structures. This diversity suggests that the choice to employ a personal chauffeur is not confined to a specific age group or household typology. Instead, it varies across households with distinct compositions and life stages, each attaching different *meanings* and significance to chauffeur-driven automobility. These meanings are closely embedded in households lived realities and shaped by the social environments within which they are living.

5.5 Overrepresentation analysis

While Table 3 provides a summary of household characteristics distributed across each cluster. This gives a sense of different characteristics based on age group, income, number of earners, car ownership etc overlapping across clusters, making it difficult to identify clearly defining traits. To address this limitation and identify key differentiating socioeconomic characteristics across clusters, a hypergeometric p-value (Bardhan et al., 2015) was conducted. As a first step, chi-square tests were performed to examine whether household socioeconomic characteristics differed significantly across clusters. Only those characteristics that showed statistically significant differences in the chi-square analysis are reported in the paper as key socioeconomic differentiators. After this, hypergeometric p-values (Drăghici et al., 2003) were calculated for these selected socioeconomic characteristics within each household cluster obtained from chi-square test. This helps us estimate statistically the probability of that socioeconomic characteristic occurring by chance in the cluster. In addition, under-representation

p-values were also computed to show certain characteristics had a lower probability of occurring in a cluster than would be expected by chance. For clarity, only statistically significant over- or under-represented characteristics are presented, and non-significant results are left blank in the

Table 6.

Table 5
Chi-square test results that indicate differences in the household clusters

1	Household Characteristics	Chi-square X^2	df	p-value	Cramer's V value
	Presence of households with school-going children	**10.002**	**5**	**0.057**	**0.282**
2	Households with female elderly above 55 years	11.34	5	0.045	0.3
3	Households with elderly above 55 years	12.706	5	0.026	0.318
4	Annual household income	24.898*	10	0.006	0.296
5	Household with self-employed	35.968	5	0.000	0.534
6	Households with Salaried employed	26.399	5	0.000	0.458
7	Households with more than 20 years of car ownership	15.084	5	0.01	0.346
8	Price of car owned by the household	47.31*	20	0.001	0.297
9	More than one car	18.613	5	0.002	0.384
10	Households with female driving license holders	16.961	5	0.005	0.367
11	Work trip	36.552	4	0.000	0.539

Table 6
Overrepresentation analysis for household clusters

No.		Household clusters.					
	Household Characteristics	**A1**	**A2'**	**A2"**	**B**	**C**	**D**
1	Households with school-going children		0.032			0.025	
2	Elderly above 55 years old	0.007					0.012
3	Annual income: Medium						
	Annual income: High		0.002			0.017	
	Annual income: Very High		0.002	0.020			0.003
4	Occupation type: Salaried				0.007		
	Occupation type: Self-employed				0.025		
5	Driving license female		0.003	0.005	0.013		
6	Two Car ownership		0.016			0.001	
7	Number of car ownership: More than two						
8	Ownership duration: More than 20 years		0.026	0.002		0.0001	0.040
9	Car price: Above 25 lakhs			0.028			
10	Work trips by car	0.002	0.046	0.002	0.011		
	Red colour cells indicates over-represented p values.						
	Blue colour indicates under-represented p values.						

Two p-values were calculated for each characteristic: one for over-representation and one for under-representation. If the p-value in either column was statistically significant, the characteristic was labelled accordingly. Only one of the two columns can show a significant p-value for a given characteristic. Thus, characteristics marked as over-represented correspond to cases where the over-representation p-value was significant. Empty cells indicate that the p-value was not significant in either column hence their level of over-under representation could not be determined. It happens because the samples were less in that cluster.

When we cross-check the household composition within Cluster A1, it becomes evident why elderly household members above the age of 55 are significantly over-represented in this cluster ($p = 0.007$). Nearly 47% of households in Cluster A1 consist of elderly individuals living alone. This dominant household composition in the cluster A1 also explains why work-related trips are significantly under-represented ($p = 0.002$), indicating a low likelihood of such travel behaviour within this cluster.

In Cluster A2', households with school-going children are significantly over-represented (*p = 0.032*). This aligns with the cluster's demographic composition, with 38% comprising parents in their forties with school-age children and an additional 29% being multigenerational households also supporting school-going dependents. These households are also characterized by high annual incomes (*p = 0.002*), ownership of multiple vehicles (*p = 0.016*), and regular work-related travel (p = 0.046). The evidence suggests that households in Cluster A2 are affluent, family-oriented units that rely heavily on chauffeur-driven vehicles to coordinate complex daily schedules involving both school drop-offs and professional commitments.

Cluster A2" is distinguished by a significant concentration of high-end vehicle ownership, particularly luxury cars valued above INR 25 lakhs (*p = 0.028*). Households in this cluster are predominantly multigenerational (*p = 0.002*), with economically active members spanning multiple generations. These vehicles are frequently used for work-related travel (*p = 0.002*), reflecting a household context in which affluence and intergenerational economic participation intersect. Together, these characteristics suggest a lifestyle configuration that supports sustained reliance on professional chauffeurs as part of everyday mobility practices.

Cluster B includes a diverse mix of households with both salaried (*p = 0.007*) and self-employed individuals (p = 0.025). This cluster is also marked by over-representation of work-related commutes (*p = 0.011*) and a notable presence of female driving license holders (*p = 0.013*). Despite the presence of licensed drivers, households here continue to opt for driver assistance, indicating the perceived value of convenience, time efficiency, or adherence to gendered driving norms.

Cluster C is marked by a significant over-representation of two-car ownership (*p = 0.001*) and a corresponding under-representation of long-term car ownership exceeding 20 years (*p = 0.0001*). This indicates relatively recent and moderate levels of car accumulation within these households. Cluster C is largely characterised by older household structures: approximately 31% of households consist of elderly members living with young adults in their twenties, while 22% comprise elderly couples or widowed individuals living alone. Together, these characteristics suggest a cluster shaped by ageing household structures, stable salaried incomes, and comparatively recent engagement with private car ownership.

Cluster D is demographically distinctive. It is characterized by the absence of elderly members above the age of 55, as indicated by under-representation. Instead, households in this cluster are more likely to include relatively younger elderly (under 55) or middle-aged adults. Additionally, long-term car ownership (over 20 years) is under-represented (*p = 0.04*), suggesting these households are relatively new entrants into automobility. This profile reflects changing socioeconomic aspirations, potentially aligned with a generational shift in lifestyle expectations and mobility needs.

5.6 Household archetype

Each household cluster displays a distinct socioeconomic profile that can be systematically linked to the motivation clusters derived from the stated reasons for employing a driver. By combining motivation

clusters (based on interview-derived reasons) and connecting the household socioeconomic characteristics broadly understood through household clustering (AB, C, and D) and supplementing them with interview narratives (thick description), we develop household archetypes This process involves going back and forth with the interview transcripts and correlate with the reasons spoken by specific households and describing their real world setting so as to present a holistic understanding of "*why a car users chooses to rely on a personal chauffeur*". This triangulation approach integrates quantitative and qualitative evidence, allowing a deeper understanding of how lived realities, effect of what we see around in family, friends and neighbours doing in a similar situation, and looking for solutions to a mobility challenge from their surrounding practical constraints interact to shape the decision to adopt personal chauffeured automobility.

5.6.1 Archetype A: Physical and Functional Constraint motivated Households

Households in Clusters A1 and C predominantly exhibit constraint-driven reliance on driver assistance, consistent with the dynamics outlined in Reasons Cluster 1. (Table 3 and Table 4). These archetypes are primarily characterised by households with a high concentration of elderly members, including retirees living alone, elderly couples, and older adults in later life stages. Age-related physical and cognitive changes—such as reduced muscular strength, joint stiffness, declining visual acuity, and slower reaction times—progressively limit the ability of these individuals to self-drive safely and confidently. As a result, personal driving becomes increasingly constrained, leading to reduced transport autonomy and greater dependence on external support for everyday mobility. In this context, the transition from driver to passenger is not a voluntary preference but a response to declining driving capability and heightened safety risks. Empirical evidence of higher accident risk per unit of exposure among older drivers further reinforces these constraints. Households at different stages of their life course exhibit varying mobility needs that are often difficult to meet without assistance. In this context, the employment of a personal chauffeur emerges as a strategic and adaptive response.

[I 13]: Driver of a 55+-year-old widow working as a school teacher living alone with her adolescent son and owner of a subcompact hatchback:

Madam's elder son, who lives in another city, purchased the car specifically for her. However, due to her knee problems, she is unable to drive at this age. If, for any reason, I am unable to come to work, she has no choice but to take leave from school and cancel any plans to go out. She relies on me entirely for all outdoor activities, including errands like shopping. Without my assistance, she is truly helpless.
[I 6]: An elderly widower living alone and owner of a compact hatchback priced at 3000 USD describes:

At 57, I bought an Alto and learned to drive. Although I used the car for my daily commute, I wasn't very confident at first. There was an incident where I almost hit someone on the road, which shook me and made me fearful of driving alone. To help with this, I hired a driver who assisted me while I practised.

However, as I grow older, I find it harder to drive confidently, so I prefer to rely on a driver for safety and convenience.
Gendered differences in driving histories and mobility practices emerge as a significant factor shaping dependence on chauffeur-driven mobility within this archetype. Many women in this cohort never acquired driving skills due to prevailing gender norms and generational expectations that limited female participation in driving. As a result, dependence on external driving assistance becomes particularly pronounced in later life. In contrast, elderly men in this group often continue to self-drive into older age but gradually reduce or discontinue driving due to declining physical capacity, diminished confidence, or perceived safety risks. This transition is commonly marked by a shift toward trip-specific, part-time, or seasonal driver arrangements before moving to more consistent driver assistance. Notably, households with elderly female members were more likely to retain full-time drivers.

[I 30]: A 30-year-old describes the role of a driver in his relative's house who has a paralyzed individual in the leg and has pertinent walking issues:

This is the greatest advantage of having a driver, especially for him. The driver not only drops him off at his office but also supports him while walking, helps him climb the stairs, and carries his belongings. Upon reaching his office cabin, the driver assists him in sitting down comfortably in his chair and stays nearby until he completes his work. Additionally, he helps him use his mobility aids whenever needed. Without a driver, his daily life would come to a standstill.
Within this archetype, car ownership is commonly adopted as a convenience-oriented mobility strategy among elderly households, irrespective of gender or marital status, as it helps address both life-stage-specific and gendered mobility constraints. Importantly, the decision to purchase a car is closely coupled with reliance on driver assistance rather than independent driving. Acquiring driving skills later in life is perceived as difficult, and even among those who do learn, concerns related to accident risk and potential vehicle damage often discourage regular self-driving.

5.6.2 Archetype B: Utility Maximization motivated Households

The theme of utility maximization corresponding to Reasons Cluster 2 (Fig. 2) is most strongly reflected in the socioeconomic profiles of households in Clusters A2' and B (See Table 3 and Table 4). These households typically include school-going children and are often headed by a male primary earner engaged in self-employment or business activities. Consistent with these characteristics, most households in this group own two or more cars: one vehicle is commonly dedicated to routine household activities such as school drop-offs and organised leisure trips, while another is reserved for work-related trips only. The profile of the households in this group reflects occupational routines marked by frequent inter-city travel also apart from rigorous intra-city work travels, irregular working hours, which creates the need to respond quickly to shifting schedules. In such contexts, navigating congested city traffic through self-driving can impose substantial stress and time pressures. Within this everyday reality, relying on a personal chauffeur emerges as a practical mobility arrangement. The presence of a personal chauffeur

enables the productive use of travel time for work-related tasks, communication, or recuperation, thereby enhancing overall time efficiency. For them, employing a personal chauffeur is not merely a matter of convenience but a rational response to complex mobility demands, allowing households to optimise daily routines often filled with uncertainty.

[I 3]: A 33-year-old businessman with three school-going children hired a driver at the time of purchase due to erratic work hours; describes:

"There is no fixed time when will I come and go … If a businessman would start driving in this traffic, he will go crazy. In the presence of a driver, I am always free and relaxed….. Driving myself would not only reduce my efficiency but also impact the time I could spend with my family or attending to business matters. This flexibility is crucial for me because my schedule is unpredictable and whose work demands immediate attention."

[I 123]: A 40-year-old owner of a subcompact SUV dependent on a car for more than 20 years

My business spans across a wide range of activities, and I'm often occupied with work, coordinating over the phone and dealing with unexpected events at work. With such a hectic schedule, it's impossible for me to handle the chauffeuring duties of my children.
[I 45]: Mother who had come to pick up her 14-year-old daughter accompanied by a chauffeur

….. We wanted to ensure their safety and avoid using school vans as the school is pretty far. Her father is employed in another district, and I am not very good at driving… Escalating safety issues outside schools, particularly due to the flocking of unruly individuals, prompted us to take this step.
Another important detail about the profile of this archetype is that, male members are often the primary license holders, but demanding work schedules leave little room to manage family logistics, particularly those involving children. Interviews indicate that many parents enroll their children in schools located farther from home, where safety and supervision during travel become key concerns. Drivers often report back to parents, acting as a communication bridge that supports both security and peace of mind. As a result, employing a full-time driver emerges as a practical arrangement—not only to transport children but also to provide trusted oversight during trips. In this archetype, reliance on a personal chauffeur is therefore closely tied to the need to coordinate children's mobility, ensure safety, and accommodate time-constrained household routines aligning with the household's broader priorities and lifestyle needs.

5.6.3 Archetype C: Habitually comfort-seeking Households

The habitually comfort-seeking households align closely with the profile of cluster D corresponding to the motivations most closely captured in Reasons Cluster 3. For many middle-aged and older household members—particularly those approaching their mid-fifties— the continued use of a personal chauffeur reflects a gradual shift away from self-driving rather than a sudden need. Subtle age-related discomforts, such as fatigue or reduced ease in night driving, combine with a declining inclination to drive, reinforcing reliance on chauffeur-driven travel. Notably, several female respondents in this group held valid driving licences and were economically active, yet continued to prefer being chauffeured. This preference

appears rooted in long-standing household norms where driving was historically delegated to male members within the household and is now seamlessly transferred to a personal chauffeur. Overall, the mobility profile is shaped by habit and lifestyle continuity, where employing a personal chauffeur sustains comfort and convenience in everyday travel rather than responding to immediate mobility constraints.

[I 33]: A female doctor and a mother of two teenage daughters who will with one elderly above 70 years:

"My husband and I both come from a family where our parents kept drivers for their personal cars. Both our parents were salaried workers in stable jobs, and it was common for them to have drivers, especially since they worked in government positions. So, the habit of being driven is old…. At present, we have a driver to drive us to our clinics and hospital (workplace). It gives us a moment to rest when there is a driver. In fact, we're even considering employing another driver because of the timing clashes between our schedules….."

Interviews revealed that the use of chauffeur-driven cars was common among elderly male respondents who previously held high-ranking government positions. In these cases, access to a driver was part of formal job entitlements, symbolising occupational status and authority. Over time, this institutional practice shaped personal mobility preferences, with many choosing to retain private drivers post-retirement, supported by household income. This pattern extended intergenerationally. Children raised in such households internalised the idea that self-driving was unnecessary even when licensed. For these households, employing a driver was not only a matter of convenience but a continuation of established norms associated with the prestige of a salaried profession. It underscores the role of occupational history and cultural norms in shaping driver dependency. For this archetype, employing a driver symbolized status, privilege, and professional success.

5.6.4 Archetype D: Habitually Assisted Households

The habitually assisted archetype aligns closely with the profile of households in Cluster A2", corresponding to the motivations most closest captured in Reasons Cluster 3 mostly characterized by multigenerational households. They typically include two or more economically active generations—often middle-aged siblings and their families—many of whom are self-employed or operate high-end businesses. With stable incomes and flexible work patterns, maintaining multiple vehicles and drivers becomes a practical way to manage the diverse and overlapping schedules of household members. Mobility demands in such households are inherently complex as different age groups access distinct destinations, such as schools, workplaces, and social or commercial venues, often requiring separate travel routes and timings. Drivers are employed not only to manage this logistical complexity but also to ensure that all household members enjoy flexibility, punctuality, and comfort. In these contexts, the driver functions as a mobility facilitator, enabling each member to maintain independence without the need for self-driving. The need for constant assistance is often a trait of elite households, passed down through generational habits. Observing family members using personal chauffeurs from a young age, household members tend to normalize and continue this practice as an extended form of household help. Since

households in this archetype are typically multigenerational car users and personal chauffeur users, prolonged relationships with drivers allow them to engage in broader household tasks, integrating the chauffeur's role into daily life. While this personalized assistance may seem minor, it reflects deeply ingrained habits shaped by parental practices and becomes a defining feature of their lifestyle. Chauffeurs insulate household members from the inconveniences and risks of direct car use, allowing travel to be limited to high-value activities such as professional commitments, curated leisure, or wellness routines.

[Interview-68]: A 36-year-old male from a joint family of 15 members who has been using a car for more than 25 years and currently owns more than three luxurious cars.

We are a joint family of 15 members, spanning three generations. We've been using driver assistance for more than 25 years now. It's become a normal part of our lifestyle….. Honestly, no one really likes to drive…. It's not that we can't—most of us know how to drive, including women, but it's just something we've gotten used to avoiding. The idea of self-driving feels unnecessary…. Also, we own different cars to meet everyone's needs. These cars require careful driving because they're high-performance vehicles, and improper handling can reduce their value….

Interview narratives repeatedly point to a shared theme within this archetype: employing a driver is not only a practical arrangement but also a subtle display of status. Households often described this practice as something long normalized within their close social and familial circles, where being constantly assisted becomes part of everyday life. Although not always expressed explicitly as a motivation, this lifelong exposure appears to normalize the practice and shape expectations around mobility. As a result, employing a driver is perceived as both a practical arrangement and a subtle marker of status. Over time, constant assistance becomes embedded in everyday life, reinforcing habits that reflect privilege, optimized time use, and continuity with long-standing social norms.

6. Discussion and Conclusion

The present study examined for the first time *why car users choose personal chauffeur automobility*, using Patna, India, a case study. Personal chauffeur use is very common in the global south, including India and despite rising car ownership, there is not one single research on it. Our study is based on 126 semi-structured interviews compared to prior qualitative transport studies published in reputed journals that typically relied on interview sample sizes, ranging from 9 to 60 interviews ((Jason) Cao et al., 2019; Burnett & Lucas, 2010; Hoffmann et al., 2020; Kopnina, 2011; Levine, 2024; Li et al., 2023; Lin et al., 2024; Lucas et al., 2022; Merfeld et al., 2019; Mowri & Bailey, 2024; Næss, 2020; Paulson, 2018; Roy et al., 2024; Sherwin et al., 2014; Sigurdardottir et al., 2014; Tennant & Stilgoe, 2021). Our study adopts a mixed-methods approach, combining quantitative and qualitative data collection and analysis to gain deeper insights into personal chauffeured automobility. The research aimed to identify the underlying motivations for employing a personal chauffeur using open-ended responses from purposively selected car users who are users of a personal chauffeur. This study provides the first empirical evidence systematically documenting the range of reasons behind the need of personal chauffeurs, thereby addressing a largely implicit and understudied mobility practice in Global South.

Firstly, our semi-structured interviews identified twenty-eight distinct reasons underlying dependence on personal chauffeurs. Based on the cluster analysis, four broad motivational themes underpin the choice of personal chauffeur-driven automobility: (i) physical or functional constraint–related reasons, (ii) utility maximization–related reasons, (iii) habitual comfort–related reasons, and (iv) habitual assistance–related reasons.

Secondly, our findings show that the choice of personal chauffeured automobility is shaped by a combination of socioeconomic factors. The study examined household characteristics, including age distribution, presence of children and elderly members, number of economically active members—particularly those above 55 years—number of licensed drivers, occupation types, work- and school-related car trips, vehicle ownership, and types of cars owned and any others listed in Table 2. Hypergeometric p-value analysis identifies characteristics that are statistically over-represented in clusters associated with chauffeur use. Households with school-going children and elderly members are more strongly linked to chauffeur use, reflecting needs for escorting and supervised travel due to safety and comfort concerns. These households prioritise reliability, flexibility, and reduced effort in daily mobility. Occupational status is also important, as salaried and self-employed households, reflecting stable incomes, enable the affordability of personal chauffeurs.

Rather than indicating differences between occupational groups, the over-representation of both salaried and self-employed households suggests a shared preference for personal chauffeurs among economically secure groups. This convergence signals a normative mobility practice rather than occupation-specific behaviour. Here, employing a chauffeur is driven not only by affordability but also by social influence, where family, peers, and professional networks normalise chauffeur-driven travel as efficient and appropriate. Continued exposure to such environments reinforces this preference, turning it into a socially learned and validated choice. Over time, repeated reinforcement within close networks embeds chauffeur-driven automobility into everyday routines, making it less a deliberate decision and more an unquestioned mobility norm.

In addition, long durations of car ownership (exceeding 20 years) and ownership of high-value cars (above ₹25 lakhs) indicate well-established car-oriented lifestyles. Prior research links expensive car ownership with car pride (Moody & Zhao, 2019; Zhao & Zhao, 2020). In the same vein, being driven in such vehicles can also be understood as part of pride-related experience. Multi-car households and frequent car-based work trips further indicates a strong dependency on private cars, where delegating driving responsibilities emerges as a functional need. Managing multiple vehicles entails ongoing demands—regular use, maintenance, timely repairs, and safeguarding high-value assets from unforeseen costs. In households with intensive work-related travel, these pressures intensify, making a personal chauffeur an effective mechanism for ensuring vehicle upkeep, reliability, and continuity of daily mobility.

Thus, we observe that specific socioeconomic characteristics are systematically associated with the choice of personal chauffeured automobility. Thirdly, in this study, qualitative narratives from respondents were also used to contextualise the choice of personal chauffeured automobility. Beyond

socioeconomic characteristics, the analysis reveals that situational and behavioural circumstances also play a critical role in shaping this mobility choice. These circumstances were categorized into four household archetypes: (A) Physical and Functional Constraint–led households, where health, age, or physical limitations necessitate assisted travel; (B) Utility Maximization–driven households, which adopt chauffeurs to optimize time use, reduce cognitive effort, and manage complex travel schedules; (C) Habitually Comfort-Seeking households, for whom convenience and travel comfort have become routine expectations; and (D) Habitually Assisted households, where long-standing trust on personal chauffeurs has normalized chauffeur-driven car use.

Together, these archetypes demonstrate that personal chauffeured automobility is triggered not only by socioeconomic factors but also by life stage challenges, lived circumstances, habitual practices, lifestyle preferences and familiar norms as seen in their previous generation and social circle. Each household archetype has a unique way of living, shaped by their participation in daily activities, which clearly indicates *why car users choose personal chauffeur automobility.*

7. Benefit of the study and future scope of work

Car ownership in India alone is expected to rise by an additional 262 million vehicles (Singh et al., 2020) amplifying existing challenges of congestion, and infrastructure (Verma, 2015). Alongside this surge, the prevalence of personal chauffeured automobility is also likely to grow. Capturing it is essential—not only to precisely explain how cars are used in India, but to anticipate how mobility behaviours may evolve in the future. Given the behavioural parallels between personal chauffeurs (PC) and personal autonomous vehicles (PAVs), analysing PC car use can significantly refine studies on implication of PAV especially preference towards PAV. (Wadud & Chintakayala, 2021) estimated preference towards PAV based on the *value* of convenience using a general population sample. More studies using PC car user's *value* of travel time and experience of comfort can add to the findings. Previous studies on cross cultural difference in the acceptance of AV (Edelmann et al., 2021) can include the perception of personal chauffeur driven car users from India as current mobility practice is uncommon in global north. In order to bring improvement in those studies' mobility choice of personal chauffeured car use needs more in-depth investigation. Studies estimating the AV travel demand such as (Dai et al., 2024) can refine the results by measuring the vehicle kilometre travelled of personal chauffeured car which closely reflects a delegated driving context similar to PAVs. Future work could examine the relationship between vehicle kilometre travelled and emission rates among personal chauffeur-driven users and self-driving car users, and further compare these patterns with those observed in developed countries. Such comparative analysis would help identify which user groups contribute most significantly to emissions and could support the design of evidence-based policies, including the categorical application of the polluter-pays principle. Studies which evaluate cost of PAV to understand the early adoption (Wadud, 2017) may consider adding the cost of keeping a personal chauffeur in the Indian context or other similar global south contexts to explain the transition better. (Wang et al., 2020) studied that attitude toward PAV and SAV. Similar analysis can compare personal chauffeured car users with ride-sharing users by linking their current motivations to future intentions. Such a comparison would offer deeper behavioural insights, helping

anticipate adoption patterns and refine mobility models beyond simplified user classifications. Examining personal chauffeur–driven car use, and projecting its prevalence through scenario-based simulations, can reveal how equivalent PAV penetration levels—given their behavioural analogy—may impact road space and congestion in cities. This study also has strong implications for evidence-based policy. Interview findings indicate that users of personal chauffeur-driven cars often avoid paying parking charges, as chauffeurs typically wait in idle lanes or on nearby streets instead of using high-priced off-street or multi-level parking facilities. As parking fees are intended to increase the cost of car use and act as a deterrent, such practices effectively undermine the policy objective. Despite consuming higher vehicle kilometres travelled, personal chauffeur-driven car use frequently escapes these cost signals. Recognising and explicitly addressing chauffeur-driven use within parking and pricing policies could therefore help restore the effectiveness of parking charges as a demand-management tool.

Note

There is no one-to-one correspondence between Reasons Clusters (1–4) and household clusters (A1, A2', A2", B, C, D). Household mobility behaviour is inherently complex and shaped by overlapping motivations. Attempting rigid alignment risks oversimplifying this reality. Instead, the analysis identifies the most prominent and relatable motivations through the combined use of household archetypes and reason clusters. These represent the closest approximation of households' lived circumstances, challenges, constraints, and aspirations, acknowledging that multiple influences coexist and vary in intensity across contexts.

Household Clusters	Most Associated Reasons Cluster
Clusters A1 and C	Reasons Cluster 1
Clusters A2' and B	Reasons Cluster 2
Cluster D	Reasons Cluster 3
Cluster A2"	Reasons Cluster 4

The formula for calculating the over-represented p-value is given below:

$$(overrepresented)\, pvalue = 1 - \sum_{i=0}^{x-1} \frac{\binom{M}{i}\binom{N-M}{n-i}}{\binom{N}{n}}$$

$$(underrepresented)\, pvalue = \sum_{i=0}^{x} \frac{\binom{M}{i}\binom{N-M}{n-i}}{\binom{N}{n}}$$

‘*N’* is the total number of samples collected for the interview (N = 126). *‘M’* is the total number of successful samples found in different household characteristics in the total interviewed data (e.g. in a household with school-going children, M = 64, Refer Table 2). ‘*n’* is the total number of samples in one cluster (e.g., $n_{cluster\ A2'} = 21$, Refer Table 2 heading). *‘x’* is the number of successful sample of households with school-going children in the cluster of interest, i.e., Cluster A2' (x = 15).

Abbreviations

PC
Personal chauffeurs
AV
Autonomous vehicles
PAV
Private autonomous vehicles

Declarations

This study involved interviews with car owners. Informed consent was obtained from all individual participants prior to their participation. The study was reviewed and approved by my Doctoral Scrutiny Committee (DSC) at the Department of Architecture and Regional Planning, Indian Institute of Technology Kharagpur, India.

The authors declare that there are no conflicts of interest. This research received no external funding.

References

1. Jason) Cao X, Næss P, Wolday F (2019) Examining the effects of the built environment on auto ownership in two Norwegian urban regions. Transp Res Part D: Transp Environ 67(January):464–474. https://doi.org/10.1016/j.trd.2018.12.020
2. Acker V, Van, Mokhtarian PL, Witlox F (2014) Car availability explained by the structural relationships between lifestyles, residential location, and underlying residential and travel attitudes. Transp Policy 35:88–99. https://doi.org/10.1016/j.tranpol.2014.05.006
3. Acker V, Van, Witlox F (2010) Car ownership as a mediating variable in car travel behaviour research using a structural equation modelling approach to identify its dual relationship. J Transp Geogr 18(1):65–74. https://doi.org/10.1016/j.jtrangeo.2009.05.006
4. Ahmad M, Wilkins S (2025) Purposive sampling in qualitative research: a framework for the entire journey. Qual Quant 59(2):1461–1479. https://doi.org/10.1007/s11135-024-02022-5
5. Ashik FR, Sreezon AIZ, Rahman MH, Zafri NM, Labib SM (2024) Built environment influences commute mode choice in a global south megacity context: Insights from explainable machine

learning approach. J Transp Geogr 116(June 2023):103828. https://doi.org/10.1016/j.jtrangeo.2024.103828

6. Bardhan R, Kurisu K, Hanaki K (2015) Does compact urban forms relate to good quality of life in high density cities of India ? Case of Kolkata. Cities 48:55–65. https://doi.org/10.1016/j.cities.2015.06.005
7. Belgiawan PF, Schmocker JD (2016) Understanding car ownership motivations among Indonesian students. Int J Sustainable Transp 10(4):295–307. https://doi.org/10.1080/15568318.2014.921846
8. Belgiawan P, Fajarindra, Schmöcker JD, Abou-Zeid M, Walker J, Fujii S (2017) Modelling social norms: Case study of students' car purchase intentions. *Travel Behaviour and Society*, *7*(2017), 12–25. https://doi.org/10.1016/j.tbs.2016.11.003
9. Ben H, Steemers K (2018) Household archetypes and behavioural patterns in UK domestic energy use. Energ Effi 11(3):761–771. https://doi.org/10.1007/s12053-017-9609-1
10. Bryant A, Charmaz K (2007) Grounded Theory Research: Methods and Practices. The SAGE Handbook of Grounded Theory. SAGE Publications Ltd., p 1
11. Bryman A (2012a) Sampling in qualitative research. In *Social Research Methods* (Fourth, pp. 415–429)
12. Bryman A (2012b) Social research strategies. In: Fourth (ed) Social Research Methods. Oxford University Press, pp 9–18
13. Bryman A (2012c) The nature of qualitative research. Social Research Methods. Oxford University Press
14. Burnett P, Lucas S (2010) Talking, walking, riding and driving: The mobilities of older adults. J Transp Geogr 18(5):596–602. https://doi.org/10.1016/j.jtrangeo.2010.05.006
15. Charleux L (2017) Deriving Mobility Archetypes from Household Travel Survey Data. Prof Geogr 0124. https://doi.org/10.1080/00330124.2017.1338588
16. Charmaz K (2006) Constructing Grounded Theory- A Practical Guide Through Qualitative Analysis. In *The Review of English Studies: Vol. XXVIII* (Issue 110). SAGE Publications. https://doi.org/10.1093/res/xxviii.110.189
17. Clark B, Lyons G, Chatterjee K (2016) Understanding the process that gives rise to household car ownership level changes. J Transp Geogr 55:110–120. https://doi.org/10.1016/j.jtrangeo.2016.07.009
18. CMP (2009) *Comprehensive Mobility Plan for Patna Urban Agglomeration Area*
19. Creswell JW (2013) Qualitative inquiry and research design - Choosing among five approaches, 3rd edn. SAGE
20. Creswell JW, Clark VLP (2018) *Designing and Conducting Mixed Methods Research* (S. Kelly (ed.); 3rd ed.). SAGE Publications. https://collegepublishing.sagepub.com/products/designing-and-conducting-mixed-methods-research-3-241842

21. Dai J, Li R, Liu Z (2024) Potential effects of automated driving on vehicle travel demand: A comparison of three case cities. J Traffic Transp Eng (English Edition) 11(2):348–361. https://doi.org/10.1016/j.jtte.2022.03.003
22. Dash S, Vasudevan V, Singh S (2013) Disaggregate model for vehicle ownership behavior of Indian households. Transp Res Rec 2394:55–62. https://doi.org/10.3141/2394-07
23. Drăghici S, Khatri P, Martins RP, Ostermeier GC, Krawetz SA (2003) Global functional profiling of gene expression. Genomics 81(2):98–104. https://doi.org/10.1016/S0888-7543(02)00021-6
24. Edelmann A, Stümper S, Petzoldt T (2021) Cross-cultural differences in the acceptance of decisions of automated vehicles. Appl Ergon 92(January):103346. https://doi.org/10.1016/j.apergo.2020.103346
25. Evans BC, Coon DW, Ume E (2011) Use of theoretical frameworks as a pragmatic guide for mixed methods studies: A methodological necessity? J Mixed Methods Res 5(4):276–292. https://doi.org/10.1177/1558689811412972
26. Feng J (2017) The influence of built environment on travel behavior of the elderly in urban China. Transp Res Part D 52:619–633. https://doi.org/10.1016/j.trd.2016.11.003
27. Ghate AT, Sundar S (2014) Proliferation of Cars in Indian Cities: Let Us Not Ape the West. Issue June. https://www.teriin.org/policybrief/docs/cars.pdf
28. Glaser B, Strauss A (1967) The discovery of grounded theory: strategies for qualitative research. Aldine Transaction
29. Guerra E (2015) The geography of car ownership in Mexico City: A joint model of households' residential location and car ownership decisions. J Transp Geogr 43:171–180. https://doi.org/10.1016/j.jtrangeo.2015.01.014
30. Guest G, Bunce A, Johnson L (2006) How Many Interviews Are Enough? An Experiment with Data Saturation and Variability. Field Methods 18(1):59–82. https://doi.org/10.1177/1525822X05279903
31. Heinonen J, Czepkiewicz M, Arnadottir A, Ottelin J (2021) Drivers of Car Ownership in a Car-Oriented City: A Mixed-Method Study. Sustainability 13(619):1–26. https://doi.org/https://doi.org/10.3390/su13020619
32. Heinrich M, Ruellan M, Oukhellou L, Samé A, Lévy JP (2022) From energy behaviours to lifestyles: Contribution of behavioural archetypes to the description of energy consumption patterns in the residential sector. *Energy and Buildings*, *269*. https://doi.org/10.1016/j.enbuild.2022.112249
33. Hennink M, Kaiser BN (2022) Sample sizes for saturation in qualitative research: A systematic review of empirical tests. Soc Sci Med 292:114523. https://doi.org/10.1016/j.socscimed.2021.114523
34. Hoffmann C, Abraham C, White MP, Skippon SM (2020) Ambivalent about travel mode choice? A qualitative investigation of car user and non-car user attitudes. Transp Res Part A: Policy Pract 141(September):323–338. https://doi.org/10.1016/j.tra.2020.09.012
35. Hopkins D, García Bengoechea E, Mandic S (2021) Adolescents and their aspirations for private car-based transport. Transportation 48(1):67–93. https://doi.org/10.1007/s11116-019-10044-4

36. J.Arnould E, Price L (2000) L. Authenticating acts and authoritative performances: questing for self and community. In S.Ratneshwar, D. G. Mick, & C. Huffman (Eds.), *Why of consumption*: (p. 158)
37. Jiang Y, Gu P, Chen Y, He D, Mao Q (2017) Influence of land use and street characteristics on car ownership and use: Evidence from Jinan, China. Transp Res Part D 52:518–534. https://doi.org/10.1016/j.trd.2016.08.030
38. Jiron P, Carrasco JA (2020) Understanding Daily Mobility Strategies through Ethnographic, Time Use, and Social Network Lenses. Sustainability 12:1–16. https://doi.org/https://doi.org/10.3390/su12010312
39. Kim J, Tanaka HS, Schmöcker JD (2020) Joint car ownership and car type preference model considering engagement in online activities and environmental concern. Transp Res Part F: Traffic Psychol Behav 68:293–305. https://doi.org/10.1016/j.trf.2019.11.012
40. Kitamura R (2009) Life-style and travel demand. Transportation 36(6):679–710. https://doi.org/10.1007/s11116-009-9244-6
41. König A, Dreßler A (2021) A mixed-methods analysis of mobility behavior changes in the COVID-19 era in a rural case study. Eur Transp Res Rev 13(1). https://doi.org/10.1186/s12544-021-00472-8
42. Kopnina H (2011) Kids and cars: Environmental attitudes in children. Transp Policy 18(4):573–578. https://doi.org/10.1016/j.tranpol.2011.01.013
43. Levine K (2024) The bus is accessible, but how do you get to the bus: First and last mile experiences of disabled transit riders. *Journal of Public Transportation*, *26*(October 2023), 100086. https://doi.org/10.1016/j.jpubtr.2024.100086
44. Li M, Wang Y, Wan Y, Huang X, Yang Y (2023) The meaning of travel: Anecdotes from children. Annals Tourism Res 103:103664. https://doi.org/10.1016/j.annals.2023.103664
45. Lin S, Chen CL, Yu X, Chung H, Vickerman R (2024) A holistic motility understanding of the social phenomena underlying inter-city high-speed rail commuting: Evidence from China's Yangtze River Delta. *Case Studies on Transport Policy*, *15*(September 2023), 101131. https://doi.org/10.1016/j.cstp.2023.101131
46. Lucas K, Philips I, Verlinghieri E (2022) A mixed methods approach to the social assessment of transport infrastructure projects. Transportation 49(1):271–291. https://doi.org/10.1007/s11116-021-10176-6
47. Ma J, Ye X, Shi C (2018) Development of multivariate ordered probit model to understand Household Vehicle Ownership behavior in Xiaoshan District of Hangzhou, China. Sustain (Switzerland) 10(10). https://doi.org/10.3390/su10103660
48. Malterud K, Siersma VD, Guassora AD (2016) Sample Size in Qualitative Interview Studies: Guided by Information Power. Qual Health Res 26(13):1753–1760. https://doi.org/10.1177/1049732315617444
49. Marshall MN (1996) Sampling for qualitative research. Fam Pract 13(6):522–525
50. Martins É, Ramos S, Jakobsson C, Nässén J (2020) Understanding daily car use: Driving habits, motives, attitudes, and norms across trip purposes. Transp Res Part F: Psychol Behav 68:306–315.

https://doi.org/10.1016/j.trf.2019.11.013

51. McIntosh J, Trubka R, Kenworthy J, Newman P (2014) The role of urban form and transit in city car dependence: Analysis of 26 global cities from 1960 to 2000. Transp Res Part D: Transp Environ 33:95–110. https://doi.org/10.1016/j.trd.2014.08.013
52. Meena S, Singh SK, Jodha K (2021) Identification of psychological factors associated with car ownership decisions of young adults: Case study of Jodhpur city, India. Asian Transp Stud 7(March):100037. https://doi.org/10.1016/j.eastsj.2021.100037
53. Merfeld K, Wilhelms MP, Henkel S (2019) Being driven autonomously – A qualitative study to elicit consumers' overarching motivational structures. *Transportation Research Part C: Emerging Technologies*, *107*(January 2018), 229–247. https://doi.org/10.1016/j.trc.2019.08.007
54. Moody J, Zhao J (2019) Car pride and its bidirectional relations with car ownership: Case studies in New York City and Houston. Transp Res Part A: Policy Pract 124(March):334–353. https://doi.org/10.1016/j.tra.2019.04.005
55. Morse JM (2007) Sampling in Grounded Theory. In A. Bryant & K. Charmaz (Eds.), *The SAGE Handbook of Grounded Theory* (pp. 229–245)
56. Mouratidis K, De Vos J, Yiannakou A, Politis I (2023) Sustainable transport modes, travel satisfaction, and emotions: Evidence from car-dependent compact cities. *Travel Behaviour and Society*, *33*(August 2022), 100613. https://doi.org/10.1016/j.tbs.2023.100613
57. Mowri S, Bailey A (2024) Riding the change: Exploring women's navigation of risk and respectability through two-wheeler mobility in Dhaka. J Transp Geogr 117(April). https://doi.org/10.1016/j.jtrangeo.2024.103888
58. Næss P (2020) Validating explanatory qualitative research: enhancing the interpretation of interviews in urban planning and transportation research. Appl Mobilities 5(2):186–205. https://doi.org/10.1080/23800127.2018.1464814
59. Navarro-Ligero ML, Valenzuela-Montes LM (2022) Scenario archetypes in urban transport planning: Insights from the implementation of LRT systems. Transp Policy 118:152–164. https://doi.org/10.1016/j.tranpol.2022.02.002
60. Ortiz MA, Bluyssen PM (2019) Developing home occupant archetypes: First results of mixed-methods study to understand occupant comfort behaviours and energy use in homes. Build Environ 163(July):106331. https://doi.org/10.1016/j.buildenv.2019.106331
61. Pas EI, Koppelman FS (1986) An examination of the determinants of day-to-day variability in individuals' urban travel behavior. Transportation 13(2):183–200. https://doi.org/10.1007/BF00165547
62. Paulson EL (2018) A habitus divided? The effects of social mobility on the habitus and consumption. Eur J Mark 52(5–6):1060–1083. https://doi.org/10.1108/EJM-03-2017-0240
63. Prabnasak J, Taylor MAP (2009) An exploration of vehicle ownership and mode choice behaviour in a mid-sized Asian city: A case study in Khon Kaen City, Thailand. *32nd Australasian Transport Research Forum, ATRF 2009*, *February 2015*

64. Raditya A, Ayu IG, Fajarindra P, Sefriyadi I, Armelia N, Ayu I (2025) Country of origin effect on car ownership choice decision of Indonesian consumer. Res Transp Bus Manage 59(February):101307. https://doi.org/10.1016/j.rtbm.2025.101307
65. Roy S, Bailey A, van Noorloos F (2024) The everyday struggles of accessing public transport for women in the first- and last-mile stretches in Kolkata. J Transp Geogr 117(May):103892. https://doi.org/10.1016/j.jtrangeo.2024.103892
66. Sherwin H, Chatterjee K, Jain J (2014) An exploration of the importance of social influence in the decision to start bicycling in England. Transp Res Part A: Policy Pract 68:32–45. https://doi.org/10.1016/j.tra.2014.05.001
67. Sietz D, Frey U, Roggero M, Gong Y, Magliocca N, Tan R, Janssen P, Václavík T (2019) Archetype analysis in sustainability research: Methodological portfolio and analytical frontiers. Ecol Soc 24(3). https://doi.org/10.5751/ES-11103-240334
68. Sigurdardottir SB, Kaplan S, Møller M (2014) The motivation underlying adolescents ' intended time-frame for driving licensure and car ownership: A socio-ecological approach. Transp Policy 36:19–25. https://doi.org/10.1016/j.tranpol.2014.07.001
69. Singh N, Mishra T, Banerjee R (2020) Projection of Private Vehicle Stock in India up to 2050. *Transportation Research Procedia*, *48*(2019), 3380–3389. https://doi.org/10.1016/j.trpro.2020.08.116
70. Srinivasan KK, Bhargavi L, Ramadurai PV, Muthuram G, V., Srinivasan S (2007) Determinants of changes in mobility and travel patterns in developing countries: Case study of Chennai, India. *Transportation Research Record*, *2038*, 42–52. https://doi.org/10.3141/2038-06
71. Sterk F, Stocker A, Heinz D, Weinhardt C (2024) Unlocking the value from car data: A taxonomy and archetypes of connected car business models. Electron Markets 34(1):1–24. https://doi.org/10.1007/s12525-024-00692-5
72. Tennant C, Stilgoe J (2021) The attachments of 'autonomous' vehicles. Soc Stud Sci 51(6):846–870. https://doi.org/10.1177/03063127211038752
73. Thomson JM (1977) Great Cities and Their Traffic. Penguin Books
74. Tiwari R, Sharma N (2016) *Safe and Inclusive Cities Patna: City Profile*. http://hdl.handle.net/10625/55689
75. Tiznado-Aitken I, Lucas K, Muñoz JC, Hurtubia R (2020) Understanding accessibility through public transport users' experiences: A mixed methods approach. J Transp Geogr 88(August):102857. https://doi.org/10.1016/j.jtrangeo.2020.102857
76. Van Acker V (2015) Defining, measuring, and using the lifestyle concept in modal choice research. Transp Res Rec 2525(2495):74–82. https://doi.org/10.3141/2495-08
77. Van Acker V (2017) Lifestyles and Life Choices. In: Zhang J (ed) Life-Oriented Behavioral Research for Urban Policy. Springer, Tokyo, pp 79–96. https://doi.org/doi.org/10.1007/978-4-431-56472-0_3
78. Van Acker V, Goodwin P, Witlox F (2016) Key research themes on travel behavior, lifestyle, and sustainable urban mobility. Int J Sustainable Transp 10(1):25–32.

https://doi.org/10.1080/15568318.2013.821003

79. Vasudevan V, Agarwala R, Dash S (2021) Is vehicle ownership in urban india influenced by the availability of high quality dedicated public transit systems? IATSS Res 45(3):286–292. https://doi.org/10.1016/j.iatssr.2020.12.005
80. Verma M (2015) Growing car ownership and dependence in India and its policy implications. Case Stud Transp Policy 3(3):304–310. https://doi.org/10.1016/j.cstp.2014.04.004
81. Verma M, Manoj M, Verma A (2016) Analysis of the influences of attitudinal factors on car ownership decisions among urban young adults in a developing country like India. Transp Res Part F: Psychol Behav 42:90–103. https://doi.org/10.1016/j.trf.2016.06.024
82. von Schönfeld KC, Tan W, Curtis C, Visser JF (2020) Every-day mobility anecdotes: Addressing the blind spot of goal- and expert-oriented mobility research. Transp Res Interdisciplinary Perspect 7:100169. https://doi.org/10.1016/j.trip.2020.100169
83. Vos J, De, Alemi F (2020) Are young adults car-loving urbanites ? Comparing young and older adults ' residential location choice, travel behavior and attitudes. *Transportation Research Part A*, *132*(April 2019), 986–998. https://doi.org/10.1016/j.tra.2020.01.004
84. Wadud Z (2017) Fully automated vehicles: A cost of ownership analysis to inform early adoption. *Transportation Research Part A: Policy and Practice*, *101*(2017), 163–176. https://doi.org/10.1016/j.tra.2017.05.005
85. Wadud Z, Chintakayala PK (2021) To own or not to own – That is the question: The value of owning a (fully automated) vehicle. *Transportation Research Part C: Emerging Technologies*, *123*(August 2020), 102978. https://doi.org/10.1016/j.trc.2021.102978
86. Wagschal U (2016) Cluster analysis. In *Handbook of Research Methods and Applications in Political Science*. Wiley Series in Probability and Statistics. https://doi.org/10.1192/bjp.120.557.474
87. Wang S, Jiang Z, Noland RB, Mondschein AS (2020) Attitudes towards privately-owned and shared autonomous vehicles. Transp Res Part F: Traffic Psychol Behav 72:297–306. https://doi.org/10.1016/j.trf.2020.05.014
88. Weber M (1904) The Methodology of the Social Sciences. In E. A. S. H. A. Finch (Ed.), *The Free Press of Glencoe Illinois*
89. Wu N, Ben X, Yao R, Yu Q, Tang C, Zhao S (2020) A Bayesian sample selection model based on normal mixture to investigate household car ownership and usage behavior. *Travel Behaviour and Society*, *20*(July 2019), 36–50. https://doi.org/10.1016/j.tbs.2020.02.006
90. Wu N, Tang C (2019) Investigation of household private car ownership considering interdependent consumer preference. PLoS ONE 14(7):1–13. https://doi.org/10.1371/journal.pone.0219212
91. Yang L, Ding C, Ju Y, Yu B (2021) Driving as a commuting travel mode choice of car owners in urban China: Roles of the built environment. *Cities*, *112*(September 2020), 103114. https://doi.org/10.1016/j.cities.2021.103114
92. Zhao Z, Zhao J (2020) Car pride and its behavioral implications: an exploration in Shanghai. Transportation 47(2):793–810. https://doi.org/10.1007/s11116-018-9917-0

93. Zhou M, Wang D (2019) Generational differences in attitudes towards car, car ownership and car use in Beijing. Transp Res Part D: Transp Environ 72(May):261–278. https://doi.org/10.1016/j.trd.2019.05.008

Figures

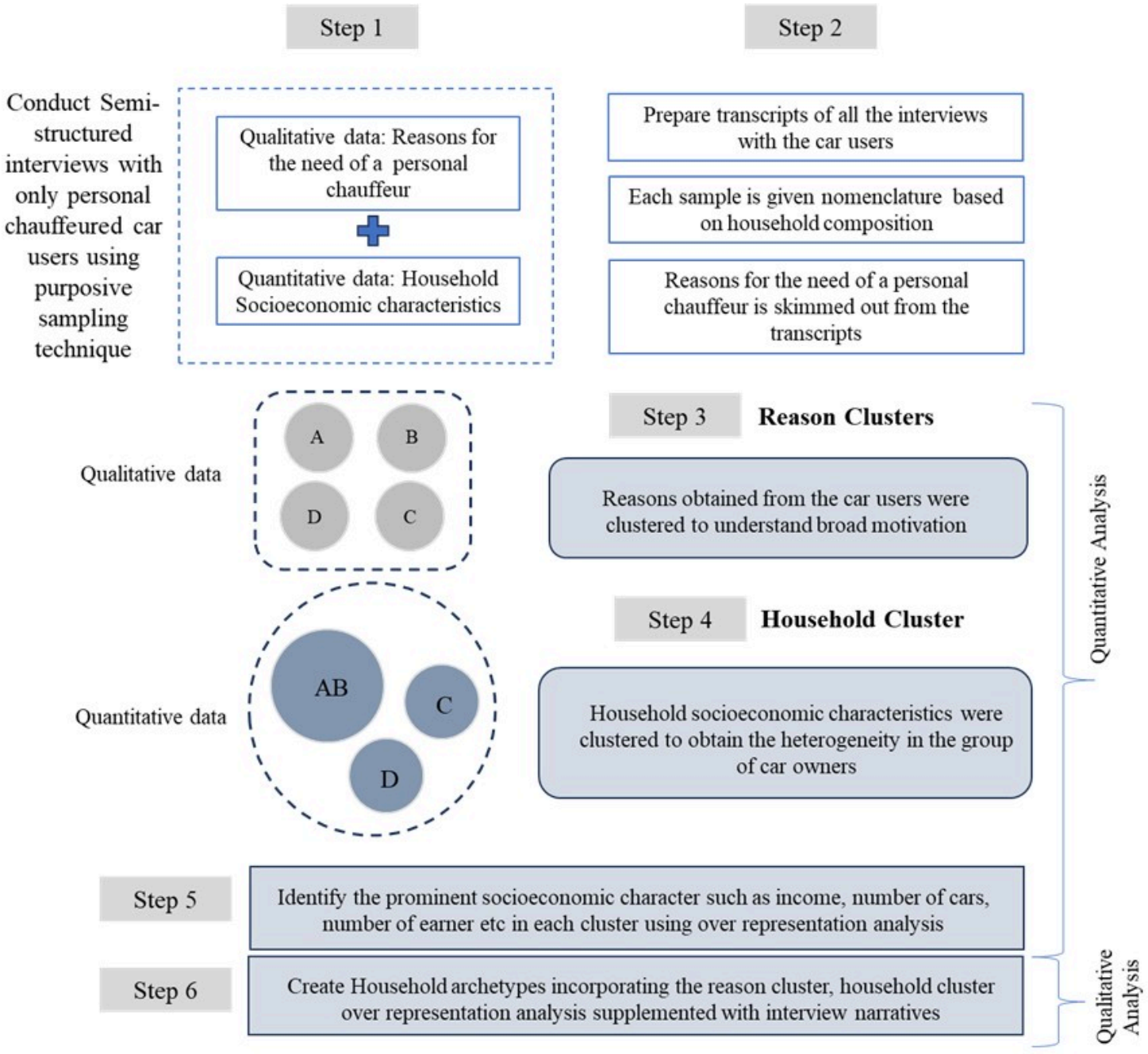
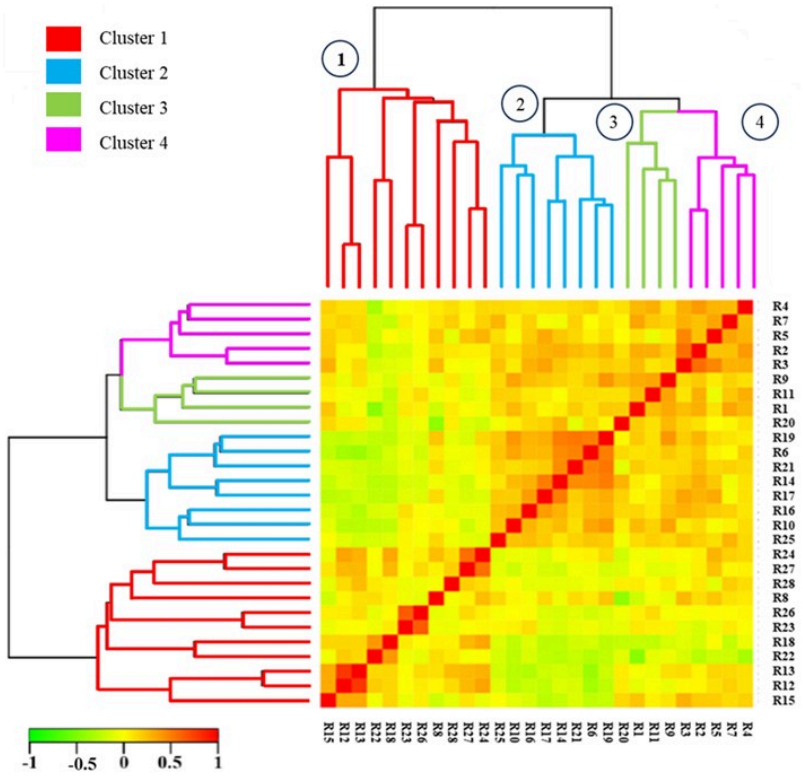


Figure 1

Methodological framework adopted for the study (A, B, C…marked are just for pictorial representation)



Code	Cluster 1 reasons
R22	Households rely on chauffeurs for their driving experience and vehicle knowledge, which helps members gradually learn about driving and car maintenance.
R24	Driver was kept due to residential location and built environment factors that hindered easy car use
R27	Household members reside in geographically disadvantaged areas where there is a lack of suitable modes of travel
R15	A single chauffeur-driven vehicle allows multiple household members to conduct parallel activities without owning multiple cars.
R18	Male member/s or one specific male member whose travel needs are car dependent do not know how to drive a car
R8	Female members in the household do not drive, resulting in dependence on chauffeur-driven mobility.
R12	Lack of driving confidence among household members leads them to rely on a trained and experienced chauffeur.
R13	Concerns about aggressive and rash driving conditions encourage households to entrust driving to professional chauffeurs.
R23	Frequent medical-related trips are easier to manage when a chauffeur can assist the ill or elderly at any time of day.
R26	Limited mobility and physical discomfort make chauffeur support crucial for safe and comfortable travel.
R28	Temporary inability to self-drive due to accidents or health conditions results in continued reliance on chauffeur services.
Code	**Cluster 2 reasons**
R17	Chauffeurs reliably escort children to school and extracurricular activities, ensuring safety and punctuality.
R16	Chauffeurs eliminate unnecessary waiting outside activity locations, allowing households to use time more efficiently.
R19	Male workers in the household have erratic work hours and often travel on short notice
R6	Time constraints make self-driving impractical, while chauffeur-driven travel enables multitasking.
R25	Chauffeur accompaniment enhances feelings of safety during late-night travel or visits to less crowded locations.
R21	Frequent phone calls and messages make it difficult for members to focus on driving.
R14	Male worker in the household has to access the chain of work locations
R10	Long-distance and inter-district trips are more manageable when handled by a professional chauffeur.
Code	**Cluster 3 reasons**
R1	Being driven allows households to commute in a stress-free manner, avoiding the mental and physical demands of driving.
R11	In some households, male members prefer not to drive, making chauffeur-driven travel more comfortable.
R20	Female members may prefer not to drive, reinforcing reliance on chauffeurs for everyday mobility.
R9	Discomfort with night-time driving encourages households to depend on chauffeurs accustomed to such conditions.
Code	**Cluster 4 reasons**
R3	Chauffeurs provide continuous assistance beyond driving, including errands and light household tasks.
R5	Chauffeurs enable smooth execution of chained trips by managing the vehicle while household members attend activities.
R4	Professional chauffeurs possess superior knowledge of traffic rules, road hierarchies, and practical navigation strategies.
R2	Vehicles are better maintained when driven by chauffeurs due to their professional familiarity with car functioning.
R7	Chauffeurs handle parking and cruising challenges, sparing households from navigating congested and space-constrained areas.

Figure 2

Cluster analysis of reasons for choosing Personal Chauffeured Automobility

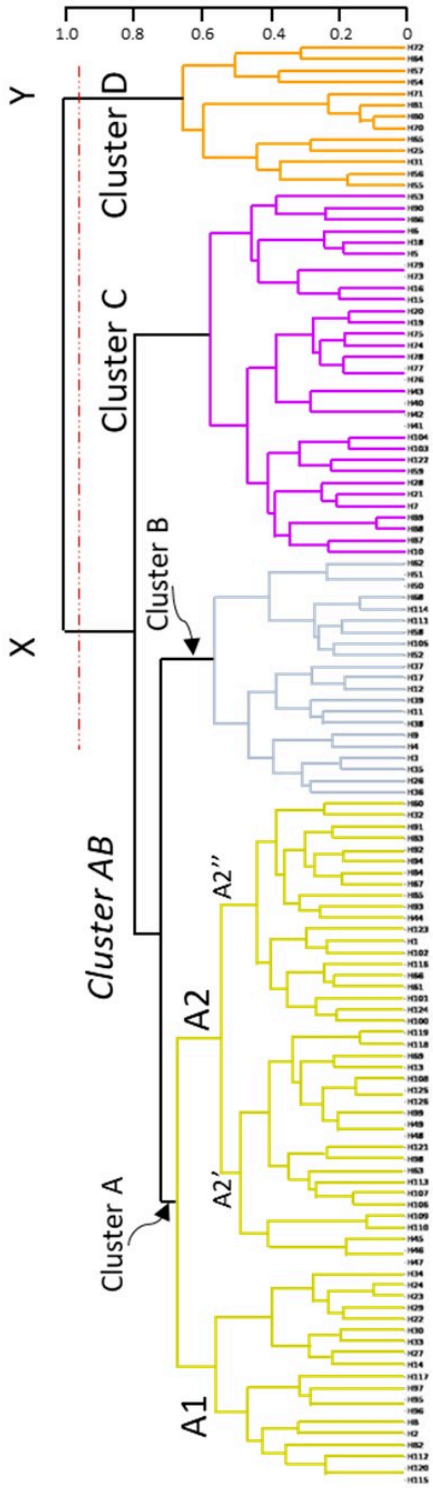


Figure 3

Cluster Analysis of Households that choose personal chauffeured automobility