

Demographics, Work Patterns, and Seasonal Coping Strategies of E-Rickshaw Drivers: A Case Study from Delhi

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Abstract

Electric rickshaws have indubitably solidified their role over the years, especially in the lives of students, as the preferred mode for last-mile connectivity. Existing literature describes e-rickshaw markets as unregulated, where legal frameworks (those that exist) are rarely enforced, and union structures, such as those among auto-rickshaw drivers, are largely absent. In this context, the present mixed-methods study aims to provide a detailed profile of e-rickshaw drivers operating at *Vishwavidyalaya* (University) Metro Station in Delhi which has the presence of large groups of e-rickshaw drivers stemming from high student footfall. Drawing on a primary survey of 67 drivers, we document demographic characteristics, occupational histories, daily work patterns, and the seasonal nature of work. Findings reveal a predominantly migrant workforce with limited formal social protection, working long hours (12-13 hours daily) to earn modest incomes ($\approx ₹1000/\text{day}$). Most drivers shifted from manual or cycle rickshaws, citing higher earnings and flexibility as motivations. Social protection remains limited: while bank account and mobile phone ownership are high (85-95%), insurance coverage and social security scheme enrolment remain low. During the 1.5-2 month summer university break, earnings drop drastically, prompting divergent coping strategies. The study contributes foundational knowledge on informal transport workers, offering baseline data for policy discussions.

Keywords: E-Rickshaws, informal transport, last-mile connectivity, migrant workers, seasonal livelihoods

JEL classification: J81, R40, O18

1. Introduction

1.1 Urban Mobility

De Soto (1989) was one of the first to suggest that informal transportation systems are a direct consequence of increasing urbanisation in developing countries, labelling it as an issue that these governments have repeatedly failed to solve. India's urban population is predicted to hit 814 million by 2050 (United Nations, 2014), this rate being observed in the period between 2018 and 2022, where the urban population increased from 465.87 million to 508.37 million. New Delhi itself is home to a population of 34 million people as of 2023, making it the second-largest urban metropolis in the world (Statista Research Department, 2025). The prominence of paratransit modes of transport in Delhi then becomes an illustration of De Soto's proposition. An increasing population pressure no doubt encourages, or even demands, more creative solutions to the issue of accessibility to mobility solutions in these areas.

Paratransit modes can be broadly divided into three categories (Priye et al, 2021), namely that of the highly regulated market of auto-rickshaws, the traditional hand-pulled cycle rickshaws and the relatively new market of electric rickshaws that emerged somewhat in defiance of these existing mobility structures within the city. These e-rickshaws have been known to serve varying functions in cities with differing levels of income across the country, but have largely fulfilled the purpose of first- and last-mile connectivity in Delhi (Harding & Kandlikar, 2017) as an extension to its sprawling metro system. The reason that a market consisting entirely of private agents, and also remaining an unregulated one, is able to reach a status of mass transit is, firstly, due to the willingness of such a large number of agents to participate and, secondly, the citizens' adoption of a system that provides them with affordable low- and medium-distance transportation with routes that are easily malleable to passenger demand in the short run as well. The fact remains that the introduction of e-rickshaws over 15 years ago filled a gap in the city's mobility sector that formal, public, or regulated modes of transport were unable to, and continues to do so. However, while attempts have been made to analyse the e-rickshaw market, there is still much to understand due to its complexity and nuances, largely due to the fact that functioning may differ based on localities and the demands and preferences of passengers, which becomes difficult to measure and analyse in a standardised manner. The rising popularity

of this mobility option, as well as the increasingly significant source of employment that it proves to be, has caught the eye of many researchers over the years. Welfare outcomes for those employed as e-rickshaw drivers thus become points of interest.

1.2 Emergence and Legal Evolution of E-Rickshaws

Delhi saw the introduction of the first battery rickshaw in 2010 as a result of efforts directed towards green mobility in the city, as well as those propagating the entrepreneurial brainchild of Dr Rajvanshi, who was born in the 1990s. The emergence of this frugal and technologically simple vehicle was initially intended as a replacement for the traditional or “colonial” cycle rickshaw, which slowly became associated with an inhumane, exploitative, and undignified labour service, though some contemporary scholars, such as Das and Franquesa (2025), argue that there has been no true reversal with the shift to e-rickshaws in this regard, attributed in part to the fact that they have not been able to fully phase out cycle rickshaws, which remain crucial to the city’s legacy. E-rickshaws were released on the roads of Delhi in a somewhat chaotic manner, receiving criticism from authorities over a lack of regulations, but were widely accepted by passengers (TERI, 2018) due to their customer-friendly and affordable model. There was, however, little political intervention or efforts at regulation pre-2014, which is when the Delhi High Court declared a blanket ban due to overloading and traffic issues. The ban was eventually overruled as a result of an amendment to the Motor Vehicle Act in 2015 by the Central Government, which integrated electric rickshaws and electric carts into the purview of existing laws, legalising battery rickshaws under 650 watts across the country, registering them with municipal authorities and providing drivers with identification cards. Originally, the Act considered any electric vehicle with a power output of greater than 250 W and a top speed of more than 25 kmph (Rojesh and Harding, 2014) as a motor vehicle, which included the majority of e-rickshaws in Delhi as well. However, the amendment proposed that vehicles with a power output of 650W, instead of 250W, be allowed to ply as non-motorised vehicles, essentially doing away with the need for institutional testing (which would potentially put driver jobs in danger as the vehicles may not pass the performance tests for registration), as well as the need for obtaining commercial licences. The intention behind the proposal was to safeguard driver interests and reduce the opportunity for rent-seeking by local authorities.

The drafting of the E-rickshaw Bill by the BJP, which eventually led to the amendment, was a

result of concessionary lobbying by parties in the run-up to the 2015 Delhi Legislative Assembly Elections, to allow these rickshaws a path of transition from the status of “category B” (evaders) to “category A” (formal). There was a shift in public discourse from questions of the legality of e-rickshaws to other issues, such as infrastructure and regulatory provisions, welfare of e-rickshaw drivers (albeit to a lesser extent), and capping of the number of e-rickshaws, signalling the permanence of the sector within the public fabric of Delhi.

Although there has been some legal evolution with regard to e-rickshaws in the city, there are varying perspectives on the extent to which these regulations have been implemented. For one, it is difficult to exercise the concessionary terms upon which the 2015 amendment was passed. Rickshaws are often seen taking more than 4 passengers, with police influence and group politics affecting e-rickshaw functioning in respective localities, rather than legal frameworks.

Dubey and Dawda (2025), for example, suggest that Indian laws have failed to integrate paratransit modes in the urban transport system. The National Urban Transport Policy (NUTP) fails to formalise and regulate the informal paratransit network, which leads to substandard service quality for commuters. Permits for e-rickshaws (open or closed) do not have a cap on issuance and are renewed every 5 years. State-level regulations vary, as each RTO enforces distinct rules. However, paratransit modes often remain a low priority, causing gaps in service quality, vehicle fitness issues, and passenger safety concerns.

Singh et al. (2021) also verify the failure of regulatory policies for e-rickshaws in Delhi and conclude how regulatory lag has jeopardised the adoption, accountability, and sustainability of e-rickshaw services. Moreover, similar to Dubey and Dawda (2025), this study also highlights the need for timely regulation and governance mechanisms to support new urban transport innovations. Existing studies argue that while Delhi’s policy framework recognises the role of e-rickshaws as a feeder service to formal public transport, the lack of integrated planning and regulatory coherence continues to limit their long-term sustainability and service quality.

1.3 Literature Review

1.3.1 Global and Indian Importance of Informal Transport

(Cervero & Golub, 2007; IDB & WRI, 2020; Oviedo-Hernandez, 2021; Joshi et al., 2023; Bansal et al., 2023)

Cervero and Golub (2007) explain that informal transportation systems mainly operate in areas that are not adequately served by formal transport, playing an important role in providing affordable mobility in low-income countries. In Latin America, more than half of public transportation trips are served by semiformal and informal transportation systems, filling a gap in demand for mobility unfulfilled by government and privately owned modes of transport (IDB & WRI, 2020).

In addition to the gap in formal transportation, the dominant emerging trend amongst paratransit services is perhaps the mushrooming of potentially disruptive digital platforms related to their operation (Oviedo Hernandez et al., 2021). Similarly, Informal transportation in India has its rising demand due to rapid urbanisation (Joshi et al., 2023). The authors note that the urbanised population is expected to reach 40% of India's total population by 2030. They highlight how informal transportation services serve as a filler in the absence of formal transport systems, providing first- and last-mile connectivity, flexibility and adaptability, point-to-point service, accessibility and faster services. The informal transportation sector provides significant employment opportunities for low-skilled workers.

Bansal et al. (2023) analyse Gurugram's informal transportation system and find strong demand for e-rickshaws specifically. The informal transportation system may be conceptualised as not just a means of individual welfare (employment generation) for workers but also beneficial for the whole socio-economic development of society (GT Tucho, 2022). The study argues for the need for sustainable transport policy, considering technological innovation and institutional changes rather than old fuel-based transportation systems, which results in sustainable economics and societal growth, along with environmental protection. Thus, intermediate transport may be considered as a means to achieve SDG 11, which aims to address four crucial attributes related to the safety, affordability, accessibility, and sustainability of the transport system, focusing on improving road safety and public transportation.

Together, these studies show how informal transportation plays a crucial role in the mobility of a nation in an urban context.

1.3.2 Precarity

(Bonner, 2006; Kerzhner 2023)

Informal transportation work is precarious, having a lack of social protection, poor working conditions, and low and unstable incomes, and therefore workers in informal precarious forms of employment often come together and form associations for security (Bonner, 2006). The study mentions methods of association within informal transport systems across three countries (Zambia, Benin, and the Philippines) and identifies three major issues with unions: 1) improving incomes and working conditions, 2) provision of welfare services, and 3) development of financial support systems like cooperatives. Associations within informal forms of transportation can take various forms, such as trade unions, which are formal associations usually for collective bargaining with the state. Formal associations (unions) are not the only form of association; most often, workers come and form various associations, such as local associations, cooperatives, etc., to prevent insecurity, competition, harassment and misuse of power and laws by police.

While policy-focused studies highlight regulatory gaps, other literature, Kerzhner (2023), examines how internal organisation and coordination among informal transport operators shape network expansion and service provisions. This study suggests that coordinated forms of organisation within informal transport systems can be beneficial for drivers by improving routes, stability and income predictability.

Thus, the need for organisation and coordination in informal transportation systems where work is precarious, unregulated and insecure is important, so that social and economic protection can be achieved.

1.3.3 Welfare

(Das and Franquesa, 2025; Khalid et al. 2025; Bari et al. 2021; Priye et al. 2021, Popoola et al. 2025)

In the context of the informal transportation system, the welfare aspect is the overall social, economic, political and emotional well-being of workers. Under these parameters, various

indicators for well-being can be studied, such as job security, stable income, worker benefits, health of workers, debt amount, etc.

Das and Franquesa (2025) have given an interesting, although rather pessimistic, view on the state of e-rickshaw drivers in the present time. Despite the eventual gentrification of the “colonial” cycle rickshaw and the negative stereotyping surrounding it, the technological progression towards the auto-rickshaw and now the e-rickshaw, it is the same class and caste communities that end up participating in the sector. A point of contention is therefore whether welfare outcomes have actually improved as pedallers transition to drivers, or if the focus has actually deviated from these workers, who continue to hold an economically marginalised position in an informal and precarious system. The study is impactful in suggesting that the legitimisation of actors with precarious livelihoods, especially in an informalised space with an ongoing green energy transition movement, is of paramount importance. To not acknowledge their needs is equivalent to propagating an informal and legally grey framework, not to mention an extremely gendered one, which leaves a large chunk of the labour force “unseen” and unable to participate democratically as citizens and economic agents.

On the other hand, conflicting empirical evidence on the welfare and social status of e-rickshaw drivers discusses the financial appeal of e-rickshaw adoption as it is positively correlated with higher income levels for the driver, consistent with previous literature as well (Khalid et al., 2025). Their findings demonstrate a strong positive correlation between economic empowerment attributed to e-rickshaw ownership and improved social standing. In addition to this, health conditions and socio-economic indicators of welfare within a group of e-rickshaw drivers in West Bengal mention that over 15 per cent of the sample population of e-rickshaw drivers suffer from backache problems due to prolonged sitting hours (Bari et al., 2021). Additionally, approximately 1/10th of the population suffers from lung- and headache-related problems.

The socio-economic profile of various transport workers (including e-rickshaw drivers); findings highlight that a huge proportion of the population is male, reflecting the genderisation of the informal transportation system (Priye et al., 2021). Additionally, operational and structural barriers exist/prevail, such as a lack of parking spaces, fixed charging stations and fare

regulation. Furthermore, safety and traffic challenges are a concern; the absence of separate lanes for e-rickshaws and light body structures together increases the risk of accidents. This study implicates the need for dedicated infrastructure and a driving training process for the welfare of e-rickshaw drivers. Similar concerns regarding workers' welfare in the informal transportation sector are highlighted by Popoola et al. (2025). The study mentions how, despite the contribution of paratransit to mobility and the economy, informal public operators in the city remain exposed to livelihood stress, which may result from police harassment.

1.3.4 Legal Challenges

(Neelam, 2021; Kerzhner, 2023)

Indicating potential challenges in the regulatory framework of Delhi, Neelam (2021) analyses e-rickshaw policy in India and recommends suggestions for it to formalize e-rickshaws through standard vehicle registration, mandatory driving licensing and insurance supported through uniform regulatory guidelines. The study indicates that the regulatory framework governing e-rickshaws in Delhi reflects a gradual shift toward formalising informal electric paratransit within the urban transport system.

The E-Rickshaw Sewa Scheme legalized e-rickshaws purchased before 2014 by enabling roadworthiness certification and regulated operation. The Delhi Electric Vehicle Policy promoted battery-electric public transport through subsidies of INR 15,000–30,000, home charging at fixed electricity rates, and expanded public charging infrastructure. However, despite the presence of these policy measures, several regulatory and operational challenges continue to exist, indicating that the current framework has not been fully effective in addressing on-ground issues. Registration of e-rickshaws is permitted only for vehicle models that have received official approval from the relevant authorities. Consequently, a significant proportion of e-rickshaws that are locally assembled or modified fall outside the formal regulatory framework and remain unregistered or non-compliant with existing regulations. The people who drive these e-rickshaws do not get training. The study highlights how the challenge of the absence of comprehensive data tracking and inconsistent enforcement across jurisdictions constrains effective governance of the sector.

While policy-focused studies highlight regulatory gaps, other literature, Kerzhner (2023),

examines how internal organisation and coordination among informal transport operators shape network expansion and service provisions. This study suggests that coordinated forms of organisation within informal transport systems can be beneficial for drivers by improving routes, stability and income predictability.

1.3.5 Seasonality in E-rickshaw functioning

While there is no substantial body of literature on patterns of seasonality and their consequences on livelihoods among e-rickshaw drivers specifically, existing research does highlight the presence of seasonal migration and consequent fluctuations in income within this sector. Puthussery's (2019) work with a large sample of rickshaw pullers (both cycle and electric) in Old Delhi showed evidence that, in addition to more than half of the sample being seasonal migrants, drivers operating battery rickshaws showed much larger monthly savings than cycle rickshaw pullers. This means, by implication, that e-rickshaw drivers potentially have greater savings to fall back on in peak seasons when demand is less, climatic stress, or in the case of returning to their hometowns. Sen and Majumder (2015), via a primary survey in the Malda district of West Bengal, showed that 85% of their sample reported that "season" is a factor for daily fluctuation in earnings. However, it is important to note that this study did not distinguish between manual and electric rickshaws.

1.3.6 Literature Gap

Most of the existing literature addresses the informal transportation system, e-rickshaws as a paratransit mode, regulatory challenges, and the benefits of coordination within informal transportation systems. Though studies on individual driver welfare do exist, they are limited in number and do not capture a large number of indicators such as stress levels, income stability, leisure, frequency of accidents, health issues, and components of expenditure. They also often cannot be generalised due to heterogeneity in e-rickshaw markets across localities. Comprehensive worker profiles of drivers are thus rare.

Similarly, there is very little research on the impact of seasonal factors on the livelihoods of e-rickshaw drivers in particular. These have the potential to significantly impact income due to potential negative effects that can be caused to the vehicle itself (such as during the monsoon season) and hamper functioning, as well as impact earnings via fluctuations in passenger

demand. It also becomes important to analyse the extent of savings by drivers in such scenarios to determine how well they would be able to supplement a potential fall in income; the presence (or absence) of saving practices and infrastructure becoming relevant from a policy point of view as well. This gap in the literature motivates the present study.

1.4 Research Questions and Objectives

The study provides a descriptive account of e-rickshaw drivers operating at Vishwavidyalaya Metro Station in Delhi. It addresses the following questions:

1. Who are the e-rickshaw drivers? What are their demographic characteristics, migration histories, household profiles, and occupational backgrounds?
2. How do they organise their daily work? What are their work hours, vehicle ownership patterns, and daily routines?
3. What assets and social protections do they possess? What is the extent of asset ownership, financial inclusion, and access to social security schemes?
4. How does seasonality affect their livelihoods? How does seasonal variation in demand, particularly during university summer vacations affect their work? What coping strategies do drivers adopt during such lean periods?

This paper is structured as follows. Section 2 describes the research setting and introduces the major e-rickshaw markets at the site. Section 3 details the methodology and analytical framework. Section 4 presents findings on driver demographics, work patterns, asset ownership, and seasonal coping strategies. Section 5 addresses limitations, Section 6 draws out policy implications, and Section 7 concludes.

2. Research Setting

One of the rudimentary observations made during the course of the study was with regard to the heterogeneity of the e-rickshaw market, which not only varied with locality, as one would expect, but also within the locality itself. The Delhi *Vishwavidyalaya* (University) area, with reference to the surrounding neighbourhoods, was taken up as a case study. E-rickshaws in the

North Campus area have been operational since soon after their emergence in 2010, and have steadily increased in number due to the high volume of student demand. This study focuses on e-rickshaws deployed in front of the Vishwavidyalaya Metro Station (Gate No. 4). The station makes for a unique case study as a result of high passenger traffic, with demand being primarily seasonal and subject to university schedules. For the purpose of clear identification, these three distinct organisational structures have been dubbed Area 1 (A1), Area 2 (A2) and Area 3 (A3). Areas 2 and 3 comprise the ‘traditional’ e-rickshaws (image 4) and have organised structures where drivers queue and move in turn, whereas Area 1 consists of smaller-sized e-rickshaws with a disorganised market structure. The present study focuses on Areas 1 and 2 exclusively, the reason for which is elaborated in the methodology (section 3).



Image 1: Satellite View of the Vishwavidyalaya Metro Station Region with Author Defined Areas

Source: Google Maps

2.1 Area 1

Area 1 consists of “mini e-rickshaws” with a seating capacity of 2-4 passengers per trip, depending on the driver's discretion. These are open-bodied models with smaller structures than regular e-rickshaws and a maximum speed of 35-40 kilometres per hour. Drivers part of this group are generally more proactive with regard to obtaining passengers or *sawaris* and can be seen in large numbers standing at the exit gate of the metro station, loudly calling for passengers and leading them to their rickshaws. This is a result of the fact that their group functions in a largely unorganised manner, where any driver is able to enter and participate. Though some drivers did admit to paying a specific amount of money as fees in exchange for being allowed to stand there, indicating the presence of some sort of system, others denied giving such fees,

suggesting that the system is not strictly enforced. This group thus exhibits a market with partially free entry and autonomy over the number of passengers.



Image 2: Vehicle driven in Area 1; **Image 3:** Drivers in Area 1 calling Passengers

2.2 Area 2

Area 2 comprises regular-sized e-rickshaws, seating 4+1 passengers. This model is larger than that of the other group, more spacious, and potentially more stable by virtue of its design. Maximum speeds for these models range from 25-30 kilometres per hour. The drivers of this group function in a systematic manner, moving in a queue from the far right end of the metro station towards the left, picking up passengers only when their turn comes. This market thus ends up being less competitive and far more organised. The group also chooses a *pradhan* or head among themselves, who is one of the drivers and responsible for collecting the mandatory, albeit informal, fee that drivers must pay for standing in line, ensuring rule-following and also handling police-related issues in the area. This enforced fee suggests that drivers may not be able to enter this market according to personal convenience. There was a larger sense of observed camaraderie among drivers in this area, perhaps due to longer waiting times or long-standing relationships.



Image 4: Vehicle driven in Area 2; **Image 5:** Drivers in Area 2 in a well-formed line

3. Methodology

3.1 Primary Survey

The study follows a convergent parallel mixed methods design, integrating quantitative survey data with qualitative insights from open-ended responses and researcher observations. A primary survey was conducted at the *Vishwavidyalaya* Metro Station in New Delhi. The two areas in question were selected due to observed differences in the organisation of drivers (collusive and non-collusive) and similarity in base fares (₹20). Another, smaller, organisation of e-rickshaws was identified at the site through observation (Area 3). However, it was not included in the study due to differences in base fare (₹15), which would affect comparability of outcomes between markets.

A total of 67 drivers participated in the survey. This includes 34 from Area 1 (50.8% of total) and 33 from Area 2 (49.2% of total). The responses were collected over a period of 25 days from 25 October to 18 November, 2025, using a convenience sampling method supplemented by referrals.

Prior to the survey, the team visited the area twice for a scoping study where informal discussions were conducted with the drivers to understand their organisation structures, pricing norms, vehicle ownership status, rental, charging and other costs, seasonal impacts on earnings, and reasons for working in their respective areas.

The questionnaire was formed on the basis of this scoping study. It consisted of sections covering: demographic information, social security, nature and stability of work, income and expenses, market functioning and perceptions. Pilot testing was conducted with 10 drivers to understand whether the questions were clear and comprehensible to the respondents.

The questionnaire was administered by a group of student volunteers from Miranda House college. Each survey took 20-45 minutes to administer, depending on respondents' willingness to engage in discussion. Kobo Toolbox, a digital survey software, was used to administer the survey. While the surveys were conducted in an interview format, and responses manually

recorded by enumerators on their phones, drivers were assured that they were not being voice/video recorded, and consent to participate in the survey was also taken from all respondents.

Drivers were approached during off-peak hours on weekdays (late afternoon) and on weekends. They were informed of the purposes of the study, who was conducting it and the types of questions they will be asked. They were assured of anonymity, confidentiality and were informed that they may choose not to answer any questions they do not wish to (thus leading to varying sample sizes per question).

Questions included quantitative and qualitative answers. Likert-scale items were used when exact numerical recall was difficult, and an open-ended final question allowed participants to address any gaps not covered by the structured questions.

3.2 Analysis

Given the exploratory nature of the study, qualitative data was used to contextualise findings and mitigate Type I error risks. Patterns observed in statistical tests were examined for consistency with drivers' narrative accounts and researchers' observations. This triangulation was particularly important given the semi-legal, largely unregulated nature of work, and potential policy implications for e-rickshaw drivers' welfare.

Statistical analysis was conducted on R as follows:

1. Continuous variables: Welch's t-test for normally distributed data with $n > 30$ per group
2. Non-normal/small sample continuous variables: Wilcoxon rank-sum test
3. Categorical variables:
 - Pearson's χ^2 test for expected counts ≥ 5
 - Fisher's exact test for expected counts < 5

Multiple visualization techniques were employed to complement statistical analysis:

1. Distribution Assessment: Histograms were used to assess normality and distribution shapes of

continuous variables

2. Outlier Detection: Box plots were created to identify and examine outliers
3. Group Comparisons: Bar graphs with error bars were used to visually compare means between collusive and non-collusive markets
4. Composition Analysis: Stacked bar charts and pie charts were used to illustrate proportions and categorical distributions

The analysis proceeds in three parts: first, we characterise the demographic and occupational profile of drivers; second, we identify and measure indicators of market organisation; third, we compare welfare outcomes across market structures.

4. Results and Discussion

4.1 The E-Rickshaw Driver Profile: Demographics, Work Patterns, and Seasonal Effects

4.1.1 Demographics

Table 1

Basic Demographic Details of Drivers

	Area 1				Area 2				Total			
	mean	sd	median	se	mean	sd	median	se	mean	sd	median	se
Age	37.18	10.29	35	1.77	38.48	10	38	1.74	37.82	10.09	37	1.23
HS	5.65	3.33	5.5	0.57	4.91	1.99	5	0.35	5.28	2.76	5	0.34
SE	0.56	0.5	1	0.09	0.64	0.49	1	0.09	0.6	0.49	1	0.06

Note: HS: Household Strength; SE: Sole Earner

Sole Earner is a binary variable, its mean can be interpreted as a proportion

This specific group provides a unique and natural demographically uniform research setting. It is important to note that there would be no errors brought about by gender dynamics in this case because of the complete absence of women e-rickshaw drivers in this market. Referring to Table

1, The mean age for drivers of Areas 2 and 3 is almost the same, 37.18 and 38.48, respectively. In addition to that, there is not much difference in the mean years of experience of drivers of both groups in this sector (10.67 for A1 and 10.05 for A2), as well as in the mean years of schooling obtained (4.5 years for A1 and 4.76 for A2). Drivers live with families of a joint mean size of 5.28 members. The family size of drivers is right-skewed, which indicates that most live in nuclear families (a natural result as we have already established that most drivers are migrant workers), while few may also live as part of a joint family. 56% of A1 drivers are sole earners as compared to 64% of A2 drivers. While Area 2 constitutes 7% more sole-earners in contrast to A1, this difference is statistically insignificant (Refer Appendix, Table A1.1).

Table 2*Birth State of Drivers*

	Area 1			Area 2			Total		
	mean	sd	se	mean	sd	se	mean	sd	se
Bihar	0.62	0.49	0.08	0.25	0.44	0.08	0.44	0.5	0.06
Delhi	0	0	0	0.09	0.3	0.05	0.05	0.21	0.03
Jharkhand	0.06	0.24	0.04	0	0	0	0.03	0.17	0.02
MP	0.03	0.17	0.03	0.06	0.25	0.04	0.05	0.21	0.03
UP	0.29	0.46	0.08	0.59	0.5	0.09	0.44	0.5	0.06

Note: Here the mean represents the proportion of drivers from the region.

Moving to geographical indicators, we can see in Table 2 that 95% of them are migrants, with 88% of them belonging to Uttar Pradesh or Bihar. While this is a common feature of Delhi's informal urban economy, peculiarly we also find that birth state significantly differs with the area drivers work in.

Maximum drivers (62%) in A1 belong to Bihar while A2 is dominated by those belonging to Uttar Pradesh (59%). A possible explanation can be the barriers to entry that persist in the two areas. However, a minute percentage of respondents report geographical locations like native

villages as a barrier. A low p-value (0.007601) indicates the difference between the two chosen groups across states is statistically significant (Refer Appendix, Table A1.2).

There also appear to be substantial differences in place of residence for drivers in the two areas. While drivers generally reside in or near the North Campus area, a greater number of A1 drivers live in neighbourhoods that are relatively greater distances from their work area and normal routes which they ply on. They live in areas such as Majnu ka Tilla (32.25%), Azadpur (14.71%), and Model Town (8.82%). On the other hand, A2 drivers reside in areas closer to the metro station such as Timarpur (18.18%), Roop Nagar (18.18%), Vijaynagar (9.09%) and Patel Chest (9.09%).

Table 3

Assets, Social Security possessed by Drivers and Indicators for Formality

Assets Owned									
	Area 1			Area 2			Total		
	mean	sd	se	mean	sd	se	mean	sd	se
Farmland	0.58	0.5	0.09	0.7	0.47	0.08	0.64	0.48	0.06
Mobile phone	0.84	0.37	0.07	0.97	0.17	0.03	0.91	0.29	0.04
TV	0.32	0.48	0.09	0.55	0.51	0.09	0.44	0.5	0.06
AC	0.06	0.25	0.04	0.12	0.33	0.06	0.09	0.29	0.04
Pucca ghar	0.65	0.49	0.09	0.85	0.36	0.06	0.75	0.44	0.05
Bank account	0.87	0.34	0.06	0.88	0.33	0.06	0.88	0.33	0.04
Social Security Card									
Ration card	0.82	0.39	0.07	0.67	0.48	0.08	0.75	0.44	0.05
Jeevan beema	0.18	0.39	0.07	0.3	0.47	0.08	0.24	0.43	0.05

Formality Indicators									
License Holder	0.29	0.46	0.08	0.58	0.5	0.09	0.43	0.5	0.06
E-Shram card	0.38	0.49	0.08	0.52	0.51	0.09	0.45	0.5	0.06
Vehicle Insurance	0.35	0.49	0.08	0.55	0.51	0.09	0.45	0.5	0.06

Note: Here, the mean represents proportion.

Data showed that an average of 58% of A1 and 70% of A2 drivers possess farmland in their villages (Table 3). Though the productivity of this farmland is unclear, it is indicative of the existence of a rural safety net to some extent. In addition to that, the possession of assets such as televisions, air conditioners and *pucca ghars* or concrete houses (as shown in the table below) gives an idea of the standard of living of drivers. Though an average of 65% of A1 and 85% of A2 drivers live in permanent houses, only 6% of A1 and 12% of A2 drivers have air conditioners installed. The prevalence of mobile phone possession among drivers (84% for A1 and 97% for A2) is likely a result of occupational necessity or a way for drivers to spend their time while waiting for passengers. A high proportion of drivers having bank accounts (87% of A1 drivers and 88% of A2 drivers) implies a medium to high level of financial and social inclusion. Prevalence in possession of both mobile phones and bank accounts is likely also a result of popularity in online payment modes (mainly UPI) among college students, who constitute almost all of their customers. In contrast, the relatively low proportion of drivers having life insurance could be a cause for concern. It was found that 18% of Area 1 drivers and 30% of Area 2 drivers hold a form of life insurance.

The above table also observes various social security measures possessed by drivers. The data collected shows a low percentage of drivers possessing various insurances, or health and food security. Although it is evident that the adoption of social security programs by drivers is very low, of the above-listed indicators, the highest share of drivers possess ration cards, with 39.44% of drivers in A1 and 29.33% in A2 having them. A relatively high proportion of drivers also possess E-Shram cards and vehicle insurance, the number making up about 45% of the total drivers interviewed.

A major difference lies between the two groups when the question of licensed drivers comes into play. It was found that a large chunk of A1 drivers did not have a license or were in the process of getting one, with approximately 29% having a license on average, whereas this proportion reached 58% in A2.

These findings support existing literature that describes informality and social precarity of workers in this sector.

4.1.2 Work Patterns

Table 4

Occupational Details of Drivers

	Area 1				Area 2				Total			
	mean	sd	median	se	mean	sd	median	se	mean	sd	median	se
Total Work Hours	12.08	1.55	12	0.27	12.88	1.98	12.88	0.35	12.48	1.81	12	0.23
Rickshaw Experience (in years)	10.67	8.52	10	1.51	10.05	7.34	10	1.28	10.35	7.89	10	0.98
Owner	0.56	0.5	1	0.09	0.64	0.49	1	0.09	0.6	0.49	1	0.06

Note: Here, the mean for 'Owner' represents proportion.

The survey aimed to capture average daily routines and worker profiles of drivers. In Table 4, it is clear that both A1 and A2 drivers work between 12 and 13 every day on average. The difference in mean work hours between Area 1 and 3 is 48 minutes. E-rickshaw drivers from either area may be owners or renters of their vehicle—being an owner suggests a daily cost of charging, while this cost is generally included in the rent of leased rickshaws. It was observed that most drivers from A2 (64%) were owners of their vehicles, as compared to 56% of A1 drivers.

Table 5

Previous employment and reasons cited for shifting to driving e-rickshaws

Previous Work									
	Area 1			Area 2			Total		
	mean	sd	se	mean	sd	se	mean	sd	se
Farming	0.15	0.36	0.06	0.15	0.36	0.06	0.15	0.36	0.04
Construction work	0.18	0.39	0.07	0.12	0.33	0.06	0.15	0.36	0.04
Sales worker	0.09	0.29	0.05	0.27	0.45	0.08	0.18	0.39	0.05
Factory work	0.12	0.33	0.06	0.09	0.29	0.05	0.1	0.31	0.04
Driver: Pedal rick.	0.44	0.5	0.09	0.3	0.47	0.08	0.37	0.49	0.06
Driver: Other	0.09	0.29	0.05	0.06	0.24	0.04	0.07	0.26	0.03
House work	0.03	0.17	0.03	0	0	0	0.01	0.12	0.01
Why E-Rick?									
	Area 1			Area 2			Total		
	mean	sd	se	mean	sd	se	mean	sd	se
More freedom	0.18	0.39	0.07	0.27	0.45	0.08	0.22	0.42	0.05
Higher income	0.38	0.49	0.08	0.45	0.51	0.09	0.42	0.5	0.06
Was introduced by a relative/friend	0.06	0.24	0.04	0	0	0	0.03	0.17	0.02
Easy to start	0.12	0.33	0.06	0.12	0.33	0.06	0.12	0.33	0.04
Vehicle was easily available	0.06	0.24	0.04	0.06	0.24	0.04	0.06	0.24	0.03

Note: Here, the mean represents proportion.

It was observed that operating e-rickshaws is generally not an initial employment choice for drivers (Table 5). Most drivers shift from other areas of employment such as farming, construction, factory work, etc. Here, the most common former source of employment is that of manual or cycle rickshaws, with an average of 44% of A1 drivers and 30% of A2 drivers operating cycle rickshaws before switching to e-rickshaws. A relatively large proportion (27%)

of A2 drivers also engaged in shopkeeping prior to driving e-rickshaws. When asked about why this shift was made, most drivers cited a perceived higher income as a reason. Others also talked about greater flexibility or freedom (“to be your own boss”) as an e-rickshaw driver, low start-up costs and easy availability of the vehicles in the market.

4.1.3 Seasonal Effects

Table 6

Trends during University Vacations

	Owner (%)	Renter (%)	Total (%)
Work During Vacation			
Go to village	33.33	75	58.7
Take up other work here	11.11	3.57	6.52
Drive e-rick	55.56	21.43	34.78
Work in Village			
Own farm work	66.67	52.38	55.56
Business	0	4.76	3.70
Construction	0	14.29	11.11
Other farm work	0	19.05	14.81
MGNREGA work	0	9.52	7.41
No work	16.67	9.52	11.11
Study	16.67	0	3.70
Survival Strategy: Driving E-Rick			
Reduce expenditure	10	0	6.25
Utilise savings	20	16.67	18.75
Earn enough from e-rick	50	83.33	62.5

Take loan	20	0	12.5
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Note:

- Data collected only from those who responded "Yes" to "whether their income gets impacted during the period of vacations".
- The sub-section, "work in village" is a subset of those who choose to go to village. Here, multiple options could be chosen by the respondents. For example- Few chose both 'own farm work' and 'other farm work'
- Since, we only surveyed those who reported their income getting impacted during vacations, in the section, "Survival Strategy" we list how the subset of e-rick drivers who stay back and continue driving e-rick sustain their 'necessary', 'everyday', expenditure.

The university disperses for 1.5-2 months long vacation during the summers (usually from June-August). As footfall at the metro station falls considerably during such periods, the daily earnings of e-rickshaw drivers also get impacted, motivating a change in their work and consumption patterns. Out of 43 respondents, 41 agreed that their income gets impacted during breaks.

Thus, over 58.7% of total drivers go to their village while 34.78% of them continue to drive e-rickshaws. However, this choice is significantly influenced by ownership status of the vehicle. Driven by daily rent payments varying between ₹400-500, as many as 75% of renters choose to go to their village in contrast to 33.3% of the owners.

Villages serve as sites of relief for many e-rickshaw drivers. Since 64% of total drivers own farmland (refer table 1), 55.56% of those who head back take up farming on their own land. While some take up multiple occupations like 'own farm work' and 'construction work', few drivers also spend time in leisure ('no work') or skill development ('study'). While, interestingly, owners spend more time in activities pertaining to leisure or skill development, nothing can be conclusively said about their behaviour due to sample size restrictions.

Among those who stay back and continue to drive e-rickshaw, 62.5% report that they are able to earn enough to sustain their daily needs. Reduced competition in the area may mediate the impact of reduced passenger footfall as maximum drivers leave for their village during this period. However, others reported that the vacation period impacts their earnings drastically. 31.25% of drivers who drive e-rickshaw during break choose to smoothen their consumption by either utilising their savings or taking a loan, while 6.25% of drivers cut back on their expenditure.

5. Limitations

5.1. Participation and sampling

Some drivers refused to participate in the survey primarily due to lack of time during their working hours, while others were either suspicious or dismissive of the research effort. The researchers were unable to offer monetary incentives to participate to adequately compensate respondents for their time due to financial constraints. However, once a few drivers agreed to participate, trust and responses were gathered through referrals. A few questions were left unanswered since they needed to make a trip. While some came back to complete the survey, few did not.

5.2 Selection Bias

While no significant demographic differences were found between both areas, each driver made a choice regarding which area to operate in. Unobserved characteristics such as risk tolerance or social networks may influence this choice, potentially introducing selection bias.

5.3 Research design and generalisability

The study's single-site design at Vishwavidyalaya metro station limits generalisability. Findings may not extend to e-rickshaw drivers in other Delhi locations or different Indian cities, where local market structures, passenger demographics, and regulatory environments vary. However, the study offers detailed descriptive insights into the demographic profile, work patterns, and seasonal coping strategies of drivers in this specific context. These findings provide valuable baseline data for understanding informal transport workers and provide valuable insight to inform regulation and policy design for this largely unregulated market that lacks social protection for workers.

6. Policy implications

There is a growing debate surrounding the regulation of e-rickshaws. While they improve last-mile connectivity and offer a comparatively accessible form of self-employment, they are increasingly criticised for causing congestion and safety concerns. However, e-rickshaw drivers' lives are characterised by precarity: they lack social security, operate in legal grey areas, and remain vulnerable to rent-seeking by authorities. In response, many have formed informal

groupings to secure income and reduce harassment. Based on our descriptive findings, several policy considerations emerge:

6.1 Provide Infrastructure, Not Just Regulation

Many e-rickshaws park informally around transport hubs such as metro stations while waiting for passengers. Outright formalisation that prohibits such parking would undermine both livelihoods and passenger convenience. Instead, dedicated, legal parking spots should be created at high-demand locations to reduce drivers' precarity and limit opportunities for rent-seeking.

6.2 Improve Awareness and Access to Portable Social Security

Awareness of social-security schemes such as E-Shram remains low among drivers. Even those who possess documents like ration cards or Ayushman Bharat cards often leave them in their villages. Given that a large share of e-rickshaw drivers are migrant workers, it is important to spread awareness about using these benefits in urban areas. Transport authorities could collaborate with pradhans to disseminate information at parking locations.

6.3 Support Age-Appropriate Transitions

Our findings indicate that e-rickshaws are particularly suitable for older workers or those unable to perform physical labour due to injury, as the work is less strenuous than manual rickshaw pulling or construction. At the same time, many younger drivers view this work as temporary, attracted by its income and flexibility. Policy could thus differentiate between e-rickshaws as (1) age-friendly employment and (2) transitional work for youth, with upskilling programmes for the latter.

7. Conclusion

This study was undertaken as an effort to bring driver welfare to focus, in contrast to the majority of literature, which focuses on consumer perceptions, safety, and legal perspectives. Both quantitative and perception-based data is utilised to develop a holistic and detailed illustration of worker profiles, and work patterns in the Vishwavidyalaya Metro Station area.

For this purpose, an area-wise analysis of demographics, daily routines, extent of informality, and work patterns that are affected by seasonality was undertaken. The findings reveal a

predominantly migrant workforce (95%), with 88% originating from Uttar Pradesh or Bihar, living in nuclear families, and working 12-13 hours daily to earn modest incomes ($\approx$ ₹1000/day). Most drivers shifted from manual or cycle rickshaws, citing higher earnings and flexibility as motivations. Vehicle ownership varies across groups (56-64%), influencing daily costs and mobility.

Social protection remains limited: while bank account and mobile phone ownership are high ($\approx$ 85-95%), insurance coverage and social security scheme enrolment remain low. During the 1.5-2 month summer university break, earnings drop sharply, prompting divergent coping strategies: nearly 59% return to their villages, 75% of renters compared to 33% of owners, with over half engaging in farming. Among those who remain, 62.5% sustain daily needs through reduced competition, while 31% rely on savings or loans to smooth consumption.

E-rickshaw drivers continue to operate in the margin, both economically and legally. While there is much public discourse for the regularisation and formalisation of this sector, it is imperative that the heterogeneity of driver profiles and work patterns is understood in greater detail before any effective policy can be introduced.

For this reason, further research is recommended to study similar informal systems prevailing in other regions of NCR so that the inherent heterogeneity of the sector may be acknowledged. Since this form of employment exhibits precarity and instability in the form of earnings and legal issues, deeper understanding of seasonal coping strategies and the role of rural linkages must be studied in greater detail and incorporated in subsequent policies. It is necessary to reiterate that while these driver profiles cannot be generalised due to the inherent heterogeneity of the e-rickshaw market, the findings provide valuable baseline data for understanding informal transport workers and serve as a foundation for future research

8. Acknowledgements

The authors thank Rini Singh for research assistance in data collection and literature review. We are grateful to Vandita Vidisha, Vanshika Venkatraman and Tanya Rajesh for their work as enumerators in collecting survey responses, which supplemented field research conducted by the authors. We also thank Dr. Hena Oak for valuable guidance and feedback throughout this research project.

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Appendix

Test Results

Table A1.1

Numeric Variables under Demographic Details

Mean			
Variable	Area 1	Area 2	Difference
Age	37.18	38.48	-1.3
Household Strength	5.65	4.91	0.74
Sole Earner	0.56	0.64	-0.08

Note: T-test employed as $n > 30$, $*p < 0.1$, $**p < 0.05$, $*** < 0.01$

Table A1.2

Categorical Variables under Demographic Details

Variable	χ^2 (chi sq)	p-value
Place of Birth X Area	13.906	0.007601***
Education X Area	8.4029	0.1354

Note: Pearson's Chi-squared test employed, $*p < 0.1$, $**p < 0.05$, $*** < 0.01$

Table A2*Social Security Cards & Relationship with Area*

Social Security Cards X Area	χ^2 (chi sq)	p-value
Social Security Card		
Ration Card	1.4266	0.2323
Life Insurance	0.86149	0.3533
Formality Indicators		
E-Shram Card	0.3969	0.3969
Vehicle Insurance	7.5868	0.1807
License	1.7045	0.1917

Note: Pearson's Chi-squared test employed, * $p < 0.1$, ** $p < 0.05$, *** < 0.01

Table A3*Asset Ownership & Relationship with Area*

Asset	χ^2 (chi sq)	p-value
Farmland	0.50215	0.4786
Bike/scooter	0	1
Mobile Phone	1.8704	0.1714
TV	2.3843	0.1226
AC	0.12153	0.7274
Bank Account	0	1
Pucca Ghar	2.5233	0.1122

Note: Pearson's Chi-squared test employed, * $p < 0.1$, ** $p < 0.05$, *** < 0.01

Table A4.1*Work Hours, Driving Experience*

Mean			
Variable	Area 1	Area 2	Difference
Work Hours	12.08	12.88	-0.8*
Years of Rickshaw Experience	10.67	10.05	0.62

Note: T-test employed as $n > 30$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.2*Ownership Status*

Variable	χ^2 (chi sq)	p-value
Own X Area	4.3245	0.03757**

Note: Pearson's Chi-squared test employed, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.3*Previous Work*

Occupational Details	χ^2 (chi sq)	p-value
Previous Work	8.2536	0.5088

Note: Pearson's Chi-squared test employed, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.4*Why E-Rickshaw*

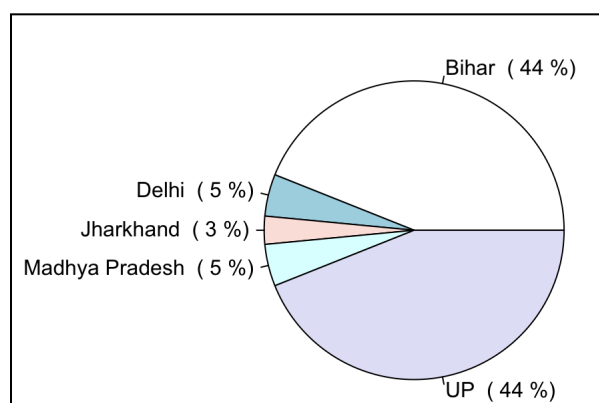
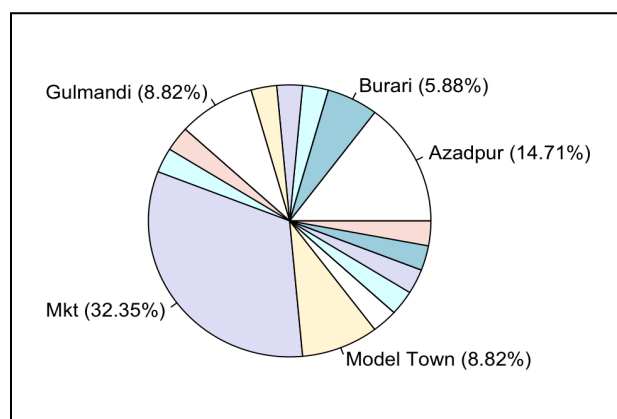
Why E-Rick	χ^2 (chi sq)	p-value
Unemployment	0.047585	0.8273
Higher Income	0.12338	0.7254
Relative/Friend recc	0.48518	0.4861
Easy to Start	5.35E-32	1
Vehicle Available	1.25E-32	1

Note: Pearson's Chi-squared test employed, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A5*Seasonal Work's Relationship with Area & Vehicle Ownership*

Work During Break X Variable	χ^2 (chi sq)	p-value
Ownership	7.8644	0.0196**
Area	2.2899	0.3182

Note: Pearson's Chi-squared test employed, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figures**Figure A1***Birth State of Drivers***Figure A2***Place of Residence of Drivers in Area 1***Figure A3***Place of Residence of Drivers in Area 2*