

Platform Labour, Time Poverty, and Food Security among Food Delivery Riders in Nanjing, China

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Abstract

Online food delivery has become an essential component of urban food systems in China, reshaping how prepared meals, fresh food, and other daily food items circulate among food providers, platforms, and consumers. Although food delivery riders are central to this system, existing studies have mainly examined riders' engagement with algorithmic management and platform control, underscoring their income instability and labour precarity. Less is known about how platform work affects riders' own food access and dietary diversity. Based on a survey of 281 migrant food delivery riders in Nanjing, this study examines how platform labour, migrant status, and time poverty shape riders' food security and workday eating practices. The findings show that migrant riders play a vital role in sustaining urban consumers' access to food, but their dietary diversity and eating routines are constrained by long working hours, uncertain income, mealtime delivery peaks, limited social protection, and insufficient time and space for regular meals. Although most respondents do not report severe household food insecurity, many experience constrained food choices and difficulty maintaining regular, diverse diets. These findings suggest that time poverty is a key mechanism linking platform labour to riders' food security. The paper argues that the resilience of platform-based urban food delivery cannot be separated from riders' own food security and calls for policy approaches that integrate labour regulation, social protection, and urban food governance to reduce time poverty and support access to adequate and diverse diets.

Keywords

platform labour, migrant food delivery riders, time poverty, food security, dietary diversity

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Cover Image

Food delivery riders from multiple delivery platforms place takeout orders at automated pickup lockers on Nanjing University's campus. Photo credit: Wen Yuan Dong

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Introduction

Online food delivery has grown rapidly in China and is now a key part of everyday food access in urban areas. By December 2024, China had 592 million online meal-ordering users, accounting for 53.4% of all internet users (China Internet Network Information Centre, 2025), making it the world's largest online food delivery market. At this scale, online food delivery is no longer a marginal digital service, but a routine way for urban residents to obtain prepared meals and other food items. As food delivery platforms expand, they reorganise how food moves among restaurants, food retailers, platforms, riders, and consumers, making urban food access increasingly dependent on platform coordination and delivery labour (Chen et al., 2022; Chen & Sun, 2020; Huang, 2023). Online food delivery has also reconfigured the meanings, practices, and infrastructures of food in urban life, with wider implications for nutrition, public health, environmental sustainability, and urban ecological systems (Farhangi et al., 2025; Granheim et al., 2022; Jia et al., 2025; Xie et al., 2021).

Food delivery riders are the backbone of this platform-mediated food system. They move between restaurants, shops, residential communities, office areas, and consumer locations, enabling food to circulate across the city within tight delivery windows (Chen et al., 2022; Huang et al., 2026). Their work connects digital orders to the physical movement of food, allowing consumers to obtain meals and other food items without visiting restaurants or food retailers directly. Through spatially dispersed, responsive delivery labour, riders also enable platforms and food businesses to respond rapidly to changing consumer demand (Huang, 2023). Riders are therefore not only platform workers managed through digital applications but also food system workers whose daily labour sustains the everyday circulation of food and consumers' access to it.

However, the convenience and resilience of online food delivery are unevenly distributed across the platform food system. For consumers and food businesses, platform delivery expands food access and improves flexibility in responding to demand. For riders, the same system organises work through algorithmic order allocation, delivery deadlines, customer ratings, incentive mechanisms, performance evaluations, and penalties (Chen et al., 2022; Chen & Sun, 2020; Huang, 2023). Although food delivery is often associated with flexible working hours, riders' actual working days are shaped by order flows, restaurant waiting times, delivery countdowns, and surge periods of intense consumer demand. Because income is typically earned through completed orders, riders may need to work longer and remain continuously available during busy periods to increase their earnings. At the same time, they face uncertain income, delivery pressure, physical fatigue, traffic risks, customer complaints, and limited social protection (Chen et al., 2025; Song & Fielbaum, 2026; Zhan et al., 2026). For migrant riders, these labour conditions also intersect with unstable urban living, weaker access to welfare, and uncertainty about long-term settlement (Chen & Liu, 2016; Lin et al., 2020; Zhu, 2007). Food delivery can therefore provide accessible employment and income while also requiring

substantial time investment and sustained responsiveness to work.

These conditions raise a question that has not received adequate attention: how do food delivery riders secure and organise their own food while spending long hours delivering food to others? Food delivery work is organised around consumer mealtime demand, especially the lunch and dinner peaks, which are also the times when riders need to eat. Long working hours, uncertain income, delivery pressure, and limited control over working time may, in turn, constrain riders' access to food, dietary diversity, and eating routines. The issue is therefore not only whether riders contribute to consumers' access to food, but also whether the labour process that sustains this access impedes riders' personal daily food practices.

Time poverty offers an important lens for understanding this tension. Time scarcity can affect food preparation, food choices, and meal planning (Jabs & Devine, 2006), while extended working hours may create practical barriers to regular, healthy eating (Escoto et al., 2012). For food delivery riders, long working hours are compounded by mobile work, fragmented breaks, and the need to respond continuously to orders. Riders may therefore have to fit meals around delivery routes, restaurant wait times, nearby food outlets, and short gaps between orders. Under these conditions, time poverty may manifest as skipped meals, irregular mealtimes, hurried eating, and eating at locations dictated by work rather than personal preference. Work, rest, and eating thus compete for the same limited time within the working day.

Understanding riders' food conditions also requires looking beyond whether they have enough food. Food insecurity can involve anxiety about food, constrained food choices, reduced food quality, and, in more serious cases, reduced food quantity (Coates et al., 2007). Moreover, having sufficient food does not necessarily ensure a diverse diet. A diet concentrated in a limited number of food groups may provide adequate energy while remaining deficient in nutritional and micronutrient diversity, contributing to "hidden hunger" (Yilmaz & Yilmaz, 2025). Dietary diversity therefore captures an important dimension of food conditions beyond basic food access, while different food-security indicators may reveal related but distinct forms of vulnerability (Maxwell et al., 2013). For riders, food vulnerability may consequently appear not only as difficulty obtaining enough food but also as irregular meals, constrained food choices, and limited dietary diversity.

A significant gap remains in understanding the food security and everyday eating practices of food delivery riders. Research on food delivery riders has largely focused on algorithmic control, platform management, labour precarity, income instability, occupational risks, employment relations, and worker resistance (Chen & Sun, 2020; Huang et al., 2026; Song & Fielbaum, 2026). Meanwhile, research on food security, dietary diversity, and time scarcity has mainly focused on households, consumers, low-income groups, and neighbourhood food environments (Coates et al., 2007;

Jabs & Devine, 2006; Leung & Tester, 2019; Morales & Berkowitz, 2016; Zhang et al., 2021). Less attention has been paid to food delivery riders as food system workers and to how their working conditions shape their food access, dietary diversity, and everyday eating practices. As a result, considerably more is known about how riders deliver food than about what they eat.

This paper addresses this gap by examining migrant food delivery riders in Nanjing, China. Drawing on 281 surveys, it analyses how long working hours, uncertain income, constrained working conditions, and migrant status intersect with riders' experiences of time poverty, food security, dietary diversity, and eating practices during the workday. The central argument is that migrant food delivery riders are vital to the resilience and everyday functioning of Nanjing's urban food system, yet this resilience is unevenly produced through workers' own vulnerability. Riders expand food access for urban consumers, while their own dietary diversity and eating practices may be constrained by platform labour and time poverty.

Literature Review

Platform Labour Precarity and Migrant Vulnerability

Food delivery riders have become an important case for understanding the experience of platform labour in gig economies in the digital age. Existing studies show that platform delivery is not simply flexible or autonomous work. Rather, it produces forms of algorithmic dependency, constrained autonomy, and labour unfreedom (Chen & Sun, 2020). Riders' labour is organised through algorithmic management, piece-rate payment, delivery deadlines, customer ratings, platform rules, and performance evaluations (Chen et al., 2022; Chen et al., 2025; Huang, 2023). Platforms allocate orders, calculate routes, set delivery time limits, evaluate service quality, and impose penalties through digital systems. Riders may not be directly supervised by conventional managers, but their movements, waiting times, delivery speed, and service performance are continuously measured and evaluated. These mechanisms shape when riders work, how they move through the city, how quickly they deliver, and how much income they can earn.

Food delivery work is also organised through urban space and time. Riders do not work only within a digital platform; they must move between restaurants, roads, residential communities, delivery zones, and local labour markets. Recent studies show that platform control operates through both digital systems and material urban spaces (Huang et al., 2026). This means that riders' labour is shaped by the interaction between platform technologies and the everyday geography of the city. Specifically, the food environment, transportation system, and the spatial distribution of residential compounds are key determinants of delivery riders' everyday experiences. At the same time, although riders are often described as having flexible working hours, their work is strongly shaped by delivery countdowns, peak-hour incentives, waiting time, and penalties for delays. Riders may use fragmented time to increase their earnings, but this

fragmented time is also produced and disciplined by platform systems (Chen & Sun, 2020). Platform work, therefore, does not simply give riders control over their time; it also compresses and reorganises it around consumer demand and delivery deadlines.

This labour arrangement creates both income opportunities and vulnerability. Because riders' earnings are typically tied to completed orders, their income depends on order volume, delivery distance, platform payment rules, weather, local demand, and availability during peak periods. This encourages riders to extend their working hours and remain available during lunch, dinner, and evening peaks. At the same time, riders face traffic risks, physical fatigue, delivery pressure, customer complaints, and uncertain responsibility when accidents or disputes occur (Chen et al., 2025; Song & Fielbaum, 2026). In China, labour outsourcing, delivery stations, and ambiguous employment relations may further complicate riders' access to social insurance and labour rights (Huang, 2023; Zhan et al., 2026). Platform delivery thus combines relatively accessible income opportunities with uncertain earnings, sustained time demands, and weak labour protection.

Food delivery riders in Chinese cities should also be understood within the broader context of internal migration. Many riders are not local urban residents, but migrants from other cities, regions, or rural areas. Their urban lives are therefore shaped not only by platform labour but also by migrant status and unequal access to urban resources. Research on China's migrant workers shows that they have contributed significantly to urbanisation and economic growth, while often remaining disadvantaged in welfare provision and social integration (Zhu, 2007). A key issue is *hukou*, the household registration system that classifies individuals by place of registration and, historically, by rural or urban status. *Hukou* status has long limited migrants' access to housing, education, healthcare, social insurance, and other public services (Chen & Liu, 2016). Although *hukou* reforms have reduced some institutional barriers, migrant status still shapes the stability of urban life.

Housing, neighbourhood conditions, and access to welfare further shape migrant vulnerability. Where migrants live usually represents housing quality, which in turn affects access to services, social integration, and a sense of belonging. Migrants living in commodity-housing neighbourhoods tend to report higher levels of social integration than those living in urban villages, rural villages, factory dormitories, or older neighbourhoods (Lin et al., 2020). More inclusive rental communities may improve urban integration, while insecure housing tenure may reinforce socioeconomic disadvantage (Zheng et al., 2020; Zou & Deng, 2022). Social insurance is equally important, particularly because platform delivery often involves fragmented or ambiguous employment relationships and uneven access to employment-based protection (Feng et al., 2024; Zhang & Liu, 2025). For migrant food delivery riders, these institutional gaps may overlap with disadvantages associated with migrant status, producing insecurity both as platform workers and as migrants within the urban welfare system (Lin, 2025; Zhang & Liu, 2025).

Platform precarity and migrant vulnerability are closely connected. Food delivery may offer migrants a relatively accessible route into urban employment and an immediate source of income, but it may also entail uncertain earnings, limited protection, unstable housing, and sustained time demands. These overlapping conditions may extend beyond employment and shape riders' everyday access to food, dietary diversity, and eating routines. However, existing research has paid much more attention to labour control and migrant integration than to how these conditions affect riders' personal food engagement and practices.

Time Poverty, Food Security, and Eating Practices

Food security is not only about whether people have enough food. It also concerns whether they can obtain sufficient, acceptable, and nutritious food in a stable and affordable way. Food insecurity may therefore manifest as anxiety about the food supply, inability to obtain preferred foods, reduced food quality, limited dietary variety, disrupted eating patterns, or, in more serious cases, reduced food intake. Existing studies show that food insecurity is often associated with poorer diet quality, lower consumption of nutrient-dense foods, and greater reliance on cheaper, more energy-dense alternatives (Kohanmoo et al., 2024; Leung & Tester, 2019; Morales & Berkowitz, 2016). Food vulnerability may therefore appear not only as insufficient quantity but also as constrained food choices and limited dietary diversity.

Food access is shaped by broader conditions of everyday life. Income and food prices are important, but they do not fully determine what people can eat. Time, mobility, transportation, household arrangements, cooking facilities, food knowledge, and neighbourhood food environments also matter. Research shows that barriers to healthy food consumption include not only cost and distance, but also time constraints, transportation difficulties, and unequal access to healthy and affordable food (Katre & Raddatz, 2023; Odoms-Young et al., 2024). Time poverty is especially important in this regard. Time scarcity refers to the perceived lack of sufficient time to complete necessary or desired activities in daily life, reflecting a condition of being "time poor" (Jabs & Devine, 2006; Vickery, 1977). It has been associated with less home food preparation, greater reliance on fast food and convenience foods, fewer shared meals, and more frequent consumption of ready-prepared foods (Jabs & Devine, 2006). Time is therefore a practical resource for food security because people need it to buy food, prepare meals, eat, and maintain dietary routines.

The relationship between working hours and diet, however, cannot be assumed to be straightforward. Working hours do not always have a direct or linear relationship with diet quality, eating out, or takeaway consumption (Sam et al., 2019). Their effects interact with household composition, food responsibilities, income, work schedules, mobility, and daily routines. Long working hours alone do not necessarily cause food insecurity, but they may become an important constraint when combined with unstable income, fragmented rest, mobile work, and limited control over mealtimes.

For food delivery riders, this connection between work and food is particularly direct. Their work is mobile, route-based, and organised around platform orders, while the periods when riders are most needed by consumers are also when they need to eat. Lunch and dinner peaks therefore create a tension: riders' availability helps sustain consumers' food access, while the same availability may reduce their ability to reserve stable, unhurried mealtimes for themselves. Riders may have to arrange meals around delivery routes, restaurant wait times, nearby food outlets, and short intervals between orders. Under these conditions, time poverty may manifest as skipped meals, irregular mealtimes, hurried eating, reliance on convenient foods, and limited control over where and when to eat. Eating may also become spatially constrained, as riders often eat near delivery starting points, along delivery routes, or during short breaks between orders. Platform delivery may therefore save time for consumers while compressing and reorganising the time and space available for riders' own eating.

Research Gap

Existing studies have examined platform labour, migrant urban vulnerability, food security, and time poverty as separate themes, yet these fields have rarely been connected through the everyday food practices of migrant food delivery riders. Platform-labour research explains how riders are managed, paid, and exposed to occupational and economic risks, but pays limited attention to how these working conditions shape riders' food access and eating routines. Migrant-worker research explains how hukou, housing, welfare access, and settlement conditions shape urban vulnerability, but rarely examines food security in the context of platform delivery. Food-security research, meanwhile, has focused mainly on households, consumers, low-income groups, and neighbourhood food environments rather than on the workers whose labour circulates food through the city.

This gap matters because migrant food delivery riders occupy a paradoxical position in urban food systems. They help expand food access for urban consumers, yet their ability to maintain regular, diverse, nutritious diets may be constrained by long working hours, uncertain income, platform rules, limited protection, migrant status, and time poverty. Existing research has therefore provided much more insight into how riders deliver food than into how they eat. This study addresses this gap by examining migrant food delivery riders in Nanjing as both platform workers and food system workers, and by linking platform-labour precarity and migrant vulnerability to time poverty, eating practices, food insecurity, and dietary diversity.

Research Methods

Study Area

Nanjing, the capital of Jiangsu Province, lies in the Yangtze River Delta along China's eastern coast. By the end of 2025, Nanjing had a permanent resident population of 9.64 million, of whom 88% resided in urban areas (Nanjing Municipal Bureau of Statistics, 2026). As an economically developed,

highly urbanised city, Nanjing recorded a GDP of ¥1.94 trillion in 2025. The primary, secondary, and tertiary sectors accounted for approximately 1.7%, 30.2%, and 68.0% of GDP, respectively. Its per capita GDP was ¥202,220 (about USD 28,135), about 2.03 times the national average of ¥99,665 (about USD 13,866). The per capita disposable income of urban residents reached ¥86,320 (about USD 12,009), about 1.53 times the national urban average of ¥56,502 (about USD 7,861) (Nanjing Municipal Bureau of Statistics, 2026; National Bureau of Statistics of China, 2026). These socioeconomic conditions provide a suitable urban context for examining platform-based food delivery in a relatively developed Chinese city.

Nanjing was selected as the study area for three main reasons. First, it is a representative case of an economically developed, highly urbanised city in eastern China, where online food delivery is now embedded in everyday urban food consumption. Second, Nanjing provides a suitable setting for examining migrant food delivery riders, as migrant workers constitute an important part of the city's labour force and are closely connected to urban service employment. According to the Seventh National Population Census, Nanjing had 2.65 million migrants in 2020, accounting for 28.5% of the city's permanent resident population (Nanjing Municipal Bureau of Statistics, 2021). In this labour-market context, platform-based delivery has become a convenient pathway for migrant workers to participate in the urban service economy. The scale of food delivery work in Nanjing also underscores the relevance of this case: in 2024, the city had approximately 20,000 dedicated delivery riders and 30,000 crowdsourced riders, totaling about 50,000 food delivery riders (Workers' Daily, 2024). Food delivery riders in this city therefore occupy a dual position. They are platform workers whose income and working time are shaped by delivery platforms, and they are also food system workers who help sustain urban food access through the daily circulation of meals and food items.

Third, Nanjing has an established research foundation in urban food security and food systems. Existing studies have examined the diversity of food sources and the continuing importance of wet markets in urban food access (Si et al., 2019), comprehensive urban food-system planning and governance (Zhong et al., 2021), and the relationship between online food purchasing and household food security during the COVID-19 pandemic (Liang et al., 2022). Taken together, these characteristics make Nanjing an appropriate case for analysing the relationship between migrant food delivery riders, platform labour, urban food access, and food security.

Data and Sampling

The data used in this study were primarily drawn from a questionnaire survey of migrant food delivery riders in Nanjing, conducted from September to October 2024. The survey was administered by trained students using an online survey platform. All respondents were food delivery riders working in Nanjing. Eligibility was determined by a screening question asking whether respondents had migrated from

another urban or rural area to Nanjing. All 281 respondents in the final sample met this criterion, yielding 281 valid questionnaires.

The study sites were selected to reflect the spatial coverage of the 2022/2023 citywide Household Food Security Survey in Nanjing, while accounting for each district's population weight. The citywide survey covered 1,722 households from 100 communities in 30 sub-districts across 11 districts. Commercial centres and take-away rider rest stations near the selected communities were then identified as fieldwork sites. Migrant food delivery riders willing to complete the questionnaire immediately were surveyed on site; others registered their information and completed an electronic version later, with phone numbers used for identity verification and to reduce duplicate responses.

Measuring Food Security and Dietary Diversity

This study employed the Household Food Insecurity Access Scale (HFIAS), the Household Food Insecurity Access Prevalence indicator (HFIAP), and the Household Dietary Diversity Score (HDDS) to assess household food security and dietary diversity among migrant food delivery riders (Coates et al., 2007; Swindale & Bilinsky, 2006). HFIAS measures the level of household food insecurity in the dimension of food access. It is assessed using nine questions about respondents' experiences over the past four weeks. These questions cover anxiety about food, inability to eat preferred foods, limited dietary variety, eating unwanted foods, reduced meal size, reduced meal frequency, going without food, going to sleep hungry, and going a whole day and night without eating. Each experience was coded as 0 = never, 1 = rarely, 2 = sometimes, and 3 = often. The total HFIAS score ranges from 0 to 27, with a higher score indicating more severe food insecurity.

HFIAP was derived from responses to the HFIAS occurrence and frequency questions. It classifies households into four categories: food secure, mildly food insecure, moderately food insecure, and severely food insecure. While HFIAS provides a continuous score of food insecurity severity, HFIAP reports the prevalence of these categories. Together, HFIAS and HFIAP indicate whether riders' households experienced difficulties accessing sufficient, preferred, and adequate food.

HDDS captures dietary diversity by counting the number of food groups consumed by the household over the past 24 hours. Food items are grouped into 12 categories: cereals, roots and tubers, vegetables, fruits, meat (meat, poultry, and offal), eggs, fish and seafood, pulses/legumes/nuts, milk and dairy products, oils/fat, sugar/honey, and miscellaneous. HDDS complements HFIAS and HFIAP by showing not only whether migrant riders' households had enough food, but also whether their diets were sufficiently diverse. This distinction is important because food insecurity among migrant food delivery riders may manifest not only as severe hunger, but also as constraints on food quality, dietary diversity, and everyday eating practices.

Riders' Working Time and Food Security

Migrant Status, Platform Work, and Working Time

Food delivery has become an important source of employment for migrant workers in urban areas (Sun & Zhao, 2024). This pattern was also evident among the riders surveyed in Nanjing. Although 88.6% of respondents had lived in Nanjing for more than six months each year, only 22.7% currently held a Nanjing *hukou*. By birthplace, 60.0% were from other provinces, 26.8% from elsewhere in Jiangsu Province, and only 13.2% were born in Nanjing. Most respondents were therefore migrant workers who had established a relatively sustained presence in the city while remaining non-local in terms of *hukou* or place of origin. The strong presence of migrants in food delivery reflects the sector's role as an accessible employment opportunity for migrant workers in urban China.

Platform delivery was an important form of employment for this migrant workforce. Nearly three-quarters of respondents (74.3%) worked directly for mobile internet platform enterprises, while others were employed through labour outsourcing enterprises or regional delivery companies connected to platforms. Food delivery therefore provided not only an entry point into urban employment but also a particular form of labour organisation through which migrant workers were incorporated into the urban service economy.

The reasons for entering food delivery explain why platform work became an important employment option. As shown in Table 1, riders' motivations can be broadly grouped into three dimensions: economic and employment pressures, the

pursuit of greater work-time flexibility, and personal or social considerations. The most frequently reported reasons were needing more money to survive (26.0%), being unemployed or unable to find other work (24.9%), and wanting greater control over working time (21.7%). Other income-related motivations included dissatisfaction with previous earnings and the prospect of earning more through additional work. Entry into food delivery was therefore shaped by both economic pressure and perceived flexibility. For some riders, it provided access to employment and income when other opportunities were limited; for others, it appeared to offer greater control over working time and the possibility of increasing earnings through additional labour.

This combination of economic pressure and perceived flexibility is particularly important when examining riders' actual working hours. Riders worked an average of 9.5 hours per day, while the median and mode were both 10 hours. Overall, 65.7% worked more than eight hours per day. The largest group worked 10 hours per day (33.1%), while 10.5% worked 12 hours and a further 5.4% worked more than 12 hours (Table 2). These figures are substantial when compared with established global standards for working time. The International Labour Organisation (ILO) established eight hours per day and 48 hours per week as conventional limits of normal working time (ILO, 1919), while the World Health Organisation (WHO)/ILO Joint Estimates identify 55 hours or more of working time per week as contributing to increased health risks such as ischaemic heart disease and stroke (Pega et al., 2021). The prevalence of 10-hour, 12-hour, and even longer working days in the rider sample therefore indicates that long working hours were a common feature of delivery work in China.

Table 1: Main Reasons for Becoming a Food Delivery Rider		
Broad category	Main response items	Item shares (%)
Economic and employment pressures	Need more money to survive	26.0
	Unemployed or unable to find other jobs	24.9
	Previous job did not pay enough	17.4
	Can earn more through overtime	17.4
	Want greater financial security for family	12.5
	Previous job did not fit qualifications	5.3
Work-time flexibility	Want more control over working time	21.7
Personal and social considerations	Wanted to do something new	10.0
	People around me had become riders	5.0
Other reasons	Other	17.1

Note: This was a multiple-response question. The table lists response items selected by at least 5% of the full sample.

Daily working hours	Average monthly income (¥)	Share (%)
More than 12 hours	7,684	5.4
12 hours	6,632	10.5
11 hours	7,714	8.8
10 hours	6,242	33.1
9 hours	5,237	7.9
8 hours	5,214	23.4
7 hours	6,000	4.6
Less than 7 hours	2,367	6.3
Summary statistics	Daily working hours	Monthly income (¥)
Mean	9.5	5,915
Median	10	6,000
Mode	10	5,000

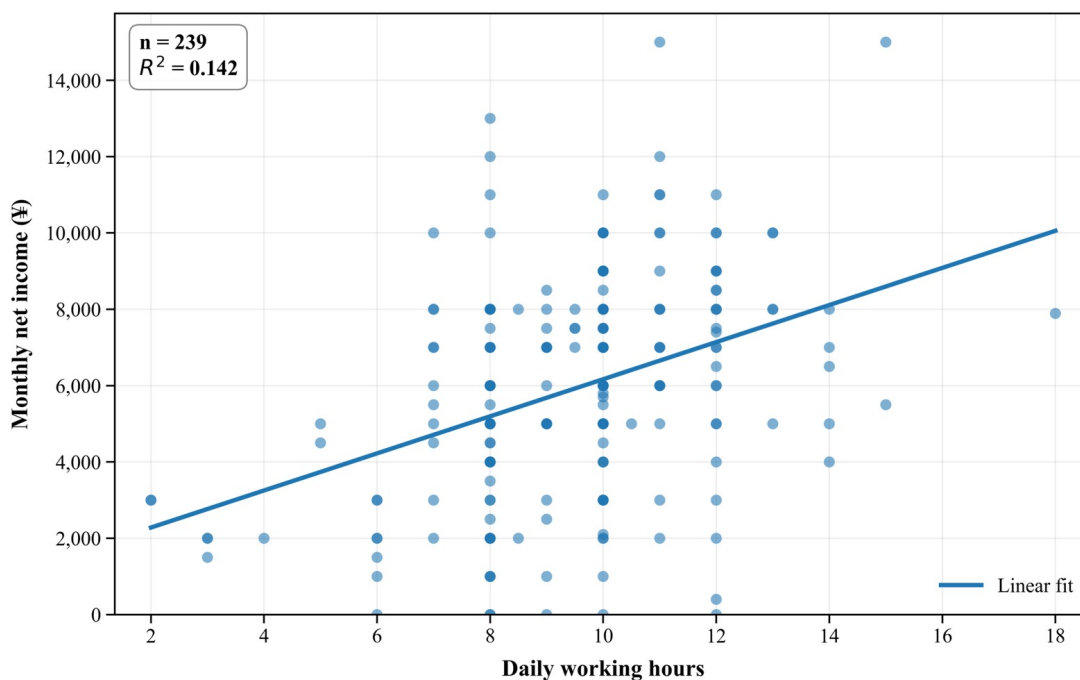
Note: All statistics are based on 239 respondents with valid data for both daily working hours and monthly net income.

The relationship between working time and income further underscores the economic significance of these long hours. Among the 239 riders with valid information for both variables, daily working hours were positively associated with monthly net income ($R^2 = 0.142$) (Figure 1). Considerable income variation persisted among riders working similar hours, but the overall pattern suggests that greater time investment was generally associated with higher monthly earnings. Table 2 points in the same direction: several of the longer-working-hour groups also reported higher average monthly incomes, although the relationship was not uniform across all categories.

These findings reveal an important tension in how platform delivery work is organised. Greater control over working

time was a key reason riders entered the sector, yet their working lives were marked by long working days, and greater time investment was positively associated with monthly earnings. This tension echoes research showing that the apparent flexibility of food delivery work can coexist with strong forms of platform-mediated time discipline (Chen & Sun, 2020). For the riders surveyed in Nanjing, flexibility therefore did not necessarily mean freedom from temporal pressure. Among migrant workers entering delivery under income and employment pressures, the ability to work longer could itself become economically valuable. Platform work thus combined formal flexibility with sustained pressure to invest time in earning income, creating the temporal conditions that shaped riders' everyday lives.

Figure 1: Relationship between Daily Working Hours and Monthly Net Income



Labour Challenges, Income, and Social Protection

The economic opportunities in food delivery were closely tied to its piece-rate payment structure. Riders' earnings were based on completed orders rather than a fixed monthly wage. Among the 216 riders with valid data for both per-order and monthly net income, the average reported payment was ¥5.6 (USD 0.83) per order, with the median and mode both at ¥5 (USD 0.74). Nearly half of these riders (47.7%) earned between ¥4 and ¥5 per order, while 18.5% earned between ¥5 and ¥6 per order (Table 3). Under this payment structure, each completed order represented an additional earning opportunity, making the accumulation of delivery tasks central to income generation.

Table 3 also suggests that higher payment per order did not necessarily translate directly into higher monthly income. Among the 216 riders with valid information for both variables, the linear model explained only 1.8% of the variation in monthly net income ($R^2 = 0.018$) (Figure 2). Riders receiving similar payments per order could therefore end up

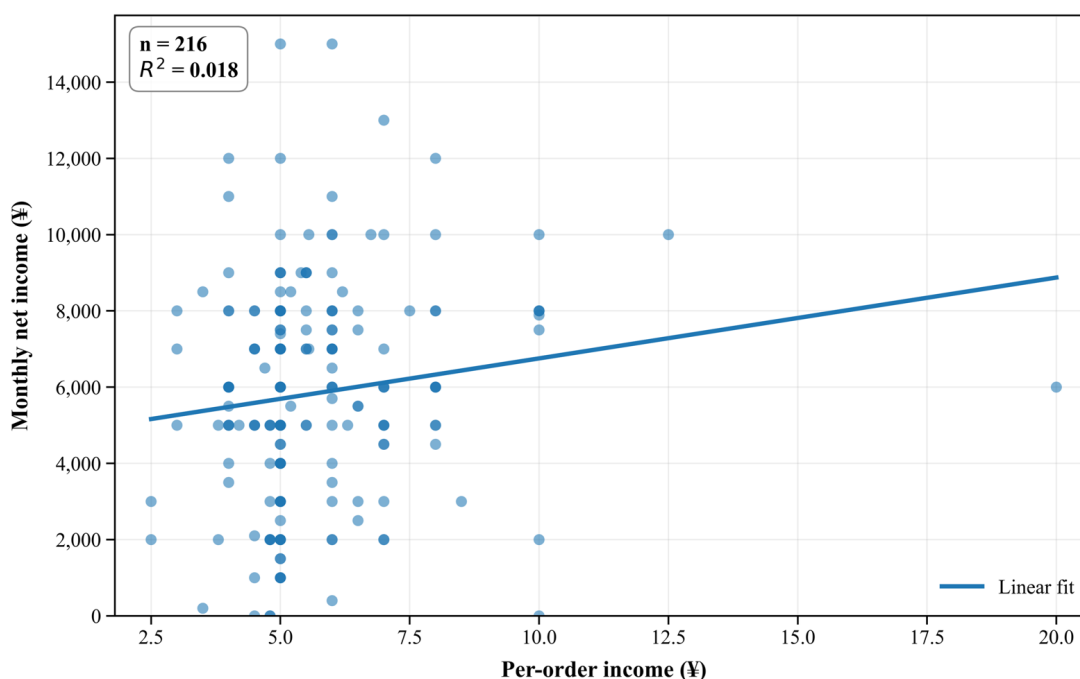
with substantially different earnings. By comparison, daily working hours showed a clearer positive association with monthly income ($R^2 = 0.142$), as shown in Figure 1. The contrast between Figure 1 and Figure 2 suggests that monthly earnings were shaped less by how much riders received per order, but more by their capacity to accumulate paid tasks through continued participation in delivery work. Working time is much more important than per-order pay in determining riders' earnings. Continued availability becomes economically important and central to the labour process (Wei et al., 2022).

Table 4 further illustrates how this income was earned. Riders in higher monthly income groups generally worked longer hours per day and accumulated more hours over the month. Average daily working time rose from 7.8 hours among riders earning no more than ¥2,000 (USD 296.4) per month to 10.6 hours among those earning more than ¥8,000 (USD 1,185.6), while estimated monthly working time rose from 220.7 to 292.1 hours. The largest share

Rank	Per-order income (¥)	Share (%)	Average monthly income (¥)
1	>4–5	47.7	5,155
2	>5–6	18.5	6,965
3	>6–7	10.6	5,848
4	>7	10.6	6,734
5	>3–4	10.2	6,077
6	≤3	2.3	5,000
Summary statistics		Per-order income	Monthly income (¥)
Mean		5.6	5,823
Median		5.0	6,000
Mode		5.0	5,000

Note: All statistics are based on 216 respondents with valid data for both per-order income and monthly net income.

Figure 2: Relationship between Per-Order Income and Monthly Net Income



Monthly net income (¥)	Share (%)	Daily hours	Working days	Monthly hours	Hourly income (¥)
≤2,000	11.6	7.8	27.4	220.7	9.0
>2,000–4,000	13.6	8.6	27.6	250.1	15.1
>4,000–6,000	31.0	9.4	26.8	253.1	23.0
>6,000–8,000	27.7	10.0	27.0	273.5	29.4
>8,000	16.1	10.6	27.5	292.1	36.7

Note: Monthly working hours were first calculated for each respondent by multiplying daily working hours by the number of working days in the month and then averaged within each income group.

of respondents earned between ¥4,000 and ¥6,000 (USD 592.8–889.2) per month (31.0%), followed by those earning between ¥6,000 and ¥8,000 (USD 889.2–1185.6) (27.7%). For comparison, the average annual wage of employees in urban private-sector units in Jiangsu Province was ¥78,114 (USD 11,576.6) in 2024, equivalent to approximately ¥6,510 (USD 964.8) per month (Jiangsu Provincial Bureau of Statistics, 2025). Food delivery could therefore provide earnings around or above this provincial benchmark for some riders, but higher monthly income was generally accompanied by greater working time.

The labour required to generate this income extended beyond regular working hours. Riders had to remain responsive to order flows while coordinating platform requirements, customer expectations, restaurant preparation times, traffic conditions, and access rules in residential compounds and office buildings. Delays, complaints, accidents, illness, bad weather, or fluctuations in consumer demand could all affect the number of orders completed and the income ultimately earned. These uncertainties were part of the ordinary conditions under which delivery income was produced, placing pressure on riders' time, bodies, and mobility.

Social protection remained limited in relation to these risks. In the survey, 41.3% of respondents reported not paying social insurance, and only 2.5% participated in employee social insurance. Another 21.0% were covered by resident social insurance, while smaller shares relied on mandatory or voluntary commercial insurance provided through platforms. This limited connection to employment-based social protection aligns with broader concerns that fragmented employment arrangements in platform work can weaken workers' access to more stable forms of institutional protection (Zhan et al., 2026).

Food delivery income was therefore marked by a tension between opportunity and insecurity. It could provide migrant riders with cash income, and, for some, earnings close to or above average private-sector wages in Jiangsu. Yet this income was produced through long working hours, continuous physical availability, fluctuating order volumes, and weak social protection. While previous research has highlighted the precarious conditions of platform work (Huang, 2023), the findings here add a further nuance: riders' vulnerability was not simply a matter of earning too little. The central issue lies in the labour arrangement through which that income was produced and the limited protection available against the associated risks.

Time Poverty and Eating Practices during Workdays

Riders' workday eating practices show how the temporal organisation of platform labour extends into everyday food routines. The issue was not simply whether riders could obtain food, but whether they had sufficient control over the time and space needed to eat regularly. Within a workday organised around orders, pickup points, waiting times, delivery routes, and demand peaks, eating competed with work and rest for limited time. This section therefore examines riders' time poverty through three interrelated expressions: meal skipping, temporal irregularity, and spatially constrained eating.

Meal skipping was selective rather than universal, but breakfast was more likely to be skipped than lunch. As shown in Table 5, 41.6% of valid respondents never skipped breakfast, 40.5% rarely skipped it, 12.4% sometimes skipped it, and 5.4% often skipped it. Lunch was more regular: 62.9% never skipped lunch, and 25.5% rarely skipped it, while only 8.1% sometimes and 3.5% often skipped lunch. Riders therefore did not generally lose access to meals altogether, but some meals, especially breakfast, were more easily displaced within the working day.

The reasons for skipping meals make this temporal pressure clearer. For breakfast, the most frequently reported reasons included dietary habits, saving time for rest, being too busy or forgetting to eat, and saving time for work or business. For lunch, saving time for rest, being too busy and forgetting to eat, and saving time for work were the dominant reasons. By contrast, saving money and limited access to satisfactory food were cited by much smaller shares of respondents. Meal skipping was therefore more closely associated with competition among work, rest, and eating than with direct food affordability.

This distinction is important. Time scarcity does not necessarily prevent people from obtaining food, but it can change which activities are postponed, compressed, or abandoned when time is limited. Previous research has similarly shown that time scarcity can shape food preparation, meal routines, and reliance on convenient foods (Jabs & Devine, 2006). Among the riders surveyed in Nanjing, the trade-off was particularly stark: time spent eating could also be used to rest, prepare for work, or complete additional delivery tasks. Meal skipping was therefore a visible outcome of a broader shortage of discretionary time.

Temporal irregularity was also evident in breakfast timing. Among 171 valid responses, most breakfasts were consumed between 7:00 and 10:00. The largest share was between 7:00 and 8:00 (33.3%), followed by 9:00–10:00 (24.0%) and 8:00–9:00 (23.4%) (Figure 3). Very few riders ate breakfast before 6:00 (1.2%) or after 11:00 (0.6%). Although breakfast was concentrated within a relatively conventional morning period, its timing was closely tied to the transition into the working day. For some riders, breakfast remained part of a home-based routine; for others, it had to be fitted around sleep, work preparation, and the beginning of order-taking.

The spatial organisation of eating further illustrates how meals became embedded in delivery work. As shown in Figure 4, 32.4% of respondents almost never ate breakfast, compared with only 5.0% who almost never ate lunch. Among those who ate breakfast, home-based eating remained important: 28.1% cooked and ate at home, while 23.8% ate food prepared by other family members at home. At the same time, breakfast was already tied to the start of delivery work. Some 23.1% bought breakfast from takeaway shops near their delivery starting point and ate on the spot, while 19.6% bought food near the starting point and ate during work.

Lunch was less likely to disappear, but it was more deeply embedded in the spaces and rhythms of delivery. A large share of riders bought lunch from takeaway shops near their delivery starting point or from other shops, either eating on the spot or during work. Specifically, 43.8% bought lunch from takeaway shops near the starting point and ate

on the spot; 38.4% bought from such shops and ate during work; 40.2% bought from other shops and ate on the spot; and 31.0% bought from other shops and ate during work (Figure 4). Lunch was therefore more likely to be maintained than breakfast, but it was also more dependent on riders' current location, delivery route, and the short intervals between orders.

Taken together, these findings can be summarised as a process whereby time poverty leads to irregular eating. This irregularity in food consumption appeared as skipped meals when work or rest took priority, as mealtimes that had to be fitted around the working day, and as meals consumed in spaces determined by delivery routes and short breaks. In other words, riders' food access was constrained not only by whether food was available or affordable, but also by whether sufficient time and suitable space were available for eating.

This pattern is especially important in the context of food delivery work because riders' mealtimes often overlap with periods when consumer demand is highest. The same lunch and dinner peaks that increase consumers' access to delivered food can reduce riders' control over their own eating time. Platform delivery therefore redistributes time within the urban food system: it saves time for consumers, while requiring riders to remain available precisely during those periods when they themselves need to eat. For the riders surveyed in Nanjing, time poverty was consequently expressed not simply as long working hours, but as fragmented, work-dependent, and spatially constrained eating.

Table 5: Frequency and Reasons for Skipping Meals

Panel A. Frequency of skipping meals					
Meal	Valid responses	Never (%)	Rarely (%)	Sometimes (%)	Often (%)
Breakfast	185	41.6	40.5	12.4	5.4
Lunch	259	62.9	25.5	8.1	3.5
Panel B. Reasons for skipping meals					
Broad category	Specific reason		Breakfast (%)	Lunch (%)	
Time and rest pressure	To save time for rest		40.2	44.8	
	Too busy and forget to eat		26.0	43.8	
	To save time for work/business		23.5	37.5	
	To save energy and physical power		5.9	9.4	
Habits and personal considerations	Dietary habits		41.7	8.3	
	Household schedule conflict		1.5	2.1	
	Health considerations		0.0	1.0	
Economic and food access constraints	To save money		4.9	10.4	
	Limited access to satisfactory food		2.0	5.2	
Other	Other		1.0	1.0	
Note: Missing and invalid responses were excluded. Reasons for skipping meals were multiple-response items; valid responses were 204 for breakfast and 96 for lunch.					

Figure 3: Breakfast Time Distribution of Migrant Food Delivery Riders

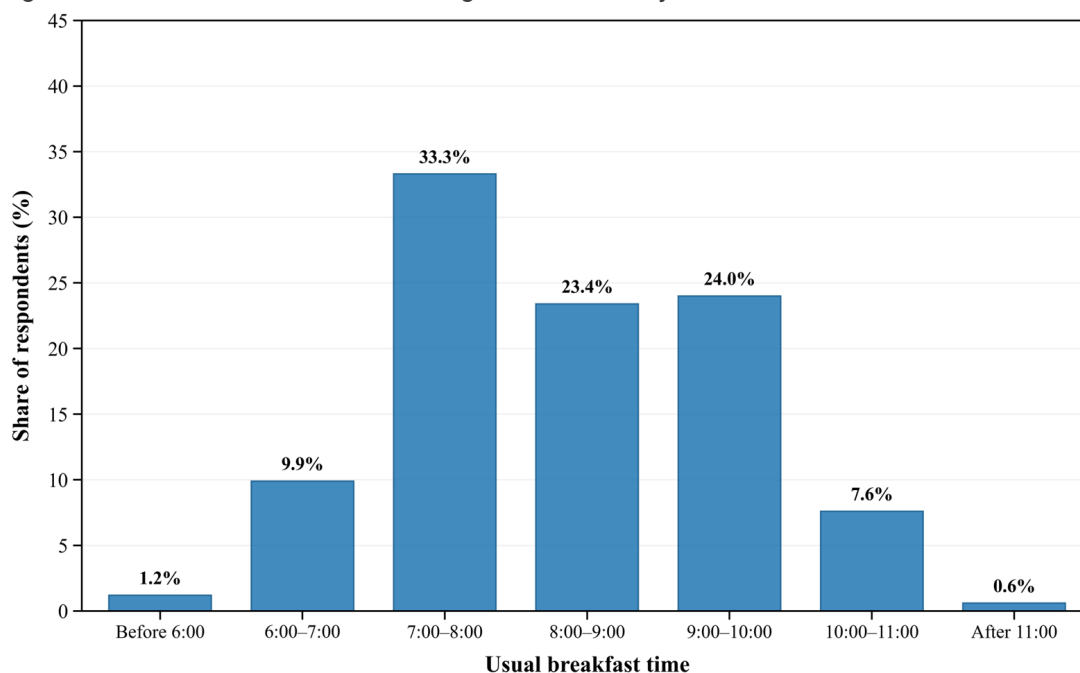
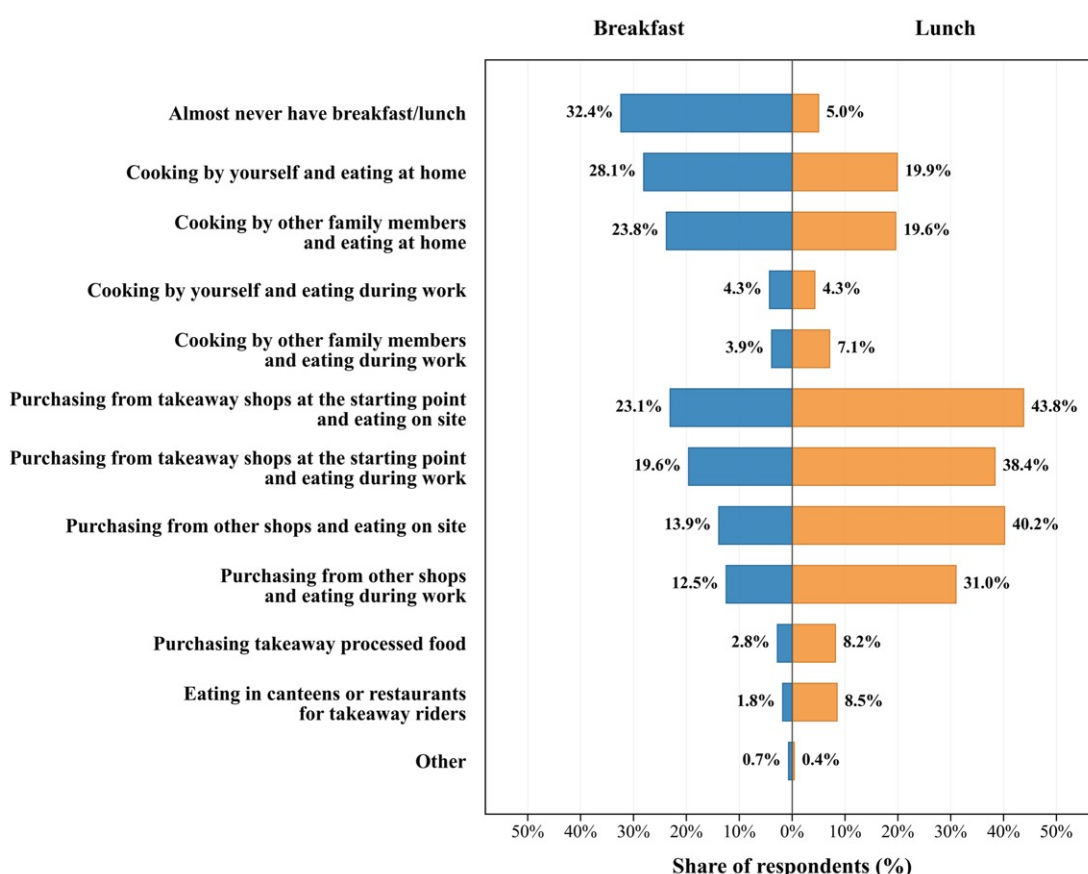


Figure 4: Meal Patterns of Migrant Food Delivery Riders during Workdays



Comparing Food Security between Citywide Households and Riders

Comparing Citywide Households and Riders' HFIAS and HFIAP

The previous section showed that riders' meals were often scheduled around delivery routes, pickup points, work schedules, and short gaps between orders. These findings raise a further question: whether such constrained eating

practices were also reflected in riders' food security status. HFIAS and HFIAP provide a way to examine this aspect because they capture experiences ranging from food anxiety and constrained food choice to reductions in food quality and quantity.

The HFIAS score distribution indicates that most migrant delivery riders reported secure food access. Among riders, 85.8% had an HFIAS score of 0, and 97.2% scored below 10. Citywide households in Nanjing showed a similarly strong

concentration at the lower end of the scale: 79.8% scored 0, 92.8% scored between 0 and 2, and 96.4% scored between 0 and 4 (Figure 5). High HFIAS scores were therefore uncommon in both groups. Overall, riders were broadly comparable with citywide households, although a small number of riders fell at the higher end of the scale.

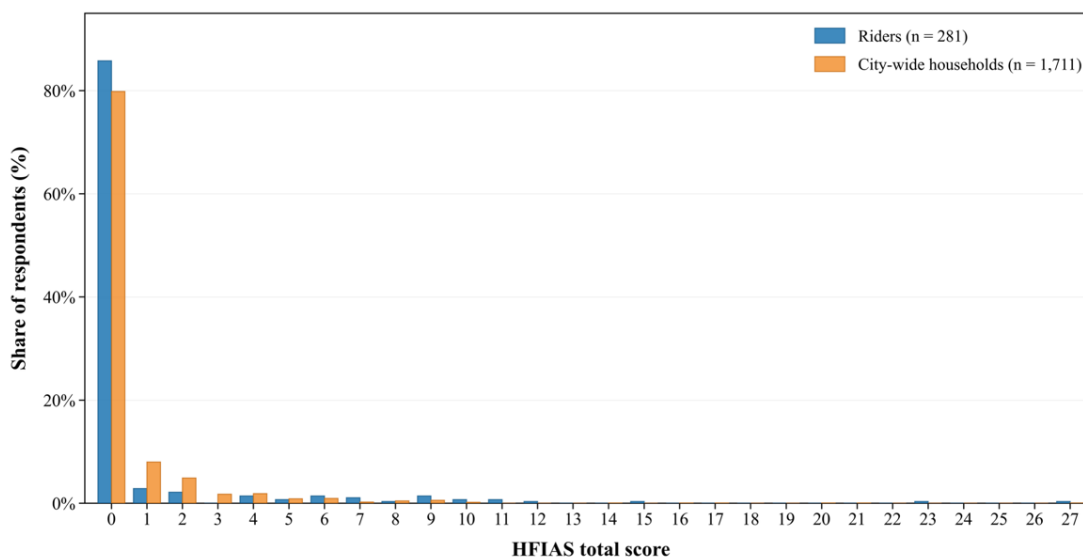
The HFIAP classification provides a clearer view of this internal variation (Table 6). Among migrant delivery riders, 86.8% were classified as food secure, 3.9% as mildly food insecure, 3.6% as moderately food insecure, and 5.7% as severely food insecure. Among citywide households, the corresponding shares were 82.6%, 9.5%, 4.9%, and 3.0%. Both samples therefore contained a high proportion of food-secure respondents. The rider sample had lower shares of mild and moderate food insecurity, but its share of severe food insecurity was almost twice that of citywide households. This pattern suggests that although food insecurity was not widespread across the rider population, a small subgroup experienced more serious difficulties in securing food.

The nine HFIAS occurrence questions further indicate which forms of food insecurity were most relevant (Figure 6). Q1 captures food anxiety, Q2–Q4 capture food quality constraints, and Q5–Q9 capture food quantity constraints and increasingly severe experiences of food insecurity (Coates et al., 2007). In both groups, “never” was the dominant response across all nine items. Among riders, the proportion answering “never” ranged from 88.6% to 95.7%, while among citywide households it ranged from 88.8% to 98.5%.

Among riders, the most common affirmative responses were in the food anxiety and food quality domains. Some 7.8% reported some degree of worry about insufficient food, 10.3% were unable to eat preferred foods, 11.4% ate a limited variety of foods, and 8.5% ate unwanted foods. These levels were broadly comparable with those of citywide households. The difference was more pronounced in the food quantity domain. Although such experiences remained uncommon overall, riders were more likely to report each of the five quantity-related experiences. Some 7.8% of riders reported eating smaller meals, compared with 4.5% of citywide households; 5.3% reported eating fewer meals, compared with 2.4%; and 5.3% reported having no food available, compared with 1.5%. The same direction of difference was observed for going to sleep hungry and going a whole day without eating. The item-level results reinforce the pattern shown by HFIAP. Most riders did not experience serious difficulties with food access, while a small subgroup reported experiences that extended to reductions in food quantity.

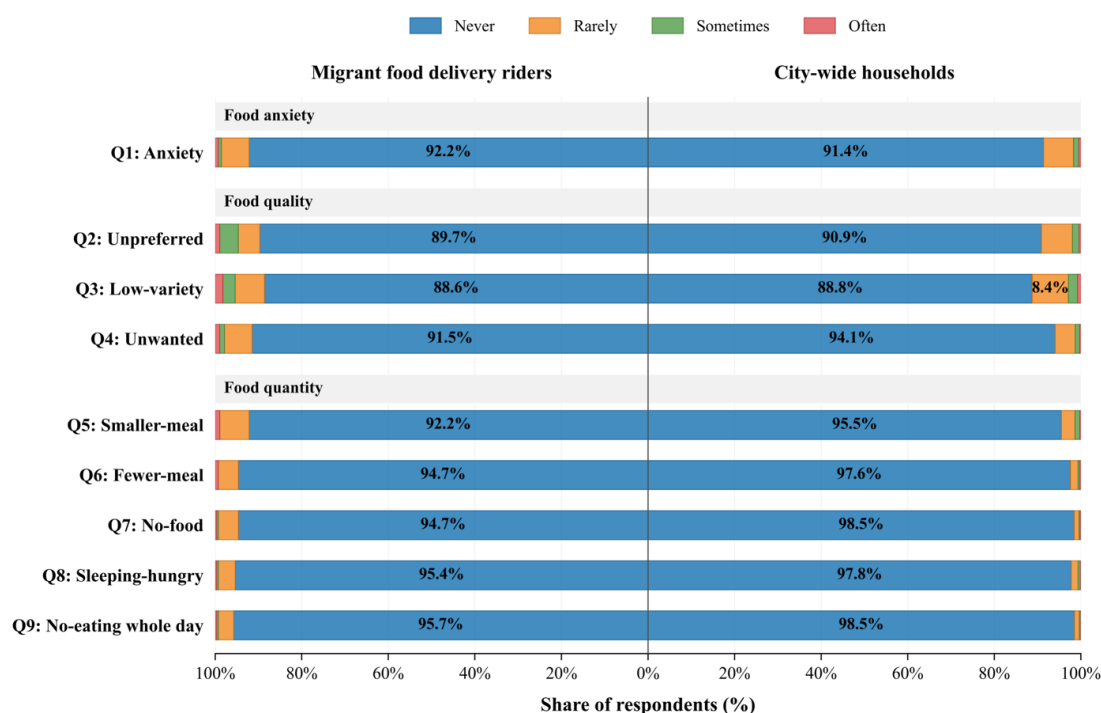
Overall, the HFIAS and HFIAP results suggest that the overall food-security profile of food delivery riders was broadly comparable to that of citywide households in Nanjing, although a small subgroup experienced more severe food insecurity. The results also clarify the form of vulnerability identified in the previous section: disrupted meals during the working day were common enough to be visible in riders’ everyday eating practices, even though most riders remained food secure by conventional food-access measures.

Figure 5: HFIAS Score Distribution among Migrant Delivery Riders and Citywide Households in Nanjing



HFIAP classification	Migrant delivery riders (%)	Citywide households (%)
Food secure	86.8	82.6
Mildly food insecure	3.9	9.5
Moderately food insecure	3.6	4.9
Severely food insecure	5.7	3.0

Figure 6: HFIAS Occurrence Responses among Migrant Delivery Riders and Citywide Households in Nanjing



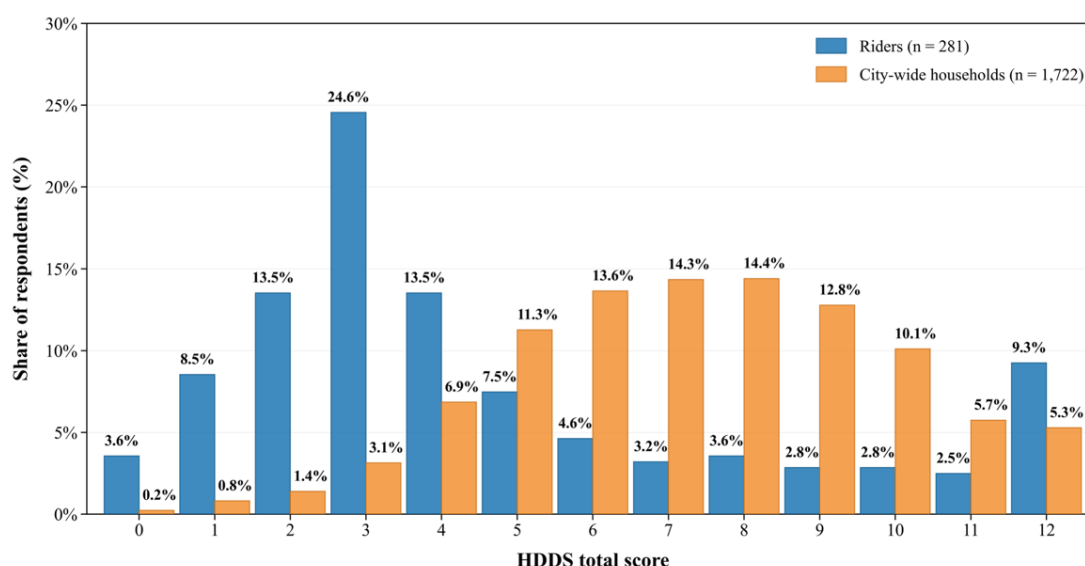
Comparing Citywide Households and Riders' HDDS

The HDDS comparison reveals a more significant difference between migrant delivery riders and citywide households. Riders had an average HDDS of 4.72, compared with 7.37 among citywide households (Figure 7). Their scores were concentrated at the lower end of the distribution: 24.6% scored 3, while 13.5% scored 2 and another 13.5% scored 4. Citywide households were concentrated at substantially higher scores, with the largest shares at scores 8 (14.4%), 7 (14.3%), 6 (13.6%), and 9 (12.8%). Compared with the relatively similar HFIAS distributions, the contrast in dietary diversity was therefore much more pronounced.

The food-group comparison shows how this narrower dietary pattern was formed (Table 7). Riders' diets were

centred on grains, meat, and vegetables, with 92.2%, 77.9%, and 70.5% of respondents consuming each, respectively. The gaps between riders and citywide households were relatively small for grains and meat, at 4.8 and 4.4 percentage points, respectively. Much larger differences appeared across other food groups. Fruit consumption was 34.5% among riders and 79.8% among citywide households; egg consumption was 38.4% and 75.5%; dairy consumption was 25.6% and 56.2%; and vegetable consumption was 70.5% and 95.5%. Riders also reported lower consumption of roots and tubers, legumes and nuts, and fish and shellfish. Their diets therefore retained staple foods and major meal components while incorporating a substantially narrower range of other food groups.

Figure 7: HDDS Distribution among Migrant Delivery Riders and Citywide Households in Nanjing



Food group	Migrant delivery riders (%)	Citywide households (%)
Grains	92.2	97.0
Meat	77.9	82.3
Vegetables	70.5	95.5
Roots or tubers	38.8	47.2
Eggs	38.4	75.5
Fruits	34.5	79.8
Dairy products	25.6	56.2
Fats and oils	23.5	59.8
Legumes and nuts	22.8	34.4
Fish or shellfish	22.1	30.8
Sugar or honey	13.9	27.6
Condiments and beverages	11.7	50.8

This contrast adds an important dimension to the HFIAS and HFIAP results. Different food-security indicators capture related but distinct aspects of food conditions and may therefore present different pictures of food insecurity (Maxwell et al., 2013). In Nanjing, most riders maintained secure access to food, yet their dietary diversity was substantially lower than that of citywide households. The food-group comparison further shows that this difference was concentrated beyond the basic components of everyday meals: grains and meat remained common, while fruits, eggs, dairy products, and several other food groups appeared much less frequently. The most widespread difference in riders' food conditions was therefore found in the limited range of foods consumed in everyday life.

This narrower dietary pattern is important because dietary diversity reflects access to a variety of foods and is commonly used as a proxy for the nutritional adequacy of diets (Swindale & Bilinsky, 2006). It also aligns with the temporal and spatial conditions of delivery work. Research has shown that time scarcity can shape food choices and the organisation of everyday eating (Jabs & Devine, 2006), while longer working hours can create practical barriers to healthy eating by leaving workers too busy to eat healthfully or with insufficient time to sit down for meals (Escoto et al., 2012). For the riders surveyed in Nanjing, meals were frequently fitted around delivery routes, nearby food outlets, and short gaps between orders. Under these conditions, obtaining a meal that could be fitted into the working day was often more practicable than maintaining a diverse diet across different food groups. The findings therefore suggest that time pressure and mobile work routines may constrain the practical possibilities for dietary diversity even when everyday food access is secured.

Overall, the comparison reveals an uneven pattern of food vulnerability among migrant delivery riders. Most riders remained food secure according to HFIAS and HFIAP, while a small subgroup experienced more severe food insecurity. However, lower dietary diversity was a much broader feature of the rider population. Taken together with findings on working time and eating practices, the results show a

consistent pattern: long working hours created time pressure, meals were fitted around work at irregular times and in irregular spaces, and riders consumed a substantially narrower range of foods than citywide households. This pattern connects time poverty, irregular eating, and food vulnerability, showing how riders may maintain basic food access while facing greater difficulty in sustaining regular and diverse diets.

Discussion

Platform Labour, Migrant Vulnerability, and Riders' Food Security

The findings of this study show that migrant food delivery riders' food security needs to be understood at the intersection of platform labour and migrant vulnerability. Food delivery offered many migrant workers in Nanjing a relatively accessible way to enter the urban labour market and earn cash income. However, this opportunity was organised through a labour process based on order-taking, piece-rate payment, continuous availability, and responsiveness to peaks in demand. Riders' income therefore depended on long working hours, bodily mobility, and constant adjustment to changing platform rules, consumer demand, and urban delivery conditions.

This labour arrangement was closely tied to riders' everyday food practices. The results do not indicate widespread severe food insecurity among riders as a whole. Most riders had low HFIAS scores and were classified as food secure according to HFIAP; their overall HFIAS and HFIAP patterns were broadly comparable to those of citywide households in Nanjing. However, this does not mean that riders' food security conditions were unproblematic. A small subgroup experienced more severe food insecurity, while broader disadvantages were evident in eating regularity and dietary diversity, along with some reported constraints on food choices and quality. Basic food access was generally maintained, but riders had greater difficulty eating regularly and diversely and in maintaining control over when and where they ate.

Riders' migrant background and status significantly shape their vulnerability. Many riders live and work in Nanjing without local *hukou*, making food delivery one of the few accessible and convenient employment options. They therefore depend heavily on delivery work for income. Riders are migrant platform workers whose food practices are organised under conditions of income pressure, time scarcity, and continuous responsiveness to platform demand. This perspective extends existing discussions of platform labour. Previous research has shown that food delivery riders are affected by algorithmic management, piece-rate payment, time discipline, weak labour protection, and uncertain employment relations. The present study suggests that these labour conditions also extend into everyday social reproduction. Platform work affects not only riders' earnings and work intensity, but also the practical conditions under which they eat, including meal timing, eating locations, and the types of food that can be conveniently obtained and consumed. Food delivery riders should therefore be understood not only as platform workers, but also as food-system workers. Their labour helps maintain the spatial and temporal accessibility of food for urban residents, while their own food security and dietary diversity remain shaped by the conditions under which this labour is performed.

Time Poverty and Constrained Eating Practices

Time poverty provides an important connection between platform labour and riders' constrained eating practices. The results show that many riders worked long hours, remained available during demand peaks, and often continued working into the evening. These temporal conditions were closely tied to when, where, and how they ate. Riders had to fit meals around orders, pickup points, restaurant wait times, delivery routes, and short breaks between tasks. Breakfast was more easily displaced by rest needs, work preparation, and the transition into the working day. Lunch was less likely to be skipped, but it was more clearly embedded in delivery spaces. In both cases, eating was difficult to separate from labour time and had to be adjusted to the rhythm of platform work. For riders, food access was therefore not only an economic issue but also a matter of time access: whether they had enough controllable time to stop, choose food, eat properly, and resume work without losing orders or income. Time poverty was expressed not only through long working hours but also through limited control over when and how eating could occur.

This interpretation also helps explain the HDDS results. Riders were generally able to obtain food, but their diets were less diverse than those of citywide households. Their food consumption was concentrated mainly on staple foods, meat, and vegetables, while fruit, eggs, dairy products, fish, legumes, and several other food groups were consumed less consistently. Economic pressure may have influenced food choices, but the findings suggest that time pressure and mobile work routines were also important. Foods that were filling, convenient, nearby, and easy to consume during work were more compatible with delivery labour than foods requiring preparation, storage, longer waiting times, or stable meal settings. Time poverty, therefore, did not necessar-

ily produce hunger directly, but it may have reduced practical opportunities for dietary diversity and made eating more hurried, fragmented, and dependent on delivery spaces.

This reveals a central paradox of platform-based urban food access. Riders help expand food access for urban consumers by keeping meals moving across the city, especially during lunch, dinner, and evening demand peaks. Yet their own eating practices are constrained by the same temporal rhythms that make delivery fast and convenient. Platform delivery improves consumers' access to food while shifting time pressure onto workers, whose meal timing, dietary diversity, and eating routines become less stable. The convenience of urban food delivery is therefore partly sustained by compressing riders' own time.

Conclusion and Policy Implications

This study examined the working conditions, food security, and everyday eating practices of migrant food delivery riders in Nanjing. Drawing on a survey of 281 migrant riders and a descriptive comparison with citywide household food-security data, it analysed riders' working hours, income, social protection, workday eating practices, food insecurity, and dietary diversity. The findings show that food delivery offers migrant workers a relatively accessible source of employment and, for some riders, competitive earnings, but these opportunities depend heavily on sustained time investment. Riders worked an average of 9.5 hours per day, and the long daily working hours, compared to per-order payment, were more strongly associated with their monthly income. At the same time, social protection remained limited, with 41.3% of respondents reporting no social insurance. These working conditions also extended into riders' everyday eating.

Time poverty was reflected in three related forms of irregular eating: meal skipping, mealtimes organised around work, and eating on delivery routes and during short breaks. Most riders had low HFIAS scores and were classified as food secure according to HFIAP, although a small subgroup experienced severe food insecurity. A more widespread disadvantage appeared in dietary diversity. Riders had an average HDDS of 4.72, compared with 7.37 among citywide households, and reported substantially lower consumption of fruit, eggs, dairy products, vegetables, and several other food groups. Their food vulnerability was therefore expressed less through widespread food deprivation than through difficulty maintaining regular, diverse diets.

By bringing platform labour and food security research together, this study shows that the effects of platform work extend beyond employment conditions and into the everyday organisation of eating. It treats migrant food delivery riders not only as platform workers, but also as food-system workers with their own food-security needs. It also connects platform-labour precarity and migrant vulnerability to time poverty, irregular eating, and food vulnerability, while demonstrating the importance of examining multiple dimensions of food security together.

More broadly, the findings reveal a tension within platform-mediated urban food systems. Riders expand the speed and reach of food access for urban consumers, but the responsiveness and working time required to provide this service may constrain their own eating practices. Yet riders' food vulnerability is not merely an individual consumption issue, nor can it be reduced to a labour dispute or left to the private sector alone to address. Rather, it reflects an inherent problem in the social organisation of the urban food system. An urban food system cannot be considered fully resilient if its everyday operation depends on workers whose own health, food security, and capacity to recover from occupational and economic risks remain weak. A more just urban food system should protect not only those who consume food, but also those whose labour keeps food moving. If riders are essential to urban food-system resilience, their resilience, health, and food security should also be central considerations in urban food governance.

These findings have implications for both labour regulation and urban food governance. Urban food governance should move beyond a narrow focus on the quantity, safety, and stability of food supply and recognise the labour conditions that sustain food access. Riders' working time, rest opportunities, social protection, and ability to maintain regular and diverse diets should therefore be treated as components of urban food-system resilience rather than as separate individual concerns.

First, a key policy priority is to clarify employment relationships in platform delivery and to strengthen social protection. Labour authorities should establish clearer criteria for determining employment responsibilities among platform companies, labour-service agencies, and delivery stations. Where riders are substantively managed as workers, outsourcing or flexible contractual arrangements should not be used to exclude them from employment-based social insurance and labour protection. Social-insurance policies also need to be more accessible and portable for migrant riders whose employment status and place of work may change frequently.

Second, it is crucial to strengthen government oversight of platform rules. Policy priorities could include requiring platforms to disclose how payments are calculated, how orders are allocated, how delivery times are determined, how penalties and customer complaints are handled, and how responsibility is assigned in accidents. Regulatory authorities should assess whether delivery deadlines and algorithmic performance requirements create unreasonable safety and time pressures. Where necessary, platforms should be required to adjust order-dispatch systems, set more realistic delivery-time standards, and factor in restaurant wait times and residential access restrictions when calculating delivery times.

Third, cities need to improve the material conditions for riders' rest and eating. Municipal governments, communities, and commercial-area managers could provide reliable rest and eating spaces in delivery hotspots, residential communities, transport nodes, and commercial districts. These

spaces could offer drinking water, charging facilities, toilets, shelter from severe weather, and space for short meal breaks. Their provision should be incorporated into community service and commercial space planning rather than left entirely to voluntary platform initiatives. Restaurants and property managers could also reduce unnecessary waiting and access barriers that further compress riders' rest and mealtimes.

Finally, this study has several limitations. The analysis relies on cross-sectional data from migrant food delivery riders in a single Chinese city, so it cannot establish causal relationships or generalise to all delivery riders or other urban contexts. The comparison with citywide households serves as a descriptive benchmark rather than a matched causal comparison. Future research could use longitudinal, diary, or time-use data to more directly examine associations between changes in working hours, order intensity, and work schedules and in meal timing and dietary diversity. Comparative studies across cities, platforms, and employment arrangements would also help identify how different regulatory and labour-market contexts shape riders' food security.

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