Mapping Vulnerabilities of Indian Long-Haul Truck Drivers

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***Abstract*—To understand the occupational and socio-economic vulnerabilities experienced by truck drivers, one hundred nine long-haul truck drivers employed under truck-fleet owners of Delhi NCR were surveyed through a questionnaire. Participants were recruited as per convenience and snowball methods of sampling. The questionnaire was administered verbally in Hindi, transcribed, and subjected to descriptive analysis. Results indicate trucking sector in India is unorganised, with little to no standardisation in terms of the compensation rate for driving labour. While drivers receive meagre pay for long work hours, they are exposed to health difficulties and frequently engage in unsafe practices such as over-speeding. Indian truck drivers are burdened with various financial and social disadvantages due to the unorganised nature of the trucking sector. Drivers are compensated only for driving labour, and other costs related to their health and well-being are mostly externalised from the supply chain, negatively impacting their quality of life. A recommended future direction is to direct research towards reorganising this sector by restructuring the industry practice of incentivising faster delivery time, standardising terms of employment for truck drivers, and upskilling them through vocational training.**

***Index Terms*—Long-haul truck drivers, LHTD, unorganised sector, remuneration, India**

I. INTRODUCTION

As India's e-retail sector booms, we find truck drivers playing a central role in the lives of all stakeholders interacting with the market. Trucking operations remain crucial to the distribution of goods irrespective of product type and support the availability of items needed for daily use and industrial material. Per the Government of India (GOI), Road Freight Transport accounts for 4.5% of the country's GDP and identifies truck drivers responsible for moving 67% of the country's freight volume [1]. This volume of freight movement is much higher than our reliance on combined rail, sea and air transport options. Hence, it brings to awareness the indispensability of truck drivers in our supply chain processes.

Truck drivers are a heterogeneous group and can be differentiated depending on the mileage clocked in driving per day. For example, those drivers who drive and cater to multiple local deliveries within a 150-mile radius are short-haul truck drivers. As opposed to this, long-haul drivers engage in longdistance journeys that typically exceed a day's worth of driving [2] and are acknowledged as the logistics sector's backbone [3].

A. Vulnerabilities faced by "Long-haul truck drivers" "Long-haul truck drivers" (LHTD)

remain an unorganised and vulnerable supply chain segment despite their importance to operations. There is no standardisation in pay or employment benefits, and since many truck drivers engage in the profession seasonally, they cannot solicit protection from trade unions. Thus, while the casualness of this sector might not be affecting the supply chain directly, it does act as a deterrent to drivers' ability to get their fair share financially – which in turn perpetuates a host of socio-economic vulnerabilities.

In a national study [3], LHTD surveyed for indices reflecting the quality of life and occupational hazards shows that drivers are overwhelmingly dissatisfied with their pay. More than 70% of the 1217 strong sample reported feeling unhappy about their income's irregularity and thought they earned very little. 53% of these drivers make between 135 to 270 USD (INR 10,000 – 20,000), and while the rate of compensation for truck driving varies amongst states, drivers are usually unable to make more than 30,000 per month. Similarly, [4] reported that long-distance truck drivers generally make meagre monthly amounts, ranging from 81.34 to 108.45 USD. However, earnings can be increased if truck drivers deliver perishable goods and can deliver them on time. Since drivers are compensated for each trip made and not paid monthly, the system resembles one where workers are contracted in a piece-wage manner. Consequently, monthly earnings are determined by how well truck drivers can weather the pressure of driving for long periods – often at the cost of their well-being and road safety.

A significant drawback of such piece-wage contracts for drivers is that when compensation is tied to consignment delivery, truck drivers remain unpaid for nondriving-related labour during trips, including loading and unloading activities [5]. Such compensation also does not factor in the fact that the time taken for deliveries does not comprise driving and rest time but includes time taken for freight loading-unloading, paperwork formalities, tolls and unnecessary Regional Transport Office (RTO) checks, during which the driver's time is essentially going unpaid. A driver's operational pressure also naturally increases when these trip components are unaccounted for in

the expected delivery time or when logistics are illplanned. This can lead to long work hours, irregular and insufficient rest periods and over-speeding [6] so drivers do not lose out on the incentives tied to fast delivery [7]. Respondents interviewed reported [3] that it is a common industry practice to deduct some amount from a driver's pay when they exceed the expected delivery time. Tardiness also affects a driver's credibility and chances of being offered future trips. This creates a strong incentive for overworking and leaves drivers with little to no bargaining power. The competition in the market, the practice of Just-in-time deliveries, and business goals tied to customer satisfaction create an urgency where freight being moved supersedes considerations for the driver's occupational and personal well-being.

Belman and Monaco [8] offer an interesting insight into whether truck drivers are underpaid by noting that pay is not just determined by work hours or productivity. They refer to the 'theory of compensating differentials' to highlight how compensation varies as per conditions of work and that usually, when employers provide inferior working conditions, they are compelled to pay more or offer increments such that prospective labour chooses a trucking job as opposed to seeking alternative employment that offers better work conditions. However, many factors work against truck drivers and deter them from receiving higher pay despite their work conditions being more or equally unfavourable compared to other blue-collar jobs. First, truck driving does not require any specialised skill or training. By working long hours, truck drivers are able to earn as much or more than other blue-collar labourers whose employment is contingent on more training and skills. However, since truck drivers have low levels of formal education, they can also not migrate or upskill to better-paying professions. Thus, truck drivers may earn more per hour than manual labourers with similar skill profiles but work extremely long hours and incur a range of social and medical costs. Thus, while they seem to be paid fairly based on their skill set, the money earned is considered insufficient, given that drivers have to put in considerably more effort to make it.

Furthermore, while truck drivers work longer to earn more, there is strong research to suggest that long working hours are tied to many health difficulties. Most prominently, LHTDs are susceptible to chronic sleeping problems [9], [10], and this impairs their reaction time, reduces alertness, heightens feelings of fatigue and drowsiness and thus increases the possibility of drivers falling asleep while driving [2], [11]. Fatigue and sleep deprivations directly affect driver competency and incidences of road accidents. However, research also highlights that truck drivers also have very unhealthy lifestyles, which might be one of the most seemingly innocuous hazards associated with the job. Some factors include long stretches of immobility while driving, eating irregularly and consuming unhealthy food, excess consumption of alcohol, and rampant use of tobacco and other stimulants while on the job [2], [12]. In their recent 2021 study, the prevalence of smokeless-tobacco was compared between heavy-load truck drivers and the general population, [13] reported that 75.3% of their sampled truck drivers consumed smokeless-tobacco as compared to 28.3% in the general population. A similarly vulnerable health profile of truck drivers was noted through medical data collected via a community-based mobile medical unit program that ran from 2017 to 2019 along the major National Highways of India. Chanda et al. [14] report that 1,167,210 truck drivers availed of this medical program, and the prevalence of non-communicable diseases like diabetes, obesity and its related morbidities was much higher than the estimates calculated from the general population. A majority of truck drivers reported musculoskeletal issues due to continual exposure to low-grade vehicle vibration, immobility and poor sitting posture. These lifestyle factors inevitably result in short-term discomforts and chronic physical difficulties like back pain and cardiovascular diseases that do not get adequate medical attention since drivers are not extended health care benefits along with their pay [15].

Additionally, truck drivers are often also socially alienated and removed from the communities to which they belong. During [3] qualitative interviews, many drivers reported that working in this sector requires them to stay away from their homes and villages for months because they get to spend very little time with their families. This isolation also contributes to social perceptions of truck driving being a low-status job and an unwillingness in communities to marry daughters to truck drivers. As a result, drivers experience loneliness and difficulty in establishing or maintaining meaningful social ties. Adverse work organisation, poor sleep health and stress are greatly coupled with work-life conflict among LHTDs [16].

Finally, the biggest long-term disadvantage experienced by truck drivers is the lack of opportunity for upward professional mobility. Truck driving is a lucrative source of fairly easy money because it demands low formal educational qualifications and limited technical knowledge/skills. However, since truck driving does not contribute to any specialised skill development or additional qualifications, drivers need help finding alternative employment options and a better quality of life. This means that LHTDs with multiple years of experience have little competitive advantage over others that have started recently.

B. Trucking regulations in India Vs developed countries

At first glance, the regulations designed for the trucking sector in India are at par with those that operate in some other developed countries (Table 1). Indian LHTDs are regulated to drive lesser per day than both US and Canada, and the frequency of rest stops – which is designated as 30-minute rest every 5 hours of consecutive driving seems to be adequate to counter driving fatigue. However, the actual enforcement of these guidelines is far from perfect. Survey research [17] on unsafe trucking behaviours in India highlights that about 44% of their sample reported driving upwards of 10 hours a day, while the national limit stipulates driving for no more than 8 hours a day. Additionally, as per [7], Indian LHTDs are not necessitated to maintain logbooks for fixed durations to

record their on-duty time. As opposed to this, drivers in the US must comply with Electronic Logging Devices and are regulated based on the record for the last eight days. In the UK, tachometer record sheets with data from the last 28 days can be used for driver regulation. It is also apparent that while [18] stipulates maximum working hours, these protocols are rarely adhered to in India. One reason is that Hours of Service regulations in India are only applicable when five or more persons are employees under a truck owner. Since the bulk of truck owners in India are small, 75-80% own less than five trucks [7], such regulation does not come into effect for most LHTDs.

TABLE I: Labour regulations for long-haul truck drivers: India vs. Developed countries

Country	Safety and Labour Regulations			
	Max. hrs /day	Extendable driving hrs	Max. hrs/week	Frequency of rest steps
India[a]	8 hrs	10 hrs out of a maximum of12 hrs on duty	54 hr	30 mins every 5 hrs of consecutive driving
US[b]	11 hrs	13 hrs out of a maximum of 14 hrs on duty	60 hr / 7 days 70 hrs /8 days	30 mins every 8 hrs of consecutive driving
Canada[c]	13 hrs	14 hrs	70 hrs /7 days 120 hrs /15 days	
UK[d]	9 hrs	10 hrs (max twice weekly)	56 hr	45 min after 4.5 hrs of driving

[a.] "Revised VDA (Minimum Wages) from 01 Oct. 2021 — Chief Labour Commissioner." https://clc.gov.in/clc/node/684 (accessed 10 Nov. 2022).
[b.] "Summary of Hours of Service Regulations —" FMCSA. https://www.fmcsa.dot.gov/regulations/hoursservice/summary-hours-service-regulations (accessed 6 Nov. 2022).
[c.] "National Safety Code https://www.cvse.ca/national_ safety_ code.htm (accessed 2 Nov. 2022
[d.] "Drivers' hours," GOV.UK.https://www.gov.uk/drivers-hours/eu-rules (accessed 5 Nov. 2022)

However, hours of labour or service do not decrease because there is a cap on the amount of work one can clock in per week. Despite countries' regulations regarding maximum work hours permitted daily, truck drivers routinely flout them to make more money. Thus, consequences such as continuous driving for long stretches, driver fatigue, and over-speeding and over-loading vehicles will continue to happen until drivers get paid more. Drivers are working longer hours, not because of an inherent joy in driving or because they have a sense of purpose (participating in the supply chain) but to earn enough money to have a decent quality of life. When we pay truck drivers better, they reduce clock time. As per [6], when drivers make about '60 cents per mile', their availability for work declines to the stipulated 60 hours/week. Additionally, drivers who are compensated for their nondriving time on the job also work fewer hours [5]; thus are less likely to be victims of road accidents due to driver fatigue.

C. Gap in Literature

Even though the trucking sector performs an critical role in supply chain processes and contributes significantly to the country's economy – there is a dearth of representative and recent data about the professional lives of Indian long-haul truck drivers. For example, the GOI does not collect or publish data on the mode and rate of drivers' compensation. The statistics on the financial insecurity experienced by truck drivers are collated from [3], [4]. Thus, an effort needs to be made to engage in more exploratory research so that the ground realities of what it means to engage in LHTDs in India may be collated.

II. Methodology

The present study employs an experimental research design to understand the different occupational and socio-economic vulnerabilities experienced by North Indian long-haul truck drivers. Exploratory research is an initial form of inquiry that sets a more detailed and conclusive investigation [19]. The broad aim of such research is to explore a phenomenon of interest to cull out specific problem areas and recommendations for future research design, sampling methodologies and data collection procedures. Therefore, the intention is not to arrive at conclusive cause-effect relationships but to clarify the problem.

A. Research method

A survey questionnaire was used as the research method to fulfil the study's objective. Data collected from the entire population is the census. When data is compiled from a predetermined sample of participants from the target population, the data collection process is referred to as a survey [20]. The questionnaire is a structured data collection tool used to 'profile the sample' [21] and comprehensively get the frequencies of how different attributes, phenomena, behaviours and opinions are distributed in the target population. The questionnaire designed for the present study (and available on request) comprised three sections, (1) questions about demographic information, (2) questions regarding truck drivers' history in the profession (3) Questions regarding the mode and rate of compensation for driving labour. Twenty-eight questions were administered verbally in Hindi and audio recorded for subsequent transcription. Data were analysed using descriptive statistics.

B. Sampling method

A total of 109 Indian truck drivers from different States in North India were recruited for the study. The inclusion criteria for this sample required participants to be truck drivers who made trips for distances greater than 241 km (those exceeding a 150-mile radius as per [2]. The population of interest for the present study is heterogeneous. An exhaustive list of all population elements was unavailable; participants were therefore recruited via nonprobability sampling methods. The researcher first engaged in Convenience sampling and contacted several truck fleet owners in the Delhi NCR region. This sampling method is time-saving and cost-effective for the researcher since contact is established with easily-accessible sample populations [22]. These truck-fleet owners were then

requested to access their respective pool of employees for data collection. Once access was granted, the researcher visited the premises and collected data from all available and consenting truck drivers that met the sample inclusion criteria. Several such rounds of data collection were done, and subsequent sets of participants were identified and contacted via the snowball sampling method.

The predominant statistical drawback of using nonprobability sampling is that the study sample is vulnerable to sampling biases. This means that sample characteristics are not true representations of the population of interest and that some elements receive disproportionate representation over others. Such discrepancy increases the chances of error and impedes the generalizability of study results. These limitations are enhanced in study designs wherein snowballing, or chain sampling, is used to recruit participants since people are more likely to refer the researcher to prospective participants who share similar social, economic, and cultural traits. Indeed, a similar trend was noted for the present study since no extreme variations were noted in the participant's demographic data.

Since there are no public databases to recruit LHTDs, or attract their participation via email or internet advertisements, convenience and snowball sampling methods allow us to contact a hard-to-reach population systematically and cost-effectively. Additionally, since the researcher is identifiably from a different social group, referrals by mutually known participants who can vouch for credibility and safety become crucial in persuading prospective participants to consent to share details regarding their finances and work-life.

C. Sample characteristics

All 109 participants recruited for the study were male. Their ages ranged from 21 to 65 years, with a mean age of 37.7 years (SD=11.3). The highest frequency of truck drivers seems to be hailing from Uttar Pradesh, closely followed by truck drivers from the Indian Capital Region and Haryana. These all together represent 69.7% of the sample. The participants' level of formal education, tabulated in Table II, reveals that most drivers who enter the trucking sector for employment have low levels of formal education and no formal skills or specialised training. None of the participants reported pursuing higher education or technical/vocational training post-school.

TABLE II: Truck drivers' level of formal education

Level of education	Frequency	Percentage
No schooling completed	13	11.92
Nursery school to 8th grade	41	37.61
Some high school, no diploma	45	41.28
High School graduate, diploma or equivalent	10	9.7
Trade/technical/vocational training."	0	0
Total	109	100

Note N = 109

All 109 truck drivers responded affirmatively to whether they hold a Commercial Driving License (CDL). About 50% of the participants have more than ten years of experience doing long-haul trucking. Almost 31% had an experience between 510 years, followed by 18% having driving experience between 2-5 years. Finally, a very small percentage of drivers have driven for less than two years. This indicates that a substantial part of the data collected through the questionnaire captures drivers' experiences who have been in the trucking sector for more than five years now.

Table III represents the details of the type of CDL held by the participants and how recently the license was renewed. Quite noticeably, 75% of the truck drivers have a "Heavy Goods Motor Vehicle, Heavy Passenger Motor Vehicle (TRANS)" license and a permit for "Heavy Goods Motor Vehicles and Heavy Passenger Motor Vehicles". While 10% of truck drivers hold a "Heavy Goods Motor Vehicle (HGMV)" license. Only about 2% have CDL for "Medium Goods Vehicle (MGV)". Some 22% of the participants report not refreshed their CDL in more than five years. As per law, Indians holding a CDL are mandated to renew their license every three years (Motor Vehicles Act, 1988), so a sizeable percentage of the truck drivers sampled seem to default on this requirement.

TABLE III: Type of CDL and the recency of its renewal

Type of CDL	Frequency	Percentage
Heavy Goods Motor Vehicle (HGMV)	11	10.1
Heavy Motor Vehicles (HMV)	8	7.3
Heavy Transport Vehicle / Light Transport Vehicle (HTV/LTV)	5	4.6
Medium Goods Vehicle (MGV)	2	1.8
Heavy Goods Motor Vehicle, Heavy Passenger Motor Vehicle (TRANS)	82	75.2
Other	1	0.9
Total	109	100
CDL last refreshed		
2-5 years	46	42.2
Less than 2 years	39	35.8
More than 5 years	24	22
Total	109	100

Note N = 109

Regarding owning a smartphone, 77.1% of the truck drivers had a personal smartphone (n=84), while 22.9% reported not having one (n=25). In addition, 89% of the participants reported that they do not own a truck (n=97), while 25.7% reported owning a truck of their own (n=12).

Truck drivers' reliance on their employers for financial stability is also highlighted because out of 109 LHTDs, 89 reported that they did not have an alternative source of income. Of the 28 truck drivers that reported having an alternative source of income, 23 shared that they are farmers.

III. RESULTS AND DISCUSSION

This section describes the primary data gathered from the participant truck drivers and gives a better understanding of working in this sector's occupational and socio-economic experiences. As per Table IV, 55.04% (n=60) of the participants sampled were employed part-time, while 30.27% (n=33) were employed full time and 14.67% (n=16) reported their engagement with truck fleet owners to be seasonal. Given this distribution, one would expect that since more than 50% of

the participants surveyed drive trucks part-time, they would have alternative sources of income. However, as described in the previous section on sample characteristics, only 28 out of 109 drivers reported having an alternative source of income, of which 23 engage in Farming to earn money.

TABLE IV: Truck drivers' employment status

Employment status	Frequency	Percentage
Employed part-time	60	55.04
Employed full time	33	30.27
Seasonal employment	16	14.67
Total	109	100

Note N = 109

On average, the sampled truck drivers reported driving 177 miles per day. As per Table V, the highest percentage of products carried include the transportation of General freight, followed by bulk supplies, with only 10% of drivers carrying Building materials and Farm Produce. This distribution suggests that truck drivers cater substantially to the Industrial Sector of our country.

TABLE V: Types of usual products transported

Type of products carried	Frequency	Percentage
Bulk supplies	19	17.43
General freight	50	45.87
Machinery	8	7.33
Building Material	11	10.09
Farm Produce	11	10.09
Special Items	6	5.50
Furniture	1	0.91
Manufactured Goods	1	0.91
Construction machines	1	0.91
Others	1	0.91
Total	109	100

Note N = 109

Finally, a unique set of trends is visible in Table VI, representing the frequency distribution of truck drivers engaging in nondriving labour. Truck drivers are usually responsible for a range of unpaid nondriving labour such as freight loadingunloading and maintaining the truck's upkeep, which adds to their hours on duty and contributes to fatigue. 75.23% (n=82) of the sampled truck drivers report that their truck maintenance is looked after by the employer, possibly suggesting that truck drivers do not have to pay for truck upkeep from the salary they receive for consignment delivery. On the other hand, 24.77% (n=27) of the drivers reported looking after the routine maintenance of their trucks by themselves. Per [23], LHTDs' involvement in tasks such as loading-unloading the goods to be transported has varying effects on the driver depending on the distance travelled. When such activity precedes or happens between long stretches of driving, the severity of driver fatigue increases; however, such exertion can have temporary energising benefits when drivers have to cover shorter distances.

TABLE VI: Truck drivers' responsibility for nondriving labour

Routine maintenance by	Frequency	Percentage
Self	27	24.77
Employer	82	75.23
Total	109	100
Method of Truck loading		
Crane	57	52.29
Labour	49	44.95
Self	3	2.75
Total	109	100

Note N = 109

A. Remuneration for LHTDs in India

This section describes the predominant trends in how LHTDs are compensated for their work. Most of the truck drivers are paid per trip, some are paid weekly, and a few (less than 10%) are paid as per the weight (in Tons) of the freight being transported (Table VII). The predominant compensation mode is cash, followed by salary deposited to the driver's Bank Account. Payment via cheque constituted a miniscule percentage. Half of the participants also reported that they receive bonus pay for early deliveries, while 6.42% reported that they earn such bonuses sometimes.

TABLE VII: Distribution of truck drivers' remuneration

Rate of compensation	Frequency	Percentage
Trip based	73	66.97
Weekly based	19	17.43
Any other	8	7.33
Ton based	9	8.25
Total	109	100
Mode of compensation		
Cash	93	85.32
Bank account	15	13.76
Cheque	1	0.91
Total	109	100
Parameters for Increment		
Yearly	30	27.52
Constant time deliveries	12	11.00
Based on Experience	26	23.85
Other	41	37.61
Total	109	100
Bonus pay for early delivery		
Yes	55	50.45
No	47	43.11
Sometimes	7	6.42
Total	109	100

Note N = 109

TABLE VIII: Distribution: truck drivers' monthly income in USD

Monthly income (in USD)	Frequency	Percentage
Less than 135.36	54	49.54
135.36 – 270.73	22	20.18
270.73 – 406.09	26	23.85
406.09 – 541.43	2	1.83
More than 541.43	5	4.58
Total	109	100

Note N = 109

B. Medical and Social benefits extended to LHTDs in India

Table IX represents the medical and social benefits extended to truck drivers by truck-fleet owners. 58.71% of the drivers report that they have availed of paid leave from their employer, while 41.28% denied receiving any paid leave. More than half the participants reported receiving medical reimbursement, while 32.11% (n=35) reported uncompensated medical expenditures incurred on the job. A little more than half of the participants (n=56, 51.37%) also report taking more than five weeks of holiday in the last 12 months, while another 22.93% (n=25) truck drivers report taking between 2-5 weeks off.

TABLE IX: Employment benefits extended to truck drivers

Paid leave	Frequency	Percentage
Yes	64	58.71
No	45	41.28
Total	109	100
Medical reimbursement		
Yes	74	67.88
No	35	32.11
Total	109	100
Holidays in the last 12 months		
<2 weeks	20	18.34
2-5 weeks	25	22.93
>5 weeks	56	51.37
Depends on nonworking days	8	7.33
Total	109	100

Note N = 109

Finally, as in Table X, 70.64% (n=77) of truck drivers report experiencing poor health due to work, and only a small number of truck drivers denied experiencing ill health (n=32, 29.35%).

TABLE X: Truck drivers reporting poor health due to work

Incidence of poor health due to work	Frequency	Percentage
Yes	77	70.64
No	32	29.35
Total	109	100

Note N = 109

Fig. 1 summarises the range of coping methods utilised by truck drivers to manage their work stress, of which some rely on healthy activities such as Music (n=11, 10%), Sleep (n= 17, 15%) and spending time with family (n=11, 10%). However, 25% (n=27) of truck drivers reported that they rely on alcohol, 10% (n=11) rely on drugs, and 13% (n=14) rely on their phones. While the prevalence of substance consumption may seem small in the present sample, when respondents were asked to selfreport or disclose sensitive behaviours such as consumption of psychoactive substances (alcohol, drugs) in surveys, there is usually an incidence of underreporting/misreporting. Therefore, looking at alcohol consumption trends across systematic metareview studies may be more viable. One such review by [23] highlights that truck drivers are especially susceptible to a bingedrinking consumption pattern that entails consuming five or more drinks within two hours. They also note that across studies, married truck drivers are more likely to engage in excessive alcohol consumption; this trend is explained by the possibility that being removed from families acts as greater stress to some drivers than others. This consumption demands intervention because it is linked to impaired executive function abilities like response inhibition and attention that allow for complex tasks like driving [24].

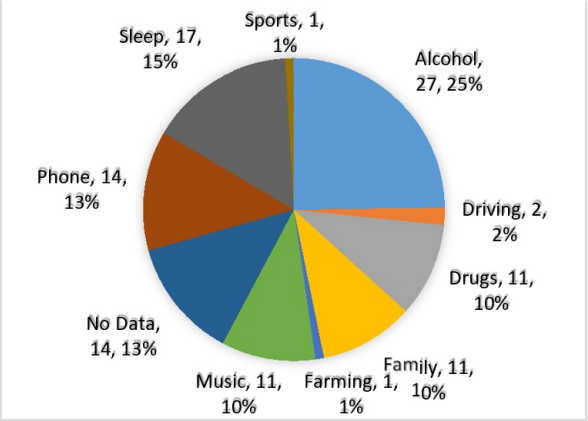

Fig. 1: Distribution of methods of coping with work stress

When compared based on employment for LHTDs, India seems inadequate and unorganised compared to other developed countries. Indian LHTDs are paid considerably less per hour than their international counterparts and are not extended any comprehensive medical or fiscal benefits.

In Table XI, there is a range of employment benefits that Indian LHTDs do not get to leverage due to the trucking industry's unorganised and poorly unionised nature. These benefits include Medical and Dental insurance as a minimum, but some countries also make provisions to buy employee stock, receive fuel discounts, and have disability coverage and tuition reimbursement. Perhaps most importantly, Indian LHTDs may benefit from receiving pension plans since there is considerable financial insecurity in this line of work. Qualitative research studies also indicate that even when welfare aids like medical insurance, minimum-wage guarantees and provident funds can be extended to drivers, companies often neglect responsibility by blaming third-party service providers for not connecting drivers to these benefits [17]. LHTDs can also not hold their employers accountable because their work contracts are often not permanent; there is a lack of unionisation and an absence of information and literacy about availing welfare facilities.

TABLE XI: Terms of employment for LHTDs india vs. Developed Countries

Trip-based compensation	Employment Benefits
INDIA **Avg INR 200-250/hr** **Annually INR 3-5 Lac**	Eligible for healthcare via National Health Authority (NHA) and All India Transporters Welfare Association (AITWA) [Under Ayushman Bharat– Pradhan Mantri Jan Arogya Yojna Scheme (PM-JAY)]
USA **Avg USD 32/hr** **Annually USD 60-65k**	Employee stock ownership plans, referral program, fuel discounts, paid time off, Life insurance and Dental insurance.
CANADA **Avg CAD 30/hr** **Annually CAD 82k**	Paid vacation, Paid sick leave, Medical and Dental insurance, short and Long term disability coverage, and pension plan.
UK **Avg 20-30 GBP/hr** **Annually 25-55k GBP**	Paid vacation, Paid sick leave, Medical and Dental insurance, Tuition reimbursement, and pension plan.

Note N = 109

IV. CONCLUSIONS AND RECOMMENDATIONS

The present study aimed to map the occupational and socioeconomic vulnerabilities of Indian LHTDs. Data collected from the questionnaire confirms that LHTDs in India operate in a nonstandardised segment of an otherwise highly calibrated supply chain system. Most sampled experience financial insecurity because of making meagre amounts of money and not having alternate sources of income. None of the participants reported having any formal education post-schooling or specialised skill or vocational training that would allow them to seek employment elsewhere with better work conditions. While some participants reported having access to medical reimbursements and paid leaves while employed, many have not experienced these medical and social benefits as part of their contracts. Perhaps one domain where Indian LHTDs seem to be faring better is their lack of involvement in unpaid nondriving labour such as loading-unloading freight, which is managed mostly by machinery. Similarly, a substantial number of drivers also reported that their employers maintained the upkeep of the trucks to be driven.

These trends indicate the need for formally reorganising the trucking sector so that LHTDs can be safeguarded from the social and health related costs externalised from this portion of the supply chain by paying them less. Recommendations include extending truck drivers' medical insurance provisions and standardising paid leaves. The Government, labour union bodies, and NGOs can also collaborate to upskill truck drivers by creating opportunities for vocational training and involvement in other nondriving aspects of this line of work, such as networking and marketing. Since LHTDs are intimately aware of on-ground realities and have frequent access to communities/villages by passing through them while driving, they can be strategically incorporated to expand the business.

Future research may also explore how the industrial process of incentivising faster delivery may be improved since it has consequences for overworking and driver fatigue. Changes in pay, incentivising no-incidence deliveries, combining social and health benefits, and incorporating insurance provisions might affect the trucking sector. In addition, the Commerce and Industry Ministry, GOI, has formulated a National Logistics Policy [26] to give Indian trade a competitive edge to become a global logistics hub where the LHTDs play an important role.

V. LIMITATIONS OF THE PRESENT STUDY

While survey questionnaires help collect primary data and complement exploratory research designs very well, several disadvantages are linked to this mode of data collection. First, the results generated are restricted to the population sampled, and the trends noticed in this research apply only to LHTDs hailing from northern parts of India. Future research can be designed to sample a more heterogeneous population of truck drivers such that a complete picture of the ground reality can be established. Second, the data collected typically lies on the nominal scale and, as such, cannot be subjected to inferential analysis. This limits researchers' ability to claim causal relationships between study variables. Third, since questionnaires are a self-report method of data collection, there is the possibility that participants intentionally or unintentionally misreport data. This uncontrolled source of variance cannot be eliminated but minimised, as was done by establishing rapport, maintaining the confidentiality and administering the data collection tool in Hindi to the participants. However, even then, some margin of error still exists in responses to substance abuse and other sensitive information.

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