

Original article

A comparative study of personal health behavior in professional and amateur drivers under COVID-19 conditions

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Abstract: Background — The ongoing COVID-19 pandemic has significantly impacted various industries, including transportation. Taxi drivers and amateur drivers have been on the frontline providing essential services while facing an increased risk of contracting the virus.

Objective — This study aims to examine and compare the personal health behaviors adopted by taxi drivers vs. private vehicle drivers in the fight against COVID-19. Understanding these behaviors can help develop strategies to protect and support the health and safety of drivers and passengers.

Methods — This cross-sectional study was conducted in 2022 in Tabriz, East Azerbaijan Province, Iran. A total of 700 drivers participated in the study, including 343 (49%) taxi drivers and 357 (51%) amateur drivers. The research team developed a questionnaire on personal health behaviors regarding COVID-19. The validity and reliability of the instrument were assessed. The personal health behaviors of taxi drivers vs. private vehicle drivers regarding COVID-19 were then examined.

Results — Our findings showed that the percentage of health-promoting behaviors (such as wearing masks in public places, disposing of masks in a trash can with a lid, using masks correctly, washing hands with soap and water, and using alcohol-based hand sanitizers) were significantly higher among private vehicle drivers than among taxi drivers ($p < 0.001$).

Conclusion — The results show that private vehicle drivers adhere stricter to health guidelines than taxi drivers. Improving taxi drivers' awareness and responsibility can help prevent COVID-19. Targeted interventions by policymakers and transportation companies can improve the safety and health of taxi drivers and their passengers.

Keywords: personal health behavior, COVID-19, taxi drivers, wearing masks.

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Introduction

COVID-19, caused by the novel coronavirus SARS-CoV-2, emerged in late 2019 and has spread rapidly across the world. It is primarily spread through respiratory droplets when an infected person coughs, sneezes, or talks. The disease can cause mild to severe symptoms, including fever, cough, difficulty breathing, and loss of taste or smell. As a contagious and potentially life-threatening disease, COVID-19 requires strict precautions to prevent its transmission [1-3].

The COVID-19 pandemic has brought significant changes in various sectors, including transportation [4]. Among those directly affected are taxi drivers and private vehicle drivers, who continue to provide essential services despite the risks involved.

Understanding one's personal health behaviors while managing COVID-19 is critical to protecting one's health and the safety of passengers [5]. The COVID-19 pandemic has significantly impacted the transportation industry. Public transportation services, including taxis, experienced a reduction in a number of passengers and struggled to maintain social distancing protocols. According to the World Health Organization (WHO), taxi drivers and passengers are at high risk of contracting COVID-19 as they often come into close contact with each other [6, 7].

Taxi drivers have been identified as a high-risk group for contracting COVID-19 due to the nature of their work, which involves working in close proximity to potentially infected passengers [8, 9]. For example, in New York City, taxi drivers have been transporting COVID-19 patients to hospitals, exposing

themselves to the risk of infection. Consequently, some taxi drivers have fallen ill as a result of occupational exposure [10].

On the other hand, during the COVID-19 pandemic, private cars have become the preferred means of transportation in urban areas. People are concerned about the risk of infection when using public transportation, and reduced traffic congestion has also affected their travel choices. As a result, there has been a noticeable shift in citizens' preferences towards using cars for commuting. The use of private vehicles has increased, and people choose private transport to minimize exposure to the virus [11]. Recent findings revealed that adequacy of financial resources, support from relatives, colleagues and health workers, perceived susceptibility, severity, benefits, barriers and motivation for health, access to personal protective equipment for COVID-19 and prevention strategies from external agencies were associated with commendable COVID-19 prevention efforts among taxi drivers in Bangkok during the COVID-19 outbreak [5].

Since the first case of coronavirus disease (COVID-19) was reported in Iran on 18 February 2019 [12], the spread of the disease has gone through five waves of ups and downs. The first wave started in mid-March 2020, followed by subsequent waves. According to official statistics from the Ministry of Health and Medical Education (MHME) of Iran, as of December 16, 2021, there have been approximately 6,200,000 COVID-19 patients in Iran, of which 131,639 have died [13]. Iran currently ranks 14th in the world in terms of the number of patients, regardless of population size, and is the worst-affected country in the region after Turkey. Overall, Iran has faced numerous challenges as it is often among the countries with the highest morbidity and mortality rates [12].

Based on the research team's search, no studies were found on the health behaviors of taxi drivers and how they compare with private vehicle drivers in Iran. Understanding the specific challenges faced by taxi drivers and amateur drivers is critical to reducing risks and ensuring safe operation of transportation services. Identifying these behaviors can help develop targeted interventions and recommendations to promote safer practices. The objective of this study was to compare personal health behaviors related to COVID-19 among taxi drivers and private vehicle drivers. By studying their personal health behaviors, we can identify areas for improvement and develop recommendations to improve safety in the transportation industry.

Material and Methods

Study design and setting

This cross-sectional study was conducted in 2022 in Tabriz, East Azerbaijan Province of Iran. Taxi drivers who are professional drivers and private vehicle drivers were recruited in the city of Tabriz, located in northwestern Iran. A representative sample was selected from different parts of the city.

Sample size and sampling procedure

A total of 700 drivers participated in the study, including 343 (49%) taxi drivers and 357 (51%) amateur drivers. The sample size was determined using statistical calculations to ensure adequate representativeness and meaningful analysis.

Data collection tools

Data were collected using a number of instruments, including a demographic information form recording age, gender, and driving history. The research team developed a questionnaire to assess personal health behaviors regarding COVID-19 ([Suppl. 1](#)).

Questionnaire development and validation

To develop the questionnaire, an initial literature review was conducted to collect background information. The extracted data were then discussed by an expert group consisting of five experts in epidemiology and health management, and the final items were determined with the help of this group. The content validity of the questionnaire was assessed using the content validity ratio (CVR) and content validity index (CVI) with 12 experts following the approach by Lawshe [14]. The calculated values of CVR and CVI were 0.83 and 0.87, respectively.

Reliability assessment

Internal consistency reliability was measured by Cronbach's alpha, and the calculated Cronbach's alpha was 0.81, which was higher than the acceptable value of 0.7. Test-retest reliability was also used to assess the stability of the questionnaire by administering the questionnaire to 30 participants. The Pearson correlation coefficient was 0.90. The parameters of validity and reliability reached the required values.

Data collection

Data collection was performed by trained interviewers, all of whom had at least a master's degree. Two briefings were conducted to ensure that interviewers understood the objective and procedures of the study.

Inclusion and exclusion criteria

Participants were recruited from both male and female subpopulations. Inclusion criteria required participants to be at least 18 years old, hold a valid driver's license, have a recent driving history (within the last month) for both amateur drivers and taxi drivers, and provide informed consent. Exclusion was based solely on the unwillingness to participate in the study.

Ethical considerations

The study complied with the ethical principles outlined in the Declaration of Helsinki. Participants were informed of the study objective and assured of the confidentiality of their data. The study received ethical approval with the code IR.TBZMED.REC.1400.022.

Statistical processing of data

Data analysis was performed using IBM SPSS version 20. Descriptive statistics including mean (standard deviation) for quantitative variables and frequency (%) for qualitative variables were used in this study. Chi-squared test was employed for analytical purposes. Statistical significance was assumed at $p < 0.05$.

Results

In this study, the mean age of all drivers was 41.03 years ($SD=13.09$). The mean ages of taxi and private vehicle drivers were

47.81 (10.66) years and 34.52 (11.86) years, respectively. Our findings confirmed that 44% of the studied drivers (308) made 1 to 5 trips within the province, and 56% (392) of them stated that the number of such trips exceeded 5. In terms of out-of-province trips, it was found that 34% of the studied drivers (238) traveled out of the province 1 to 5 times, while for 66% (462) of them, this number exceeded 5 ([Table 1](#)).

As demonstrated in [Table 1](#) and [Figure 1](#), about 6% of our study participants use masks more than 80% of the time when they are at work, in public places, shopping malls, stores, etc.

The results regarding the use of masks showed that about 6% of the participants in this study used the mask continuously or at intervals for more than 5 hours.

About 32% of the participants said that they use the mask correctly (it covers their mouth, nose, and chin). Only 7% of the participants said that they maintain a physical distance of at least 1.5 m in public places. About 19% of the participants stated that they wash their hands with water, soap, and alcohol.

Approximately 38% of the participants in this study said that they observed noncompliance with health protocols during their visits to public places.

The results of the comparison of health behavior in taxi drivers vs. amateur drivers ([Table 2](#)) showed that the percentage of health behaviors in cases of using masks in public places, throwing masks into a trash can with a lid, using masks correctly, washing hands with soap and water, and using alcohol-based hand sanitizers was significantly higher among drivers of private vehicles than among taxi drivers (p-values for each comparison are presented in [Table 2](#)).

Discussion

The objective of this study was to investigate and compare the health behaviors adopted by taxi drivers and private vehicle drivers in the fight against COVID-19 disease. The results of this comparison showed that the shares of health behaviors related to

using masks in public places, throwing masks in a trash can with a lid, using masks correctly, washing hands with soap and water and alcohol-based sanitizers were significantly higher in amateur drivers than in taxi drivers.

According to our study, the percentage of taxi drivers who wore face masks was quite low compared with private vehicle drivers. Comparison of the results of this study with other studies showed that the percentage of mask use among taxi drivers in the current study was lower than that of taxi drivers in other regions of the world. A similar study conducted in Ethiopia among taxi drivers demonstrated that the percentage of taxi drivers who wore a face mask was 54.68%. It was also found that more than half (52.5%) felt uncomfortable wearing a face mask [7]. Results from other studies conducted among other road users showed that mask wearing is rare among taxi drivers. For example, a study in Hong Kong found that 94.8% of pedestrians wore masks [15]. This observed difference may be due to several factors such as different knowledge, attitudes, training periods, and local cultural issues. According to the results of several studies, people who believed that wearing masks was effective were more likely to actually wear them [16-18].

The behavior of throwing masks into a trash can with a lid was higher among private vehicle drivers. This may be due to the fact that taxi drivers do not have easy access to such trash cans. Many communities and public places have installed trash cans specifically for used masks [19]. The study found that more than half of the respondents claimed to throw their masks into these special trash cans. However, it should be noted that discarded masks have been found in various places, including buses, train stations, and streets. To effectively address the problem of mask disposal, it is essential to actively promote specific measures. Several measures can be implemented in this regard. One of them is to place more trash cans for used masks in public places so that public transportation drivers can easily access them. These trash cans can be more attractive if painted over with attractive logos.

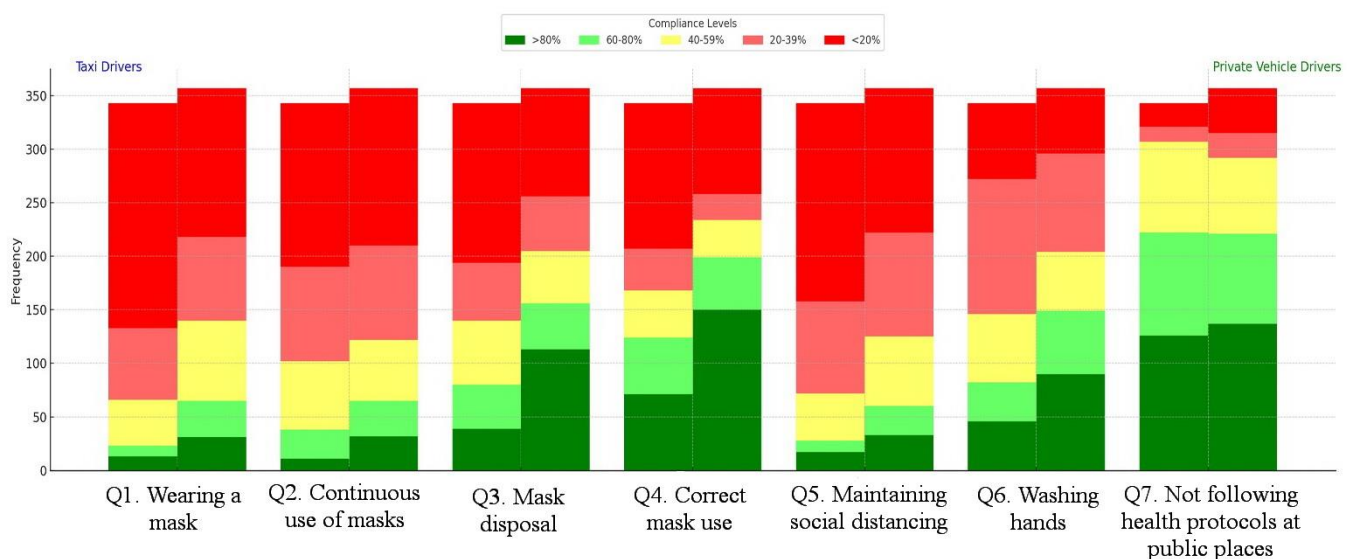


Figure 1. Comparison of compliance levels of personal health behaviors between taxi drivers and private vehicle drivers during COVID-19.

Table 1. Frequency distribution of compliance with personal hygiene behaviors among all study participants in connection with COVID-19 disease

Personal hygiene behavior	Frequency (%)				
	>80%	60-80%	40-59%	20-39%	<20%
1 Wearing a mask in public places	43 (6.1)	44 (6.3)	118 (16.9)	145 (20.7)	349 (49.9)
2 Continuous or intermittent use of a mask for more than 5 hours	43 (6.1)	60 (8.6)	121 (17.3)	176 (25.1)	300 (42.9)
3 Disposing of the mask in a closed trash can after each use	152 (21.7)	84 (12)	109 (15.6)	105 (15)	250 (35.7)
4 Correct use of a mask (covering the mouth, nose, and chin)	221 (31.6)	102 (14.6)	79 (11.3)	63 (9)	235 (33.6)
5 Maintaining a physical distance of at least 1.5 meters	50 (7.1)	38 (5.4)	109 (15.6)	183 (26.1)	320 (45.7)
6 Washing hands with soap and water or alcohol-based hand sanitizers	136 (19.4)	95 (13.6)	119 (17)	218 (31.1)	132 (18.9)
7 Visiting some public places without following health protocols related to coronavirus infection	263 (37.6)	180 (25.7)	156 (22.3)	37 (5.3)	64 (9.1)

Table 2. Travel details of the study participants

Personal hygiene behavior	Taxi drivers, Frequency (%)					Private vehicle drivers, Frequency (%)					p-value
	>80%	60-80%	40-59%	20-39%	<20%	>80%	60-80%	40-59%	20-39%	<20%	
Wearing a mask in public places	13 (3.8)	10 (2.9)	43 (12.5)	67 (19.5)	210 (61.2)	31 (8.7)	34 (9.5)	75 (21)	78 (21.8)	139 (38.9)	<0.001
Continuous or intermittent use of a mask for more than 5 hours	11 (3.2)	27 (7.9)	64 (18.7)	88 (25.7)	153 (44.6)	32 (9)	33 (9.2)	57 (16)	88 (24.6)	147 (41.2)	0.021
Disposing of the mask in a closed trash can after each use	39 (11.4)	41 (12.0)	60 (17.5)	54 (15.7)	149 (43.4)	113 (31.7)	43 (12)	49 (13.7)	51 (14.3)	101 (28.3)	<0.001
Correct use of a mask (covering the mouth, nose, and chin)	71 (20.7)	53 (15.5)	44 (12.8)	39 (11.4)	136 (39.7)	150 (42)	49 (13.7)	35 (9.8)	24 (6.7)	99 (27.7)	<0.001
Maintaining a physical distance of at least 1.5 meters	17 (5)	11 (3.2)	44 (12.8)	86 (25.1)	185 (53.9)	33 (9.2)	27 (7.6)	65 (18.2)	97 (27.2)	135 (37.8)	<0.001
Washing hands with soap and water or alcohol-based hand sanitizers	46 (13.4)	36 (10.5)	64 (18.7)	126 (36.7)	71 (20.7)	90 (25.2)	59 (16.5)	55 (15.4)	92 (25.8)	61 (17.1)	<0.001
Visiting some public places without following health protocols related to coronavirus infection	126 (36.7)	96 (28)	85 (24.8)	14 (4.1)	22 (6.4)	137 (38.4)	84 (23.5)	71 (19.9)	23 (6.4)	42 (11.8)	0.032

Since viruses that cause respiratory infections can survive on surfaces for long periods of time [20], handwashing has been shown to reduce the risk of virus transmission [7]. The results of the current study showed that handwashing with soap and water for at least 20 seconds and applying alcohol-based hand sanitizers occurred statistically significantly more often among amateur drivers than taxi drivers. We revealed that 66.4% of taxi drivers had good knowledge, positive attitudes, and frequent hand hygiene practices [7]. Given the low hand washing rates of taxi drivers and the high likelihood of encountering the disease in this group of society, effective measures need to be taken for this group of society to avoid contracting the disease and prevent the spread of the disease to others. For taxi drivers, maintaining their current proactive stance is critical. By consistently adhering to health guidelines and providing a safe and disinfected environment for passengers, they can make a significant contribution to minimizing the spread of COVID-19. In addition, they can continue to learn the latest developments to be better prepared to protect themselves and their passengers.

This study has several strengths that can strengthen future research. One of the strengths is that it focused on professional taxi drivers vs. amateur drivers, providing relevant scientific evidence. Another strength of this study is its acceptable generalizability achieved by using cluster sampling methods in the study city. The study benefits from a large sample size of 700 drivers, which increases the reliability and generalizability of the results across East Azerbaijan Province. By using a cross-sectional design and including drivers from different regions, the study covers a wide range of health behaviors, improving understanding of the factors influencing preventive measures in different settings. Additionally, the results provide helpful insights for policymakers and transportation companies to develop targeted

interventions, improve safety measures, and enhance health education among drivers, thereby contributing to broader efforts to control COVID-19 transmission.

However, our study also has limitations that may affect its findings. Relying on self-reported data to assess personal health behavior may introduce bias, as participants may overreport socially desirable behaviors. Future studies may include observational methods to validate self-reported data. Additionally, the study is limited to East Azerbaijan Province, which may limit the generalizability of the results to other regions with different cultural and socioeconomic contexts. Expanding the study to include multiple regions would provide more comprehensive information. Another limitation of this study is that it did not include online taxi drivers due to resource constraints. It is therefore recommended that future studies include this group of drivers.

Conclusion

The results of this study highlight the differences in personal health behavior between taxi drivers and private vehicle drivers. While private vehicle drivers show higher levels of compliance to guidelines, taxi drivers could benefit from improved awareness and responsibility in their COVID-19 prevention efforts.

Ethical approval

This study complied with ethical standards of the Declaration of Helsinki. Participants were informed about the objectives of the study and assured of data confidentiality before the survey. The ethical approval code for this study is IR.TBZMED.REC.1400.022.

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Conflict of interest

The authors declare no competing interests.

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Supplement 1.

English version of the travel questionnaire

<i>Question</i>	<i>Not applicable</i>	<i>Never</i>	<i>Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Always</i>
Q15-1: When traveling by car, I follow the health protocols related to the prevention of coronavirus disease (COVID-19) at the gas station and when filling the gas tank.						
Q15-2: I try to avoid traveling to high-risk cities and places (red zones) declared by the National COVID-19 Headquarters.						
Q15-3: I warn people who do not wear masks or do not follow the health protocols when traveling by public transportation during the COVID-19 pandemic.						
Q15-4: If I experience any suspicious symptoms of COVID-19 during my trip, I immediately go to the first medical center/ward for testing.						
Q15-5: Due to unfavorable economic conditions, I was unable/unwilling to pay for a full compartment when traveling by train and for a neighboring seat when traveling by bus in order to maintain physical distancing.						
Q16: After arriving at my destination, due to the COVID-19 pandemic, I have set aside time for personal quarantine to avoid contact with people.						

<i>Question</i>	<i>Never</i>	<i>Rarely</i>	<i>Sometimes</i>	<i>Often</i>	<i>Always</i>
Q17-1: Transport authorities (such as highways, municipalities, terminals) implement or monitor health protocols related to COVID-19.					
Q17-2: Passengers comply with health protocols related to COVID-19.					
Q17-3: Traffic police warn passengers or drivers if they notice noncompliance with health protocols related to COVID-19.					
Q17-4: The driver and assistant driver warn passengers if they notice noncompliance with health protocols.					