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Exploring drivers' willingness to pay for safer roads in Iran: a discrete choice experiment on reducing injury and mortality risks

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Abstract: **Background:** Road traffic injuries (RTIs) are a leading global health challenge, with Iran facing significant economic and social costs due to these incidents. This study investigates Iranian drivers' preferences for road safety and their willingness to pay (WTP) to reduce injury and mortality risks. It also examines the influence of demographic and driving-related factors on these preferences.

Methods: A discrete choice experiment (DCE) was conducted among Shiraz residents to analyze route preferences. Participants evaluated hypothetical commuting scenarios characterized by variations in travel time, cost, injury risk, and fatality risk. Using a D-efficient fractional factorial design, 10 two-alternative choice scenarios were developed. Data were collected through interviews in five districts, achieving an 81% response rate. A mixed logit regression model was employed to assess how route attributes influenced participants' decisions.

Results: Key factors driving route choices included the number of deaths, injury rates, travel time, and cost, with fatalities being the most influential. Participants were willing to pay $7.07 extra for routes with travel times under 30 minutes, $8.98 for routes with fewer than 10 annual injuries, and $11.83 for routes with fewer than 5 annual deaths. WTP varied significantly across demographic groups: men prioritized reduced travel time, while women emphasized safety. Personal-use drivers exhibited higher WTP compared to professional drivers like taxi operators. Larger family sizes correlated with lower WTP, whereas individuals in excellent health or with supplementary health insurance displayed higher WTP for safer and faster routes.

Conclusion: This study underscores the utility of DCEs in capturing drivers' preferences for road safety and efficiency in Iran. By highlighting the trade-offs drivers are willing to make and identifying key factors, these findings offer actionable insights for policymakers to design transportation systems that align with public safety and mobility priorities.

Keywords: Discrete Choice Experiment; Risk Reduction Behavior; Road Safety; Road Traffic Accident; Willingness to Pay

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1. Introduction

Road Traffic Injuries (RTIs) are significant contributors to global mortality and disability, with approximately 9% of total deaths worldwide attributed to such injuries (1). Global road injuries increased by 63.3%, from 63.2 million in 1990 to 103.2 million in 2019 (2). In 2017, more than 1.2 million individuals globally lost their lives due to road injuries. Although age-standardized incidence rates have been increasing, there has been a decrease in mortality rates over time (3). In low- and middle-income countries, traffic accidents are a chief global health concern, not only causing the death or disability of 1.35 million people annually but also being the seventh leading cause of death by 2030, highlighting the immediate need to focus on preventing accidents through safety measures (4).

Like many other countries, Iran experiences a high burden of injuries, as accidents and injury incidents are the leading causes of death and disability (5). Even though Iran has a higher proportion of deaths caused by drivers or passengers of motorized vehicles compared to the global average, the burden of road traffic injuries in Iran decreased by 61.1% from 1990 to 2019 (6).

Road traffic accidents have a significant economic burden, highlighting the need for strong preventative measures and policies (7). As reported by the world health organization (WHO), the annual costs of road traffic accidents in low- and middle-income countries represent 1-2% of Gross domestic product (GDP) (8). In this regard, road traffic accidents in India (0.77%), Iran (2.19%), Egypt (1.0% in 2008), and Vietnam (0.45% in 2005) significantly impacted their economies, representing a substantial portion of their GDP (9-12).

Considering that accidental injuries, particularly road traffic accidents, lead to high out-of-pocket expenditures due to frequent hospitalization (13), Iran is no exception, experiencing healthcare costs for traffic injuries that are relatively higher than the global average, especially for medical treatment and both temporary and permanent disabilities, placing a burden on families and public health (10). Taking that into consideration, in Iran, the government covers all costs to reduce the financial burden of accidents (5). As shown in a study conducted in Iran in 2015, the total costs for injured patients of road traffic accidents were measured at $1.7 million, with 27.4% and 72.6% related to direct and indirect expenses (14). The considerable economic impact of RTIs emphasizes the need for preventive measures to lessen the overall societal burden (15). However, progress in achieving crucial road safety indicators has been slow, in particular in low- and middle-income countries where death rates continue to be disproportionately high (10). Concerning the importance and effect of the burden of traffic-related injuries and fatalities, valuing road safety is crucial in policy-making (16).

Regarding valuing road safety, there are various methods, including the contingent valuation method (CVM) and choice experiment (CE) method, to evaluate individuals' willingness to pay (WTP) for safety improvements (17,18). Considering that the chief method is WTP, measuring how much an individual is willing to pay to reduce the likelihood and impact of a road injury, done through two main approaches (19). The stated preference method involves using survey questionnaires to estimate the value of statistical life, whereas the revealed preference method is based on the actual purchasing behavior of individuals, such as buying cars with different safety features (20). Moreover, the value of statistical life (VSL) can be estimated through contingent valuation surveys using models like log-logistic, log-normal, and Weibull for analysis, as a study in Ethiopia estimated the VSL for road safety using WTP data, with the log-logistic model showing the best performance and resulting in a VSL estimate of USD 1.07 million, which can be applied to other low- and middle-income countries to improve road safety initiatives (17). This study not only evaluates the WTP of Iranian drivers to reduce mortality and injury risks from traffic accidents, but also examines how socioeconomic and demographic factors influence WTP. The study utilizes the DCE method to gain insights into the trade-offs drivers make between travel time, costs, and safety. It highlights the significant economic burden of road traffic injuries, underscores the need for effective preventative measures, and quantifies the economic value drivers place on safety.

2. Methods

2.1. Study design

In this study, the DCE was used to elicit the preferences of individuals residing in Shiraz (the most populous city in the south of Iran) regarding different commuting routes. In this method, participants were presented with hypothetical scenarios and asked to choose their preferred option between two choices. The DCE test was developed based on guidelines available in this area (21,22). Two proposed routes were offered, defined by different levels of four key attributes. To achieve this goal, firstly, the relevant attributes of the commuting routes were extracted through the literature available in this area (18,23,24), and then confirmed by a group of experts (two health economists, two health policy experts, and one epidemiologist). The four attributes included in this study are the travel time difference between routes, the monthly driving costs on each route, the number of injuries per year on each route, and the number of deaths per year on each route. The levels of each attribute were selected to reflect a realistic context in Shiraz. In Iran, an accidental point is defined based on the number of injuries and fatalities occurring at a specific location over the past three years, with a history of at least 2 fatal crashes, three injury crashes, or one fatal crash plus two injury crashes (25). Therefore, thresholds for injuries and fatalities were set annually by considering a maximum of 5 accidental points on a daily traffic route. Travel time categories were aligned with typical commute times in Shiraz. That is less than 30 minutes and between 30 to 60 minutes. In addition, the monthly driving costs levels equivalent to 8,000,000 Iranian Rial (IRR) (34.78 US Dollars) were based on the average cost of gasoline per kilometer, oil changes, and deterioration, with increases of 10% and 20% to account for sensitivity to higher costs.

To ensure clarity and comparability, all monetary values collected in IRR were converted to US dollars using the exchange rate of 1 USD=230,000 IRR, provided by the Central Bank of Iran at the time of data collection (26).

To select the scenarios to present to participants, a fractional factorial main-effects D-efficient design was used. By combining the selected attributes and levels and using the designed experiment, 10 two-alternative scenarios were presented to participants. An example of the scenarios presented to participants is shown in figure 1.

Ten scenarios were presented to each participant, and the participants could choose one of the two proposed routes by considering the mentioned features.

At the beginning of the questionnaire, respondents were provided with a clear explanation reminding them to answer as if they were actually facing the stated costs and consequences in real life. In addition, they were informed that the results of the study could potentially influence real decision-making processes (e.g., urban policies or road safety interventions). These two strategies, commonly referred to as the cheap talk script and the consequentiality script, were employed to reduce hypothetical bias and encourage respondents to take the questions more seriously. While the effectiveness of these approaches was not formally tested in this study, they were expected to enhance the realism of responses and limit the extent of hypothetical bias.

2.2. Sampling

Convenience and accessible sampling were conducted. In order to ensure the representativeness of the sample, data collection was done in five different districts of Shiraz city, including the two busy streets of the north, south, east, and west of the city. The inclusion criteria were age between 18 to 75 years, having at least two years of driving experience, being literate, and willing to participate in the study. The exclusion criteria were unwillingness to participate and not understanding the questions. The average duration of the study interview per individual did not exceed 17 minutes. Data collection was done from October 2021 to March 2022.

2.3. Data analysis

The collected data were first checked for completeness and consistency. Out of 755 respondents, 473 valid questionnaires were retained for analysis after excluding incomplete or inconsistent responses. Missing values were minimal and were handled through case-wise deletion. Before modeling, categorical variables (injuries, deaths, and travel time differences) were coded as dummy variables, while the continuous variable of driving costs was entered directly in monetary terms (USD).

To examine route choice behavior, a mixed logit regression model was applied, as it accounts for unobserved preference heterogeneity among individuals and relaxes the independence of irrelevant alternatives assumption (27). The dependent variable was the binary choice of route (Route A vs. Route B). In contrast, independent variables included travel time difference, monthly driving costs, number of injuries per year, and number of deaths per year.

The model was estimated using JMP Pro 17 software with 5000 Bayesian iterations to ensure stable parameter estimates. Model adequacy was evaluated through the Akaike Information Criterion (AIC), the bayesian information criterion (BIC), and the -2 Log likelihood, all of which confirmed good model fit. In addition, overall model significance was tested using the whole model test, lack of fit, and effect wald tests, all showing Prob > ChiSq < 0.0001. To interpret preferences in monetary terms, WTP values were obtained by dividing the estimated attribute coefficients by the cost coefficient (28).

In the second stage, participant-related variables (e.g., gender, marital status, number of family members, health insurance, self-reported health status, travel purpose, driving behavior, and traffic perception) were added to the model to explore their moderating effect on WTP.

2.4. Ethical approval

The study was approved by the ethical committee at Shiraz University of Medical Sciences (IR.SUMS.REC.1399.987). All methods were performed in accordance with the relevant guidelines and regulations. The study has also been performed in accordance with the Declaration of Helsinki.

3. Results

3.1. Demographic characteristics

Among the participants, 255 (53.9%) were female, and 218 (46%) were male. The participants' mean age was 36.5±13.26 years. Based on the analysis, 48 (10.1%), 206 (43.5%), 136 (28.7%), and 83 (17.5%) participants used their vehicles for a variety of purposes, including private driving (e.g., taxi drivers and ride-hailing drivers), daily commutes to work or university, personal use (e.g., shopping, errands), and other reasons, respectively. The average number of family members was 3.32, with a standard deviation of ±1.31. Also, 316 (67.2%) of the participants assessed themselves in perfect health (10 on a 0-10 scale of visual analogue scale (VAS)).

The variables are categorized into participant-related variables and driving-related variables. Some participant-related variables that may be relevant to the study include gender, marital status, education level, occupation, employment status, place of residence, head of household, insurance, supplementary insurance, social class, vehicle ownership, health status, and travel purpose. Some driving-related variables that may be relevant to the study include driving distance, safety belt usage, mobile phone use while driving, speed limit, traffic, risk, other risk factors, and experience. The demographic and driving-related variables of the participants are presented in supplementary table S1.

3.2. Regression results

The logistic regression model results showed that all four considered attributes have a significant effect on the probability of selecting a driving route, and the number of deaths and costs of each route had the highest and lowest impact on the probability of selection, respectively. Since the correlation between the selected attributes and levels was less than 50%, the cross-effects of variables were not considered in the study. Additional information is provided in table 1.

According to the results of the mixed logit regression model, a route that has a travel time difference of less than 30 minutes, costs 34.78 USD, has less than 10 injuries per year, and also has less than 5 deaths per year, has a 70% probability of being chosen by individuals, as shown in figure 2.

Various significant tests also confirmed the significance of the estimated model. Results of tests such as the whole model test, lack of fit, and effect wald tests showed Prob>ChiSq<0.0001* and confirmed the significance of the model.

Considering the baseline of a route with a travel time difference of more than 30 minutes, a travel cost of 34.78 USD,

Table 1 Logistic regression results for route selection factors

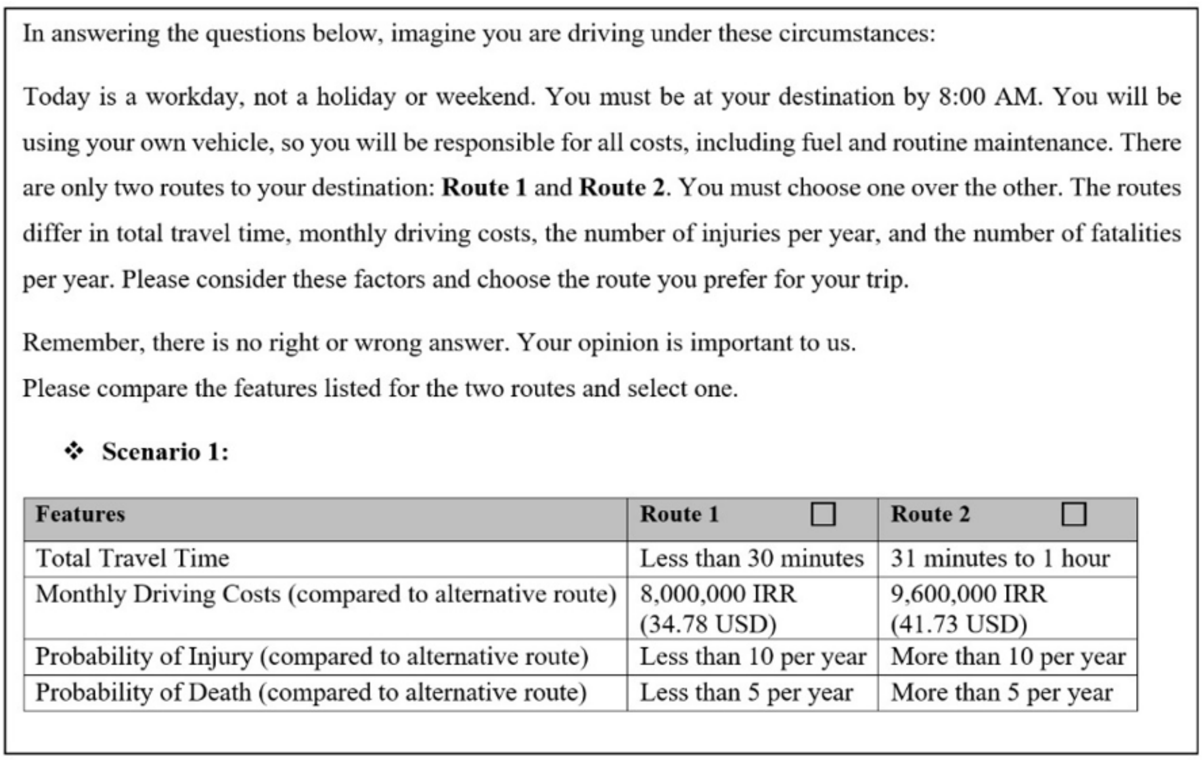
Term	Estimate	Std Error	Lower 95%	Upper 95%	L-R Chi square	DF	Prob>ChiSq
Time	-0.1734	0.0314	-0.2351	-0.1119	30.568	1	< 0.0001*
Cost	-0.0010	0.00027	-0.0016	-0.00052	15.072	1	0.0001*
Injury	-0.2201	0.0303	-0.2797	-0.1607	53.066	1	< 0.0001*
Death	-0.2902	0.0322	-0.3535	-0.2271	82.268	1	< 0.0001*

AICc:6312.9315; **BIC:**6338.7152; **-2*LogLikelihood:**6304.9229; **-2*Firth LogLikelihood:** 6267.6811; Std: Standard deviation; LR: Likelihood ratio; DF: Degrees of freedom

Table 2 Willingness to pay of drivers for reductions in travel time, injuries, and fatalities across route attributes

Factor	Feature setting	Price change (IRR)	Std error	Lower 95%	Upper 95%	New price (IRR)	Price change (USD)	New price (USD)
Time	< 30	162.73	51.2634	62.25	263.20	962.73	7.07	41.42
Time	> 30	0.00	51.2634	-100.47	100.47	800.00	0	34.78
Injury	< 10	206.48	57.6594	93.47	319.49	1006.48	8.98	43.76
Injury	> 10	0.00	57.6594	-113.01	113.01	800.00	0	34.78
Death	< 5	272.25	71.3735	132.36	412.14	1072.25	11.83	46.62
Death	> 5	0.00	71.3735	-139.89	139.89	800.00	0	34.78

Note: Standard deviations for Price Change were calculated by the Delta method.
Std: Standard deviation; IRR: Iranian Rials; USD: US Dollar


In answering the questions below, imagine you are driving under these circumstances:

Today is a workday, not a holiday or weekend. You must be at your destination by 8:00 AM. You will be using your own vehicle, so you will be responsible for all costs, including fuel and routine maintenance. There are only two routes to your destination: **Route 1** and **Route 2**. You must choose one over the other. The routes differ in total travel time, monthly driving costs, the number of injuries per year, and the number of fatalities per year. Please consider these factors and choose the route you prefer for your trip.

Remember, there is no right or wrong answer. Your opinion is important to us.
Please compare the features listed for the two routes and select one.

❖ **Scenario 1:**

Features	**Route 1** ☐	**Route 2** ☐
Total Travel Time	Less than 30 minutes	31 minutes to 1 hour
Monthly Driving Costs (compared to alternative route)	8,000,000 IRR (34.78 USD)	9,600,000 IRR (41.73 USD)
Probability of Injury (compared to alternative route)	Less than 10 per year	More than 10 per year
Probability of Death (compared to alternative route)	Less than 5 per year	More than 5 per year

Figure 1 Procedure of generating the items of trauma quality scale from patient's perspective (TQS-PP)

more than 10 injuries per year, and more than 5 deaths per year, participants in this study were willing to pay approximately 7.07 USD more to reduce travel time to less than 30 minutes. They were also willing to pay 8.98 USD more to select a route that has fewer than 10 injuries per year. Similarly, there was a willingness to pay 11.83 USD more for a route that has fewer than 5 deaths per year. Table 2 shows the WTP changes in different attribute levels.

Participant-related variables were added to the model to investigate their impact on WTP (Table 3). The results showed that gender, marital status, number of family members, supplementary health insurance, health status, purpose of travel, speed limit adherence, and traffic on routes had a significant effect on WTP.

Finally, the amount of change in WTP due to changes in participant-related variables is presented in table 4. Individuals who have a job-related connection with driving had the lowest willingness to pay, but those who drove for personal

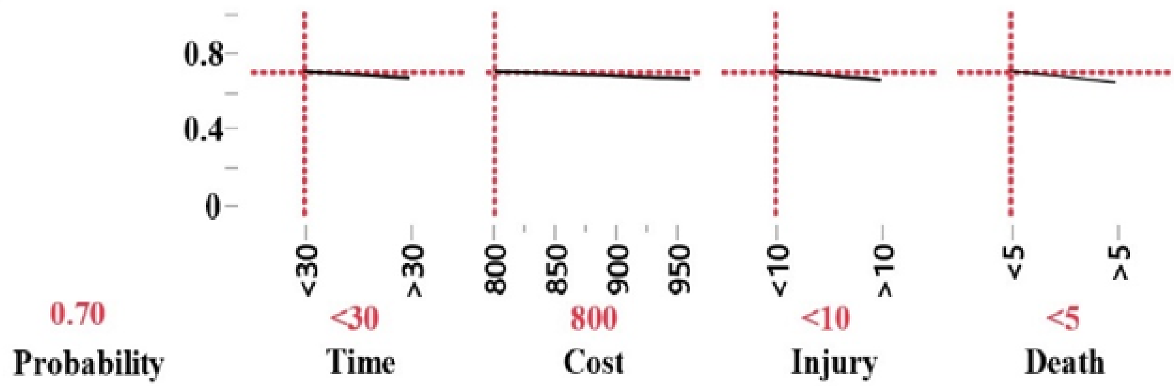


Figure 2 Scree plot of the exploratory factor analysis (EFA) for the trauma quality scale from patient's perspective (TQS-PP) (n=220)

Table 3 The impact of participant-related variables on willingness to pay for route attributes

Factor	L-R Chi square	DF	Prob>ChiSq
Age	23.323	16	0.1054
Gender	15.508	4	0.0038*
Marital status	23.871	12	0.0212*
Education level	13.937	20	0.8337
Occupation	30.466	32	0.5442
Employment status	6.843	8	0.5537
Place of residence	9.165	4	0.0571
Number of family members	20.389	4	0.0004*
Head of household	1.914	4	0.7516
Health insurance	5.461	4	0.2432
Supplementary health insurance	10.666	4	0.0306*
Social class	15.168	12	0.2324
Vehicle ownership	0.498	4	0.9737
Health status	55.328	36	0.0207*
Travel purpose	24.853	12	0.0155*
Driving distance	24.839	16	0.0727
Seatbelt use	25.963	16	0.0546
Mobile phone use while driving	22.791	16	0.1194
Speed limit adherence	35.720	16	0.0032*
Traffic on routes	27.003	12	0.0077*
Risk of accident-related injury or death	22.529	16	0.1269
Risk of non-accident-related injury or death	16.073	16	0.4479
Experience of accident-related injury and death	15.238	12	0.2287

LR: Likelihood ratio; DF: Degrees of freedom

use had a higher willingness to pay. Moreover, men had a higher willingness to pay for shorter routes in terms of time, compared to women. However, women had a higher willingness to pay for safer routes in terms of the number of injuries and deaths.

4. Discussion

This study aims to investigate individuals' preferences for commuting routes in Shiraz, the most populous city in southern Iran, and to assess their WTP for various route attributes. A DCE was conducted to elicit preferences and estimate WTP for travel time, cost, injuries, and deaths. Given the increasing use of DCEs in transportation studies, particularly for understanding WTP for various transportation attributes such as travel time, vehicle features, and transport policies, this study aimed to contribute to this growing body of research (29,30).

The key findings from the current study, using the DCE method, show that the importance of attributes, including travel time, cost, injuries, and deaths, has a significant effect on the probability of route selection. The number of deaths has the highest impact, followed by injuries, travel time, and cost. Specifically, the logistic regression model shows that a one-unit increase in the number of deaths, injuries, travel time, and cost decreases the probability of route selection by 0.290, 0.220, 0.173, and 0.001, respectively, as shown in table 1. Consistent with our findings, previous research demonstrated that safety, cost, and time significantly affect WTP and route choice decisions in transportation planning (31-33). Additionally, subjective externalities like noise and air

Table 4 Changes in WTP due to participant-related and travel characteristics

Factor		Time	Injury	Death
Travel purpose	Personal use (e.g., shopping)	21.46	135.22	212.47
	Commuting to work/university	14.68	11.24	15.22
	Private driving (e.g., taxi drivers)	2.41	3.29	3.50
	Others	3.30	5.06	5.45
Speed limit adherence	Never	14.78	12.85	(-5.84)
	Rarely	(-28.04)	(-5.20)	(-28.41)
	Sometimes	16.68	7.33	19.83
	Often	6.08	10.30	8.76
	Always	1.88	5.55	13.23
Traffic on routes	Rarely	1.42	5.98	25.67
	Sometimes	3.39	6.99	9.67
	Always	2.33	4.97	8.06
Gender	Female	5.92	13.13	21.54
	Male	7.71	6.58	6.20
Marital status	Separated	(-1.35)	(-1.43)	0.60
	Widowed	15.27	(-33.27)	(-106.40)
	Married	3.02	6.09	9.08
	Single	17.72	15.23	16.17
Number of family members	1	(-14.39)	(-8.24)	(-6.51)
	2	378.44	307.12	321.94
	3	10.05	11.39	13.92
	4	4.23	6.71	9.06
	5	2.25	5.12	7.40
	6	1.25	4.32	6.57
	7	0.65	3.84	6.06
	10	(-0.25)	3.11	5.31
Supplementary health insurance	Yes	9.97	7.35	14.42
	No	5.46	9.86	10.39
Health status	1	676.39	9356.52	3782.94
	2	2.69	1.33	5.78
	3	4.80	-11.79	-3.74
	4	-43.93	46.12	7.40
	5	-30.62	254.05	96.97
	6	2.83	14.45	11.97
	7	4.70	5.84	10.80
	8	4.40	2.01	9.02
	9	9.21	10.77	13.67
	10	9.58	12.99	13.33

Note: The values in () represent a reduction in the change in WTP.

pollution correlate positively with increased WTP for route selection (34). It should be noted that, as with many stated-preference methods, hypothetical bias is a potential concern in DCE studies. To minimize this risk, attributes and levels in our design were drawn from realistic commuting conditions in Shiraz, validated by experts, and clearly presented to respondents with instructions to consider the scenarios as real-world choices. These design strategies, which align with best practice in prior studies, help reduce but cannot fully eliminate the risk of hypothetical bias.

Regarding the WTP, participants prefer to pay an additional $7.07 to reduce travel time from more than 30 minutes to less than 30 minutes. For injury reduction, participants are WTP $8.98 more to select a route with fewer than 10 injuries per year compared to a route with more than 10 injuries. Moreover, for fatality reduction, participants intend to pay $11.83 more for a route with fewer than 5 deaths per year compared to a route with more than 5 deaths, as shown in table 2.

Research on drivers' WTP for reduced travel time and improved safety indicates substantial economic values. For instance, a study in San Diego estimated a WTP for reduced commute time of approximately $30 per hour (35) European research found the value of time (VOT) to be 16.1 EUR/h, with the value of a statistical life (VSL) at 6.2 million EUR and the value of a statistical serious injury (VSSI) at 950,000 EUR (36). Additionally, a study in North Cyprus estimated the VOT at €11.81 per hour, the VSL between €315,293 and €1,117,856, and the VSSI between €5,603 and €28,186 (37). Compared to the WTP provided in these international studies, our estimates of WTP are substantially lower in absolute monetary terms, which can be explained by differences in income levels, exchange rates, and socio-economic conditions. However, the relative ranking of attributes where safety outweighs travel time and cost remains consistent across contexts, supporting the external validity of our results.

As shown in table 3 and table 4, the willingness to pay is significantly influenced by participants' characteristics in relation to their gender, marital status, number of family members, supplementary health insurance, health status, purpose of travel, following the speed limit, and traffic on routes. For instance, regarding the gender feature, men have a higher WTP for shorter travel times, with a change in WTP of $7.71 for reducing travel time to less than 30 minutes, compared to $5.92 for women. However, women have a higher WTP for safer routes, with a change in WTP of $13.13 and $21.54 for reducing injuries and deaths, respectively, compared to $6.58 and $6.20 for men. Another survey revealed a significant increase in individuals'WTP for road safety improvements, influenced by various demographic factors, including gender (women) and age (older individuals) (38). Consistence across the results of our study with this study highlights that gender and age-related differences in WTP are not limited to a single cultural context.

Regarding travel purposes, participants who use their vehicles for personal purposes (e.g., shopping) have the highest WTP, with changes in WTP of $21.46, $135.22, and $212.47 for reducing travel time, injuries, and deaths, respectively. In contrast, those who use their vehicles for private driving (e.g., taxi drivers) have the lowest WTP, with charges of $2.41, $3.29, and $3.50 for the same attributes. Consistent with our findings, business and commute trips typically have higher WTP values than recreational trips for travel time savings and improved safety (39,40).

Regarding health status, participants who rate their health as 'perfect' (10 on a 0-10 scale) have a significantly higher WTP for safer and faster routes compared to those with poorer self-reported health. For example, those with a health status of 10 have a change in WTP of $9.58, $12.99, and $13.33 for reducing travel time, injuries, and deaths, respectively.

The study finds that the number of family members significantly impacts participants' WTP for safer and faster routes. Individuals with smaller household sizes, such as those living alone (1 family member), have a lower WTP. Conversely, those with 2 family members demonstrate substantially higher WTP, with increases of $378.44, $307.12, and $321.94 for reducing travel time, injuries, and deaths, respectively. As the household size increases, the WTP generally decreases. For example, in families with 10 members, the WTP for a reduction in travel time decreases by $0.25. For safety improvements, they exhibit a WTP of only about $3.11 for decreasing injuries and $5.31 for reducing deaths. However, their WTP remains higher than that of single-person households. These findings suggest that individuals with larger families may place a lower value on transportation improvements that enhance safety and efficiency, potentially because they perceive a lower responsibility for improving road safety or because competing financial priorities within larger households take precedence. Consistent with our previous findings, prior research indicated that larger household sizes correlated with lower WTP for travel time reductions, likely due to family conditions that influenced risk perception and resource allocation (41,42).

Marital status also emerges as a significant factor influencing participants' WTP. Widowed individuals have the highest WTP for reductions in travel time, with increases of $15.27. However, they have the lowest WTP for injury and fatality reduction, with a decrease of $33.27 and $106.40, respectively. In contrast, single participants have the highest WTP for fatality reduction, with an increase of $16.17, as well as higher WTP for travel time and injury reductions compared to married and separated individuals. These findings suggest that marital status may reflect different priorities and risk perceptions, with widowed individuals potentially more sensitive to travel time and injury concerns, while single individuals place a greater emphasis on fatality reduction. In contrast to our findings, studies conducted in the US and India revealed that married individuals generally exhibited a strong preference for minimizing travel time, potentially due to family responsibilities (42,43). This discrepancy could be because of cultural and socio-economic differences in family roles and commuting behavior in different contexts.

Finally, understanding these key findings can help policymakers tailor transportation interventions to not only address the varied needs and preferences of diverse user groups, including households, drivers, and commuters, but also to enhance safety by reducing injuries and fatalities and minimizing travel time. This will ultimately lead to the development of targeted transportation strategies that align with user priorities.

5. Conclusion

This study demonstrates the effectiveness of DCEs in understanding drivers' preferences and assessing their WTP for transportation routes in Iran. As one of the first studies of its kind in the region, it offers valuable insights into the factors influencing route choice decisions and provides data-driven recommendations for policymakers.

By considering a wide range of attributes and demographic factors, the study offers a comprehensive understanding of the determinants of route choice. The findings highlight the importance of travel time, cost, injuries, and deaths in shaping driver preferences and inform the development of more effective and efficient transportation systems that align with the needs and priorities of drivers nationwide.

6. Declarations

6.1. Acknowledgement

Hereby, we extend our gratitude to all the participants of this research project.

6.2. Authors' contribution

Conceptualization and study design: STH, NM, LZ, KBL; Case collection and data gathering: FR, YS; Statistical analysis and data interpretation: FR, LZ, NM, MAMS; Manuscript draft preparation: LZ, STH, MAMS. All authors reviewed the results and approved the final version of the manuscript.

6.3. Conflict of interest

None.

6.4. Funding

This paper was extracted from a research project at Shiraz University of Medical Sciences with grant number 20980. The funder had no role in the study design, data collection, statistical analysis, interpretation of findings, and writing of the manuscript.

6.5. Availability of data and materials

The datasets gathered and analyzed during the current study are available from the corresponding author upon reasonable request. The corresponding author has full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

6.6. Ethical considerations

All experimental protocols were approved by The Ethical Committee of Shiraz University of Medical Sciences (code: IR.SUMS.REC.1399.987) previously. Written informed consent was obtained from the participants before completing the questionnaire form. All methods were performed following relevant guidelines and regulations.

6.7. Consent for publication

Not applicable.

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