



## Analysis of Youth Travel Behavior toward Rail, Air and Bus Transportation in Iran

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### ABSTRACT

The median of Iran population is much younger than many developed countries. This has impacts on the overall transportation behavior of the society. In this research it is found that there is a significant Pearson correlation (-0.765) between median age and fatalities in different countries of the world. A questionnaire is developed to analyze the importance of various factors in choosing mode of transport. It was then distributed among some bus, train and plane passengers on Tehran-Isfahan route. A total number of 766 passengers filled in the questionnaires. For this survey the Cronbach's alpha factor was calculated to be 0.763 that is an acceptable level. The respondents were divided into two groups of youth under 25 years old and other age groups. The importance of seven factors for their transportation mode of choice is calculated. By performing T-tests it is found that for air transportation there is no significant difference for any of the factors. But for railway mode of transportation "range of choice for departure times" and for road transportation "importance of viewing the landscape" is significantly different.

## 1. Introduction

According to the statistics published by the United Nation, Iran as a developing country has a rather young population with the median age of 29.4 years. This puts it in the rank of 80<sup>th</sup> among different countries of the world sorted by age [1]. The so called developed countries such as Germany have the median age of 46.8 years, United State 37.6, France 41.2, United Kingdom 40.2, Japan 46.3 and Netherlands 42.1. A comparison of median age of Iran in Asia with the selected countries is shown in Figures 1&2, respectively. Moreover, 13% of the population of Iran is aged between 10 to 24 years [1]. The young population of the country has impacts on transportation and mode choice which is further investigated in this research.

Iran is also an oil exporting country. The fuel price in the country is much cheaper than the

average world price, Figure 3 [2]. 99% of the energy in Iran is obtained from fossil fuels which lead to high rate of pollutants. 25% of CO<sub>2</sub> emissions and 49% of NO<sub>x</sub> is produced by the transportation sector [3]. The road fatalities in Iran are at 72.5 fatalities per 100000 of population that is much higher than the world average of 45.05 fatalities per 100000 of population [4]. 33.3% of road fatalities in Iran involves youngsters who are aged below 25 years old [5].

According to the statistics published by the World Economic Forum, the quality of rail infrastructure in Iran is considerably higher than other modes but its modal share is the lowest, (Table 1). The principal question for this research is to find out that how the choice of transportation mode for the youth of Iran is different from its' other age groups within the local societies.

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2. Background

The cost and travel time are usually the top two priorities for choosing the mode of transport. However, other parameters such as the urban form [7-9], context change [10], land use [11], race [12-15], gender [16, 17], age [18, 19] and even weather [20] can affect it.

Considerable research has focused on age and especially youth travel behavior. As attending school and university is the major occupation of

the youth, many scientific articles are published that are concerned on how the transportation mode is selected for these purposes.

Mitra [21] reviewed extensive existing literature in this regard. Case studies on school transportation have also been conducted in countries such as Finland [22], the USA [23], Canada [24, 25], Belgium [26] and China [27, 28].

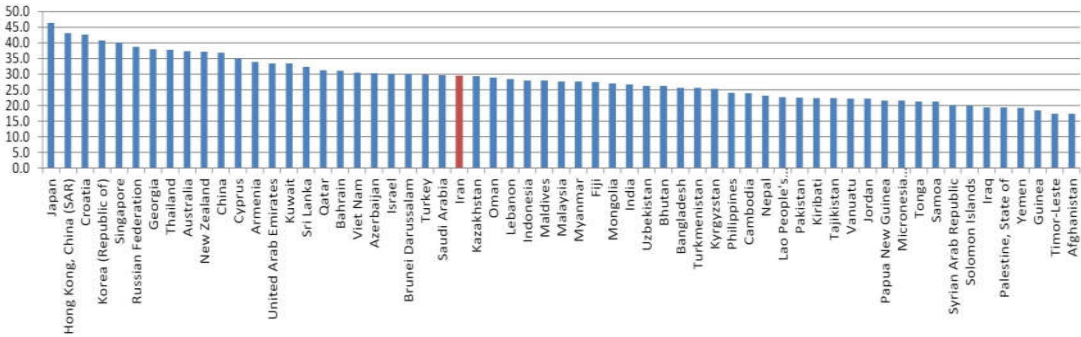


Figure 1. Median age of the Asian countries (Based on the UN data [1])

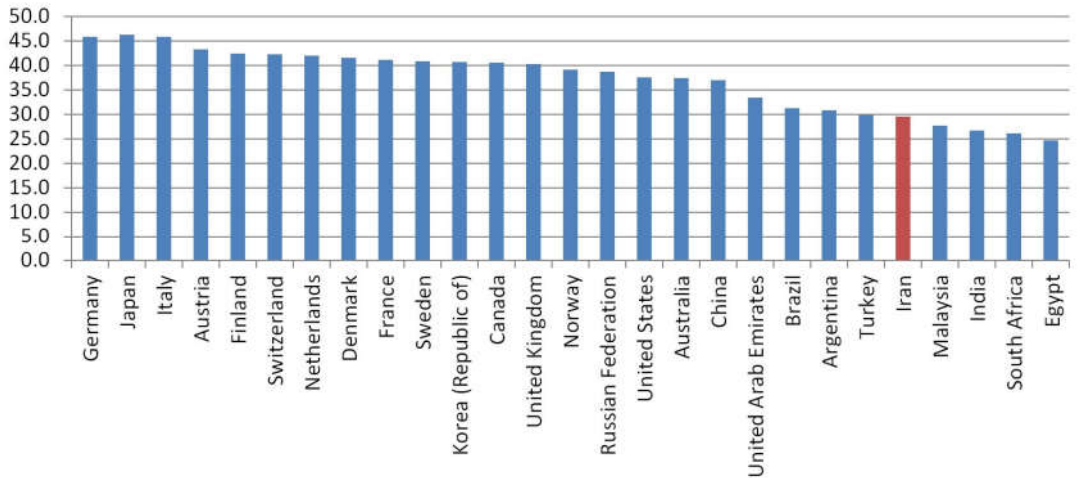


Figure 2. Comparison of median age of Iran and the selected countries (based on the UN data [1])

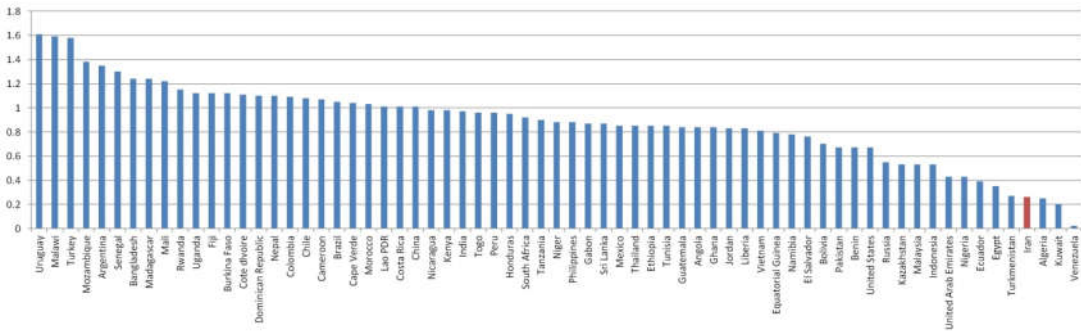


Figure 3. Comparison of fuel price in different countries [2]

Table 1. Quality of transportation infrastructure in Iran

Transportation Mode	Service Quality Rating [6]	Infrastructure Quality Rating [6]	Modal Share [3]
Air	89	105	1.05
Road	67	71	98.16
Rail	44	42	0.79

Similar researches are reported on commuting to university. A study in the Netherlands shows that long commute times affect the performance of the youth at university and even the frequency of attending university [29] and the use of campus [30, 31]. Lon found that long commute times to university negatively influence social capital of university students in Canada [32]. Youth are also found to be using the more active mode of transportation more often.

Panther [33] reviewed major research published on the parameters affecting active travel in youth. Impact of free bus passes on youth travel behavior in London was studied by Jones [34].

There are different hard and soft barriers that affect choosing railway mode of transportation and they are reviewed by Blainey [35].

### 3. The Method of Research

As the first stage of this study, it is investigated whether there is any correlation between road fatalities and median age at different countries. The results are presented in Table 2.

From this set of data it can be inferred that there is a strong negative correlation between the median age and road fatalities. This suggests that the younger the population of a country, the higher are road fatalities although this may not be a causal relationship.

As it is presented in Table 3, there is no correlation between the median age of a country and the number of rail passengers but there is a positive correlation between the rail passengers per capita and the median age of the correlated which is significant at 0.01 level. This suggests that the older the population of a country, the higher is the rail passenger per capita. Part of this is due to the higher life expectancy in the developed countries hence higher median age.

So far, it is clear that there is correlation between the age and the road fatalities as well as the rail passenger per capita. In the second stage of this research a questionnaire was developed to investigate the transport mode choice behavior in Iran. This questionnaire was used in one of the busiest routes of the country that is the route between the two major cities of Tehran and Isfahan. This was to check whether factors affecting mode choice are different for the youth when compared with the other age groups.

Tehran and Isfahan are the two important metropolitan cities within the country. Tehran is the capital and the most populous city in which more than 8.6 million people reside. All the major companies and service industries are based in this city. Isfahan is a historic and very touristic city. It hosts 3 world heritage sites attracting many tourists and business trips. The population is also the third in the country. The location of Tehran-Isfahan route is presented in Figure 4. The existing transportation choices between these two cities in terms of the frequency, cost and time are presented in Table 4.

The first section in the questionnaire included questions about demographic characteristics including the age group, gender, job, level of education, ownership of private car and the city of residence. The second section included questions on travel frequency, purpose of the trip, accompanying persons and mode of the trip. The third section enquired the respondents to rate the importance of several factors in their transport mode of choice. The items for the evaluation at this part of questionnaire extracted from the survey by Blainey [35] that included safety, cost, speed, punctuality, departure time and convenience. One more factor was added to these items. This was about being able to view the landscape. It came from the luxury of Iran being a vast country with versatile natural sceneries of mountains, deserts, forests and the like.

Table 2. The Pearson correlation between road fatalities and median age

	No. of countries with available data	Pearson Correlation	Sig.	Remarks
Median age [1]	184	-0.765	0.000**	Significant at 0.01 level

Table 3. The Pearson correlation between median age and rail passenger

	Pearson Correlation	Sig.
Rail Passenger [36]	-0.142	0.439
Rail Passenger/Population [1],[36]	0.545	0.001**



Figure 4. Map of the route for the case study (Tehran-Isfahan)

Table 4. A comparison between different available public transportation choices in the route of the case study

	Air	Road (Bus)	Rail
Frequency (Per Day)	5	24	1
Cost (\$)	22	3	4
Travel time (Hours)	1	5	8

Table 5. Location of the questionnaire respondent

Location	Number of respondents	Percentage
Airports of Tehran and Isfahan	217	28.4
Railway stations of Tehran and Isfahan	235	30.9
Bus terminals of Tehran and Isfahan	311	40.7

The questionnaires were distributed in paper format among passengers of the three possible existing modes of public transportation including the bus, airplane and railway. The characteristics of the respondents are presented in Table 5.

#### 4. Results

To test the reliability of the questionnaire that was developed during the course of this research the Cronbach's alpha factor was used. It yielded to 0.763 that is an acceptable level. 22.9 percent of the respondents were young and below 25 years old. 61.5% of them had a bachelor degree or above and 44.8% reside in Tehran. 62.4% of them had irregular trips in the Tehran-Isfahan route while 13.2% travelled three times or more in this route. 47.1% of the trips were for business and 43.3% were recreational. 36.2% were travelling alone. Other descriptive statistics of the respondents are provided in Table 6.

For the three modes of transportations, the average importance of different factors was calculated for the youth and other groups and is presented in Table 7. The highest overall weight for safety, cost, viewing the landscape, range of choices for departure times and comfort was for the railway travelers. While those that choose plane trips had the least concern for the cost and viewing the landscape. However, the plane travelers had the highest concern for the speed and punctuality. The total respondents were divided into two groups of the youth of under 25 years old and the others.

The null hypothesis that is needed to be tested is that whether the mean of importance for youth and the others are equal. Then the 21 T-tests including the seven factors for each three modes of transport were performed and the results are presented in Table 8.

From the above provided data it can be inferred that for air transportation mode all seven null hypothesis cannot be rejected. Therefore, for this mode of transport there is no statistically

significant difference between the youth and the other age groups. For rail transportation mode, six null hypotheses cannot be rejected but the "range of choice for departure times" for youth is significantly lower than for other groups and the null hypothesis rejected. For road transportation, the only null that is rejected is the "Importance of viewing the landscape" which is significantly lower for the youth.

#### 5. Conclusions

The youth travel behavior in developing countries is understudied. This is especially important for the case of Iran that has very low fuel price, the median age is much younger than many countries of the 80<sup>th</sup> in the world based on median age and road fatalities are very high. It is found that there is significant correlation between the median age and the rail passengers per capita as well as median age and road fatalities. This research was based on the development of a questionnaire. Through this questionnaire the importance of safety, cost, speed, punctuality, viewing the landscape, range of choice for departure time and comfort on the travel behavior of the respondents is studied. Statistical analysis showed that youth travelers, who chose air transportation, perceived the importance of these seven factors the same as other age groups. For the railway and road transportation modes, the only observed difference was for the "range of choice for departure times" and the "importance of viewing the landscape", respectively. Future research is suggested to study the travel behavior of the youth in each mode of transportation in details.



Table 6. Descriptive statistics of the respondents

		Count	Percentage
<b>Gender?</b>	Female	294	38.4
	Male	471	61.6
<b>Age?</b>	Less than 25	175	22.9
	26-35	263	34.4
	36-45	164	21.4
	46-55	101	13.2
	More than 55	62	8.1
<b>Job?</b>	Student	151	19.9
	Soldier	2	0.3
	Employee	178	23.5
	Self-employment	270	35.6
	Retired	60	7.9
	Unemployed	61	8
	Other	37	4.9
<b>Level of education?</b>	Under Diploma	49	6.4
	Diploma	122	16
	Associate	123	16.1
	Bachelor	249	32.6
	Master	155	20.3
	Ph.D. and higher	66	8.6
<b>Ownership a private car?</b>	Yes	583	77.1
	No	173	22.9
<b>City of residence?</b>	Tehran	342	44.8
	Isfahan	263	34.5
	Qom	9	1.2
	Kashan	78	10.2
	Other	71	9.3
<b>Travel frequency in this route per month</b>	Irregular	473	62.4
	Once	128	16.9
	Twice	57	7.5
	Three times and more	100	13.2
<b>Purpose of trip?</b>	Business	356	47.1
	Educational	57	7.5
	Recreational	327	43.3
	Medical	16	2.1
<b>Accompanying person?</b>	Alone	276	36.2
	Family	329	43.1
	Friends	51	6.7
	colleague	88	11.5
	Other	19	2.5

Table 7. Importance of different factors on mode choice for youth and others

	Air			Rail			Road		
	Youth	Others	Total	Youth	Others	Total	Youth	Others	Total
Importance of safety	4.78	4.77	4.77	4.86	4.87	4.87	4.75	4.82	4.80
Importance of cost	3.78	3.62	3.64	3.89	4.07	4.02	3.96	4.01	4.00
Importance of speed	4.52	4.58	4.57	4.45	4.27	4.32	4.13	4.21	4.19
Importance of punctuality	4.59	4.69	4.68	4.55	4.51	4.52	4.45	4.40	4.41
Importance of seeing the landscape	3.58	3.52	3.53	3.85	4.14	4.06	3.39	3.85	3.73
Importance of Range of choice for departure times	4.32	4.17	4.19	3.90	4.36	4.22	3.71	3.88	3.84
Importance of comfort	4.67	4.70	4.70	4.68	4.81	4.77	4.46	4.57	4.54

Table 8. T-tests to examine the difference in the means of youth and other age groups

Null hypothesis	Air			Rail			Road		
	t	df	sig	t	df	sig	t	df	sig
Importance of safety for youth and other age groups are equal	-0.075	31.499	0.941	0.104	144.752	0.917	0.935	299	0.351
Importance of cost for youth and other age groups are equal	-0.752	194	0.453	1.302	220	0.194	0.400	296	0.689
Importance of speed for youth and other age groups are equal	0.399	193	0.690	-1.408	220	0.160	0.681	295	0.497
Importance of punctuality for youth and other age groups are equal	0.772	195	0.441	-0.315	214	0.753	-0.449	292	0.654
Importance of seeing the landscape for youth and other age groups are equal	-0.240	196	0.810	1.750	104.89	0.083	2.703	103.098	0.008
Importance of Range of choice for departure times for youth and other age groups are equal	-0.762	189	0.447	3.766	206	0.000	1.167	285	0.244
Importance of comfort for youth and other age groups are equal	0.294	197	0.769	1.618	97.050	0.109	1.126	295	0.261

### Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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