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COVID-19: Transportation and Tashkent State Agrarian University

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Abstract. The outbreak of COVID-19 pandemic has considerably and negatively affected the global community. To restrain the transmission of viruses, a restricted mobility has been highly imposed across the world and Uzbekistan as well. Our paper which responds to one of the directions of UI GreenMetric University Rankings provides a novel dataset on attitude-behaviors and personal perceptions of university students and academic staff in the term of transportation collected after the severe quarantine regime within the COVID-19 outbreak in Uzbekistan. We formulated a questionnaire design hinged on employing qualitative virtual interview and a short survey with students and university staff, estimating the sensitivity toward the potential crisis in crucially deciding on daily routines with restricted transportation and future mobility modes in the company of an urgent health concern. An online survey was distributed through Internet platforms such as Telegram within the period April-May 2020, with a total of 600 students, while a Zoom interview was organized for 50 of academic staff of Tashkent State Agrarian University. Our dataset comprises 362 out of 600 valid and full responses from students. Our survey was split into two sections. The first one has characterized the using frequency of all transportation modes before and after restricting the mobility, whereas the second section has considered potential risks of contracting COVID-19 from multi-modal transportation and potential effectiveness of travel mitigation measures. In general, the dataset was conveniently used to quantify and investigate students' and staff's attitude behavior towards traveling options and modal shifts due to COVID-19. Aligning with descriptive statistics, our paper also shares the results of possible explanatory emission calculations in transportation, serving as a reasonable reference for future studies during the pandemic.

Keyword:

Multimodal transportation, attitude-behavior, COVID-19, questionnaire, interview, emission, Uzbekistan

1. Introduction

The outbreak of COVID-19 pandemic is nowadays deemed significantly challenging globally [1], since both the number of cases and deaths is increasing at an arithmetically progressive rate today [2]. As known, two of the most important drivers leading to the widespread of the newly introduced respiratory syndrome are high transmissibility and hypermobile society [3]. In regards to the insufficient information of the effects of any vaccination, unprecedented social measures such as keeping a social distance and a restricted individual mobility have been enacted around the globe to control the pandemic situation [4]. Along with the statement of “stay-at-home” promoted worldwide, it is somewhat unclear how people have altered their travel attitude-behaviors regarding the bans on freedom of movement [5]. The highest potential risk to contract and transmit infectious diseases from shared traveling options emanates from the fact that individuals are in proximity living in a restricted environment [6]. Since mobility is related in a close link to habits and daily routines, the mitigation and adaptation measures and perceived potential risks necessitate structural mobility alterations among multimodal transport modes [7, 8].

Uzbekistan confronts an increased risk of catching infection as a country in close juxtaposition to the preliminary central point of the pandemic, and to intensively tackle with the spread of COVID-19 all of the social activities (i.e. transport mobility) were restricted and braked down. Notwithstanding the validity and reliability of such responses in social practice, these responses have to a higher extent influenced our common life-being; however the impact of this influence is still indefinite.

Together with a focus on academic staff and students of Tashkent State Agrarian University (hereinafter, we refer as TSAU) in Uzbekistan as a subject of our investigation, our current dataset is targeted to extent our actual knowledge repertoire with reference to several aspects of the COVID-19. In Particular, we investigated how academic staff and student’s attitude-behavior and discernment could change owing to the crisis of public health. Our short interview and questionnaire examine the actual sensitivity of the staff and students against setbacks in crucial decision-making of daily regimens and past and future traveling modes in the case of a health concern. Besides that, as our second target, we theoretically calculated potential emissions from different transport modes traveling from A

to TSAU to show how we affected transportation, as one of the directions of UI GreenMetric University Rankings, by shifting to an online education.

2. Methods

We organized an interview and created our survey dataset to collect information in regards to the travel attitudes of the academic staff and undergraduate students of TSAU. An online interview through a Zoom platform and questionnaire through Telegram social-network [4, 9] was held and distributed April-May 2020. By this time, all of the students and academic staff had suffered travel restrictions, thus making possible for all 50 interviewees who own a car and 362 out of 600 survey respondents to compare their traveling options within the both “before” and “during” pandemic and foreseen contracting risks of COVID-19 from multimodal transportation.

Our dataset originating from the cross-university people investigation denoted two main areas of our interest: (1) to distinguish the use of multimodal transport available in Tashkent, Uzbekistan (walking, biking, car-driving alone, car-pooling, taxi, autobus, and metro) before and after the enforced restrictions and (2) to perform the related foreseen risk assessment of contracting the COVID-19 and the discerned effectiveness of the mitigation measures on traveling. The interview and questionnaire targeted above-emphasized two fields with an item list (Table 1) and five specific survey questions [4, 9].

Table 1. Item list for an interview

Goal: To understand the perception of TSAU academic staff on multimodal transportation before and during the pandemic		
Target group: 50 academic staff of TSAU who own a car		
Instructions: Maximum 10 minutes should be spent for an interview. Keep asking the relevant questions, if necessary ask additional short questions to support the idea. Key words are to guide the conversation.		
Opening	<ol style="list-style-type: none"> 1. Explain why the interviewee is selected and what will be done with the answers of the interview; 2. Ask for their permission to record; 3. Explain the main goal and specific objectives of the interview; 4. Explain the structure/lay-out of the interview and maybe indicate how much time it will take; 5. Confidential disclosure agreement. 	
Topics	Concepts	Aspects
Transportation	Attitude-behavior Issues Transport modes	Car type Safety Emission Traveling costs Time Accessibility
COVID-19 pandemic	Before After Risk assessment	Air quality Road accidents Exposure to COVID-19 Benefits Routine

Ending	Thank them for participating
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The survey dataset is not yet publicly available and has been translated into English language. Moreover, the English transcription of the survey questions is attached here to establish the general overview and its structure is also shown below in Table 2.

Table 2. Structure of the questionnaire

Basic information
Name SURNAME, Group, Faculty
Confidentiality and data processing
AGREE, DISAGREE
Demographic information
1. Age
2. Gender
3. Province/City
Car type
If you own a car, what model of a car did/do you use to commute before and during the pandemic?
If you did not/do not skip this part
Q1: Part 1 - Study mobility <u>before</u> the COVID-19 pandemic
1. Approximate distance from your living place to TSAU (in kilometers)
2. How often did you walk to TSAU? (6 days in a week, 5 days in a week, 4 days in a week, 3 days in a week, twice in a week, once a week)
3. Which of the following transportation modes did you use to reach TSAU?
- bike
- autobus
- metro
- private car
- car pooling
- taxi
Q1: Part 2 - Study mobility <u>during</u> the COVID-19 pandemic
1. How often do you walk to TSAU? (6 days in a week, 5 days in a week, 4 days in a week, 3 days in a week, twice in a week, once a week)
2. Which of the following transportation modes do you use to reach TSAU?
- bike
- autobus
- metro
- private car
- car pooling
- taxi
Q2: Part 1 – Leisure time mobility <u>before</u> the COVID-19 pandemic
1. How often did you go out for a walk?

(6 days in a week, 5 days in a week, 4 days in a week, 3 days in a week, twice in a week, once a week)

2. Which of the following transportation modes did you use to go out?

- bike
- autobus
- metro
- private car
- car pooling
- taxi

Q2: Part 2 – Leisure time mobility during the COVID-19 pandemic

1. How often do you go out for a walk?

(6 days in a week, 5 days in a week, 4 days in a week, 3 days in a week, twice in a week, once a week)

2. Which of the following transportation modes do you use to go out?

- bike
- autobus
- metro
- private car
- car pooling
- taxi

Q3: Part 1 – Common mobility before the COVID-19 pandemic

1. How often did you go out to ...?

(6 days in a week, 5 days in a week, 4 days in a week, 3 days in a week, twice in a week, once a week)

- visit family or relatives
- meet with friends
- buy primary needs
- buy secondary needs

2. Which of the following transportation modes did you use?

- walking
- bike
- autobus
- metro
- private car
- car pooling
- taxi

Q3: Part 2 – Common mobility during the COVID-19 pandemic

1. How often do you go out to ...?

(6 days in a week, 5 days in a week, 4 days in a week, 3 days in a week, twice in a week, once a week)

- visit family or relatives
 - meet with friends
 - buy primary needs
-

- buy secondary needs

2. Which of the following transportation modes do you use?

- walking
 - bike
 - autobus
 - metro
 - private car
 - car pooling
 - taxi
-

Q4: Attitude-behavior related to COVID-19 infection and transportation

How do you rate the chance of contracting COVID-19 by using the listed transportation modes below?

(Severely low, Very low, Low, Average, High, Very high, Severely high)

- walking
 - bike
 - autobus
 - metro
 - private car
 - car pooling
 - taxi
-

Q5: Attitude-behavior related to COVID-19 infection and transportation

How do you rate the national restrictions on the listed transportation modes to reduce the COVID-19 widespread?

(Severely ineffective, Very ineffective, Ineffective, Neutral, Effective, Very effective, Severely effective)

- walking
 - bike
 - autobus
 - metro
 - private car
 - car pooling
 - taxi
-

End of the survey

To test the internal consistency of responses to each specific question, we used Cronbach's alpha.

Assuming on the given private car type in both questionnaires and interviews, we determined a potential emission that was not emitted to the atmosphere due to the strict quarantine regime according to the standard fuel consumption by using the emissions factor of 2.33 kg CO_{2e}/liter and the following Equation (1):

$$E = P_{\text{consumption}} / S \times 2.33 \times D_T \times N \quad (1)$$

where, $P_{\text{consumption}}$ – standard fuel consumption of cars, liter; S – standard traveling distance, 100 kilometers; D_T – average daily trip, kilometers; and, N – number of respondents.

3. Results and discussion

In this section, we created tables for Cronbach’s alpha results and a potentially kept emission due to mobility restriction. Furthermore, we plotted figures to see the combined (interview results + questionnaire) patterns before and during the COVID-19 pandemic in Uzbekistan in the term of transportation.

Table 3 below depicts the internal consistency (Cronbach’s alpha) for the questionnaire items given in each specific question, and the obtained values show how our dataset is reliable.

Table 3. Cronbach’s alpha values

	Q1		Q2		Q3		Q4	Q5
	before	during	before	during	before	during		
	the	the	the	the	the	the		
Cronbach’s alpha	0.671	0.615	0.722	0.794	0.623	0.609	0.789	0.764

All the interview and questionnaire responses could be portrayed efficiently considering the mean and standard deviation values. For instance, according to Questions 1-3, the transport mode frequency for multimodal transportation before and during the travel restrictions enforcement throughout the pandemic is displayed in Fig. 1.

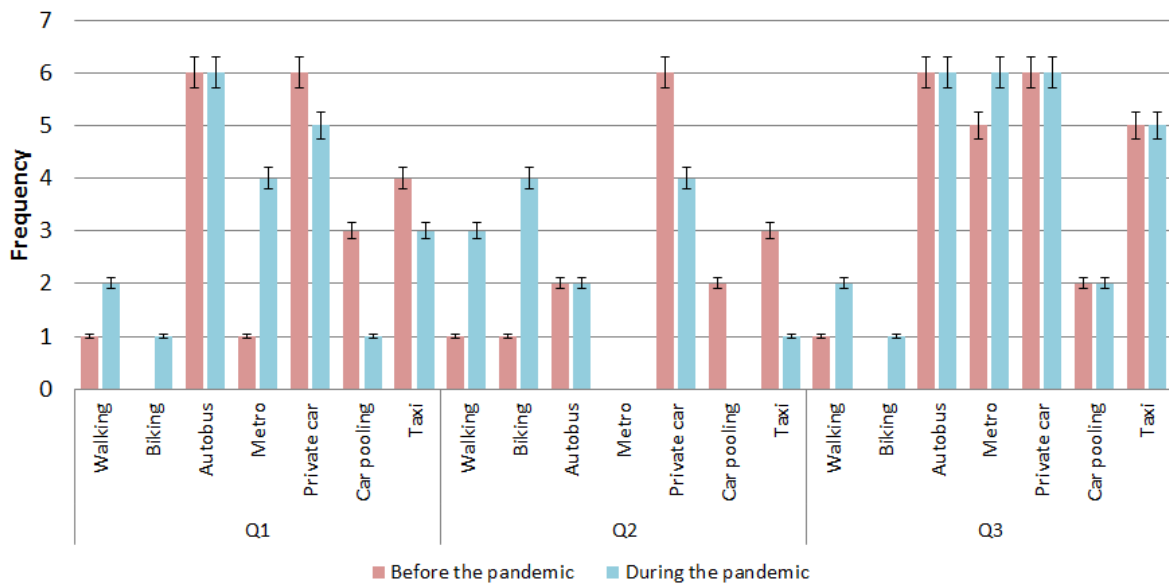


Figure 1. Mobility frequency because of nationwide travel restrictions in the scale of: 1 – once a week; 2 – twice a week; 3 – 3 days in a week; 4 – 4 days in a week; 5 – 5 days in a week; and, 6 – 6 days in a week, and mean and standard deviation values for multimodal transportation

Our data standing for the risk perceptions (Question 4) and the effectiveness of governmental mitigation measures given in Question 5 are illustrated in Fig. 2 below.

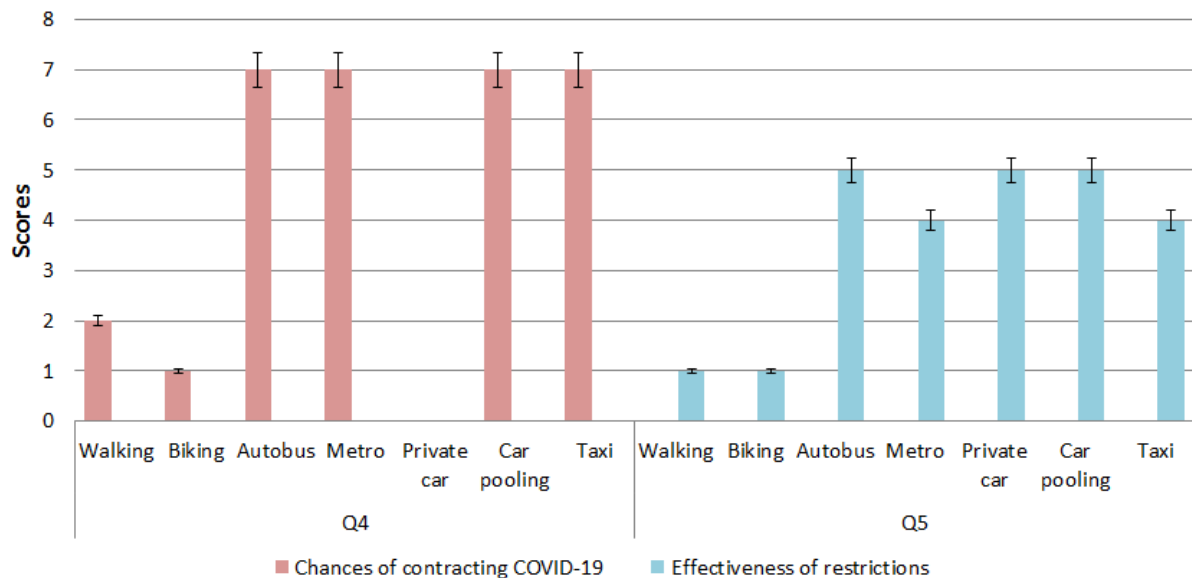


Figure 2. Attitude-behavior ranging in the scale of “1 – severely ineffective” and “7 – severely effective” and mean and standard deviation values for multimodal transportation

In the following table (Table 4), we calculated a restricted potential emission, which would be emitted to the atmosphere, coming out of vehicles throughout the strict quarantine regime from April 1, 2020 to May 15, 2020 (45 days) according to the interview and survey results.

Table 4. Restricted potential emission from vehicles

Vehicle	# of respondents	Average daily trip [km]	Standard fuel consumption [liter]	Emission [kg CO ₂ /km]	Total non-released emission (45 days) [kg CO ₂ /km]
Questionnaire					
Chevrolet Matiz	98	29	7.9	523	23,535
Chevrolet Spark	76	24	6.1	259	11,655
Chevrolet Nexia	41	26	7.3	181	8,145
Ravon Nexia	24	18	9.3	94	4,230
Chevrolet Lacetti	27	20	9.2	116	5,220
Chevrolet Epica	2	18	9.2	8	360
Chevrolet Tracker	4	16	12.4	18	810
Chevrolet Malibu	2	15	10.7	7	315
Others	7	23	~8	30	1,350
Bus – Mercedes-Benz Low Floor	24	18	27	272	12,240
Interview					

Chevrolet Matiz	11	29	7.9	59	2,655
Chevrolet Spark	15	24	6.1	51	2,295
Chevrolet Nexia	9	26	7.3	40	1,800
Ravon Nexia	6	18	9.3	23	1,035
Chevrolet Lacetti	6	20	9.2	26	1,170
Chevrolet Epica	1	18	9.2	4	180
Chevrolet Tracker	1	16	12.4	5	225
Chevrolet Malibu	1	15	10.7	4	180
Total					77,400

AS we found out that due to the strict restriction of mobility, 77,400 kg CO₂ was not released to the atmosphere within 45 days.

4. Conclusions

Our dataset helped us determine the attitude-behavior of cross-university people on transportation modes “before” and “after” the nationwide strict quarantine regime in Uzbekistan. As one of our findings, the majority of university population tended/tends to use their private car or autobus to commute from A to TSAU “before” and “during” the COVID-19 pandemic. This, in turn, may emerge a car-centric culture at a university level. In the view of chances of contracting COVID-19, our target group thinks that traveling with autobus, car-pooling, metro, and taxi could highly increase the probability. However, they also suggested the efficiency of transportation restrictions; for instance, restricting mobility by autobus, metro, car-pooling, private car, and taxi is highly efficient. But, this might significantly and adversely impact the local economy. In the term of CO₂ emission, by strict transportation regulations, within 45 days 77,400 kg CO₂ was prevented from being released to the atmosphere. More or less, this is also the contribution of our university population to the global environment. As far as, we cannot deal with the development of car-centric culture at a university level, we may introduce electric cars and give social priorities to those who own an electric car as a nationwide mitigation measure.

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