



Didube Minibus Station, Tbilisi, Georgia. Photo by Tsisana Khundadze

SAFER TRANSIT OPTIONS FOR PASSENGERS (STOP)

Policy Paper



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Executive summary

In 2015, over 600 Georgians died as a result of roadway accidents. The high human costs of automobile related fatalities requires action. As Georgia works towards approximating its legislation to the EU's as part of the Association Agreement process, road safety legislation is set to be changed. This presents an opportunity for the Government of Georgia to make policy that will lead to safer transit options for passengers.

In order to inform this process, CRRC-Georgia carried out research on intercity minibuses (marshrutka) transport safety, including a randomized control trial of a minibus monitoring program. Minibuses were selected as the primary subject of research since they are one of the primary forms of transport in Georgia. Intercity minibuses were selected since the market is under-regulated.

Through experiment, it es. Testing behavioral related alysis with a randomized control bute to unsafe marshrutkas services. place practiceresearching the intercity minibus market, the regulatory environment, and dangerous and distracted driving practices among minibus drivers, CRRC has identified contextual and behavioral factors that appear to contribute to unsafe marshrutka services. Key research findings include:

- The vast majority of minibus drivers engage in dangerous driving;
- Unfair competition on the intercity transport market leads to dangerous driving;
- Existing regulations related to intercity transportation are often unenforced;
- New regulations are required to fill legislative gaps and fulfill Georgia-EU Association Agreement requirements.

The research also suggests practical regulatory, enforcement, and educational policy options to make intercity transport safer. We recommend that the Government of Georgia:

- Make smoking while driving illegal for commercial passenger transport drivers;
- Install speed radars that estimate average speed between locations in addition to speed at the time of measurement on Georgian motorways;
- Define technical standards for intercity transport pre-trip inspections and monitor pre-trip inspections;
- Introduce zoning ordinances for stations that move stations to the entrances of cities;
- Make access to rear seatbelts mandatory on commercial vehicles;
- Carry out an awareness raising campaign about seat belts, focusing on their importance for back seat passengers.

The results of the randomized control trial suggest that a small minibus monitoring program could dramatically improve minibus safety in Georgia. Hence, we recommend that the government:

- Implement a small minibus monitoring program.

Ultimately, the implementation of the above recommendations is likely to lead to safer transit options for passengers.

Introduction

According to the World Health Organization (WHO), Georgia has among the highest death rates on roadways in the wider European region.¹ The problem also appears to be getting worse: official figures from the Ministry of Internal Affairs of Georgia show an increasing number of fatalities on Georgian roadways. From 2013 to 2015, deaths increased from 514 to 602,² a 17% increase. At a per capita rate, this amounts to approximately 162 fatalities per million citizens,³ more than four times the EU average in 2015, the latest year in which data is available.

While the human costs and need for action are clear, the Government of Georgia also has a clear policy window in which to act. As part of the Georgia-EU Association Agreement,⁴ the country must reform its transport regulations (Articles 292, 293, and 296). To help feed into this process and stem the tide of roadway fatalities in Georgia, CRRC-Georgia together with the Fund Partnership for Road Safety carried out the Safer Transit Options for Passengers (STOP) project within the East-West Management Institute's (EWMI) Advancing CSO Capacities and Engaging Society for Sustainability (ACCESS) project, funded by the United States Agency for International Development (USAID).

The study aimed to identify potential policy solutions to make Georgian intercity minibuses safer, thus reducing the number of fatalities on Georgian roadways. Intercity minibuses were selected for study, given that little of the existing regulation on them is enforced and the widespread perception that minibuses often engage in unsafe driving practices.

In order to study minibus safety and identify potential policy interventions, CRRC-Georgia used a mixed-methods research design. For institutional analysis, desk research and key informant interviews were carried out. To understand the key issues passengers and drivers face, focus groups and in-depth interviews were carried out. To understand the scale of dangerous and distracted driving practices in Georgia as well as whether a small monitoring program would be effective, CRRC carried out a randomized control trial.

The results of the study suggest that legislative gaps, inadequate enforcement of current regulations, and low levels of awareness are all problematic when it comes to intercity minibus transport. At the same time, the study has identified a number of simple regulatory, enforcement-related, and education-based policy solutions available to the Government of Georgia to stem the dangers of driving and riding on Georgia's roadways.

In the next section of this paper, we describe the research methods used within the project. An analysis of regulatory issues follows. In the subsequent section, dangerous and distracted driving issues are described. The report concludes with recommendations for the Government of Georgia.

Research methods

In order to identify existing challenges in the intercity transportation system, as well as their causes and potential solutions, the STOP project utilized a mixed-methods research design. The project used desk-research, focus groups with passengers, and in-depth interviews with station management and drivers in August 2016. Next, a randomized control trial focused on the issue of distracted and dangerous driving

1 World Health Organization. "Road traffic deaths: Data by country." GHO | By category | Road traffic deaths - Data by country. Accessed May 22, 2017. <http://apps.who.int/gho/data/node.main.A997>.

2 Agenda.ge. "Making Georgia's roads safer: Experts develop a National Strategy on Road Safety." Agenda.ge. July 7, 2016. <http://agenda.ge/news/61585/eng>.

3 Eurostat. "Slightly over 26 000 victims of road accidents in the EU in 2015: Fewer than half as many as 20 years ago." News release, November 18, 2016. Eurostat. <http://ec.europa.eu/eurostat/en/web/products-press-releases/-/7-18112016-BP>

4 "EU – Georgia Association Agreement." Parliament of Georgia. August 30, 2014. <http://www.parliament.ge/en/gavigot-meti-evrokavshirtan-asocirebis-shetanxmebis-sheaxebe/associationagreement.page>

practices was carried out in September-October 2016.

While desk research was used to analyze the institutional and legal framework of the intercity transportation system, focus groups and in-depth interviews enabled an understanding of the priorities, challenges, and problems actors in the field of intercity transport face. Overall, eight in-depth interviews were conducted with representatives of three large minibuses stations. In-depth interviews with station management were supplemented

with ten in-depth interviews with minibus drivers at the same stations. Four focus groups were conducted with passengers.⁵

In addition to qualitative research, the project team carried out a randomized control trial (RCT), which aimed to test whether a small, inexpensive minibus monitoring program could improve minibus safety in Georgia. The RCT was carried out between September 20 and October 20, 2016. It tested whether the knowledge that for safe driving, a driver could receive an award and that they would be monitored might improve their driving.

Randomized control trials encompass a class of methods which are used to make causal inferences about the effects of a “treatment”. To make this inference, researchers randomly assign people, firms, areas, or other units to control and treatment groups. While treatments traditionally refer to a medicine, in recent years methods have been developed appropriate to testing potential policies and programs. For randomized control trials, treatments are given to a treatment group and not to a control group. After the treatment group receives the treatment, measurements on outcomes of interest are measured and compared between the treatment and control group. Statistical tests are then used to check whether the policy made a difference.

In order to randomly assign minibuses to treatment and control groups, prior to observation, CRRC-Georgia collected schedules of minibus routes. CRRC-Georgia staff then identified the most similar routes based on distance of travel and roads taken. For each pair of routes, one was randomly assigned to the treatment group and the other to the control group.

CRRC-Georgia interviewers observed 360 minibus trips in three waves of observation. In the first wave of observation, minibus routes which had been randomly selected were observed without telling the driver that they were being monitored. This group forms the study’s control group. In the second wave of observation, routes assigned to the treatment group were observed. In the third wave of observation, observers returned to both the control and treatment minibuses for anonymous observation. A number of previously unobserved minibuses were also observed in the third wave.

The above research design allows for a number of comparisons. First, by comparing the first wave control group to the second wave treatment group, we can test how the direct knowledge that one is being observed for safe driving effects driver safety. Second, by comparing the second wave treatment group to the third wave treatment group, we are able to tell whether the knowledge that one might be monitored again in the near future stayed with drivers, what we call a “lasting effect.” Third, by comparing drivers in the first wave control group to drivers in the third wave control group, we can tell whether there was a “contagion effect” i.e., whether the treated drivers talked to the non-treated drivers about the monitoring and they in turn also became safer drivers.

Actors and infrastructure

For the last decade, as part of a larger strategy aimed at fighting corruption through eliminating bureaucracy and government regulation, intercity transportation policy efforts largely focused on deregulation. A significant number of regulations were either abolished or simplified. As the thinking went, free market competition would dictate quality and price of service. This has led to legislative gaps, which should be

⁵ Qualitative data collection included interviews and focus groups with eastward and westward travelling passengers and drivers. A focus group with Metro bus company passengers was also carried out.

addressed as part of the Georgia-EU DCFTA⁶ approximation process. Compounding matters, even when there are regulations, they often are poorly enforced. This section provides an overview of the intercity minibuses market, regulatory environment, and highlights a number of legislative gaps.

Service providers

The Georgian intercity transport market mainly consists of service provision from privately owned minibuses, buses, and minivans. Most are owned and operated by the same person, who owns and operates one or two vehicles. Very few companies own three or more vehicles. Although no official statistics are available, the research shows that the majority of the registered carriers use M2⁷ category minibuses, while M3⁸ category buses are gradually disappearing from the market.



As a result of the deregulation policy mentioned above, commercial operation on intercity routes, besides Tbilisi-Rustavi,⁹ does not require any license. In contrast, the Land Transport Agency at the Ministry of Economy and Sustainable Development licenses intracity and international transport.

Besides carriers who operate M2 and M3 class registered vehicles and are registered as businesses, unregistered operators, colloquially known as “predators” by minibus drivers, also operate on the Georgian intercity transportation market. These carriers generally use M1¹⁰ category vehicles, allowing them to operate without inspection. The research also found that most M1 class vehicles are not registered as economic actors, and therefore, do not pay taxes. Without these costs, they can offer lower prices than registered carriers, creating unfair competition on the market. Although fair market competition is beyond the scope of this paper, minibus drivers reported that these drivers also encourage speeding, which is discussed in greater depth below.

The number of hours intercity drivers are allowed to work is not regulated. However, from 2019 tachographs¹¹ will become mandatory in accordance with the Georgia-EU Association Agreement, enabling the police to monitor driver working hours.¹²

Stations

Georgian legislation defines three classes of stations. The requirements for each class of station vary in regards to quality and technical equipment. While first class stations must be rather well-equipped, third class stations require a minimal number of facilities. The choice of station class lays with the owner, and stations of all three classes are allowed to operate intercity transportation.

Stations vary greatly with regard to their size and state of infrastructure. While several stations possess a passenger lounge area, lavatories, and ticket offices, some stations consist of a small cabin for ticket sales

6 European Union. European Commission. EU-Georgia Deep and Comprehensive Free-Trade Area Reading Guide. February 11, 2014. http://eeas.europa.eu/archives/delegations/georgia/documents/eap_aa/dcfta_guide_2014_en.pdf

7 A vehicle with more than 8 passenger seats except driver and weighing not more than 5,000 kg, mostly minibuses like the Ford Transit or Mercedes Sprinter.

8 A vehicle with more than 8 passenger seats except driver and weighing more than 5,000 kg, mostly large buses.

9 The Rustavi Municipal Government licenses this route.

10 A vehicle with 8 passenger seats or less except driver and weighing less than 5,000 kg.

11 A tachograph provides a record of engine speed over a period.

12 See [legislations: EUR-Lex - 32006L0022 - EN - EUR-Lex. EUR-Lex - 32006R0561 - EN - EUR-Lex. EUR-Lex - 32014R0165 - EN - EUR-Lex.](#)

and do not provide any waiting facilities to passengers.

Currently there are at least 25 intercity minibus stations scattered across Tbilisi.¹³ The fact that stations are located throughout the city rather than located at the eastern and western entrances to the city increases traffic congestion by putting minibuses which will travel between cities on city roadways.

All stations are responsible for ensuring that drivers undergo medical tests before trips.¹⁴ Two of the larger stations studied have medical facilities, where drivers can be tested before driving. However, these facilities are not mandatory for second and third class stations and are not available in most stations. Given that all drivers

must undergo inspection, but only first class stations are required to have medical facilities, this represents a clear gap in Georgian legislation.

Vehicle inspections

A technical commission inspects M2 and M3 category vehicles. Vehicles in these categories undergo inspection once per year for the first four years the vehicle is first used and twice per annum thereafter.¹⁵ (Bi) Annual inspections are carried out at 24 authorized Attestation Centers,¹⁶ which are located throughout the country. M2 and M3 category vehicles receive inspection stickers indicating they have successfully undergone an inspection. Stations are also expected to inspect vehicles prior to travel. M1 category vehicles are not currently inspected, however, from 2018,¹⁷ they will be inspected as well.

Poorly maintained vehicles can endanger passengers. Although Georgian legislation requires technical inspection of vehicles, one of the main problems drivers, passengers, and station managers identified was the poor state of vehicles. The observations of the passengers, drivers, and station managers was supported by the randomized control trial. During trip observation:

- 4% of minibuses needed to be repaired by the driver during the course of the trip;
- In 4% of minibus cabins, there was a smell of fuel, which might indicate a mechanical malfunction;
- 22% had at least one damaged window;
- 10% were equipped with seating that was not adequately attached to the floor of the minibus.

The qualitative research shows that a key driver of the poor technical condition of vehicles is the high-cost of vehicle maintenance. Only a small number of drivers report buying new vehicles. Because the majority of vehicles are old, drivers find it difficult to keep them in proper technical conditions. While drivers report that they take care of their vehicles as much as they can and try to keep them clean, drivers reported that a majority of minibuses require repairs.

13 Georgia. Ministry of Economy and Sustainable Development of Georgia. Land Transport. „ქ. თბილისში არსებული დეკლარირებული სამგზავრო ავტოსადგურები 2017 წლის მარტის მდგომარეობით“ [Official auto-stations in Tbilisi as of March 2017] <http://lta.gov.ge/doc/samgzavro-gadakvanebi/avtosadgurebi/TBILISI.pdf>

14 “ტექნიკური რეგლამენტი “ავტოსადგურის ფუნქციონირების წესისა და პირობების” დამტკიცების შესახებ.” [Technical Regulation “Rules and conditions for the functioning of auto-stations”]. August 18, 2011. <https://www.matsne.gov.ge/ka/document/view/1462431>.

15 “ტექნიკური რეგლამენტი „სხვადასხვა კატეგორიის ავტოსატრანსპორტო საშუალებების ტესტირების პერიოდულობის შესახებ.” [Technical Regulations “Means of regular inspection for different classes of automobiles”. January 03, 2014. <https://matsne.gov.ge/ka/document/view/2189748>.

16 “ტესტირების ცენტრები.” [Testing centers]. სახმელეთო ტრანსპორტის სააგენტო [Land Transport Agency]. November 25, 2013. http://lta.gov.ge/?page_id=71

17 Diasamidze, Giorgi. “ვიცეპრემიერი: სავალდებულო ტექდათვალიერება 2018 წლის 1 იანვრიდან ამოქმედდება.” [“Vice Premier: Obligatory technical inspections enter force from January 1, 2018”]. ნეტგაზეთი [Net Gazeti]. November 8, 2016. <http://netgazeti.ge/news/153166/>.

Drivers report that technical inspections are acceptable and believe technical monitoring to be important. Station administrations also agree that technical inspections are important, and some require inspections in contracts between stations and drivers. However, minibuses do not usually undergo technical inspection before trips, as required in Georgian legislation. The representatives of one station stated that they inspect minibuses before travel. However, this was a simple visual inspection.

Although station administrations reported reluctance in taking responsibility for minibus inspection, legally, they are already required to do so.¹⁸ How they are required to do so though is less than clear based on the legislation. While clearly defined inspection terms are important, the prescription to carry out inspections without some form of monitoring and enforcement is unlikely to yield results as is the case at present.

Transportation practices

Dangerous driving practices are frequent on roadways in Georgia. They also are likely to be a primary cause of the high fatality rates. Minibuses are widely believed to engage in high levels of dangerous and distracted driving; the observations CRRC-Georgia carried out confirm this perception.

Overall, 96% of drivers in the first round of observation of the randomized control trial engaged in at least one type of dangerous driving behavior. In the first round, the most common was illegal passing (79%), followed by talking on the telephone (67%), carrying out aggressive maneuvers (63%), smoking (40%), not wearing a seatbelt (36%), and transporting standing passengers (8%). Relatively few drivers text messaged.

While dangerous driving is common, the scale of the issue varies greatly between different minibuses. During the first wave of minibus observation, 13 incidents took place per trip on average.¹⁹ While on some rides, there were no incidents, as many as 62 unsafe behaviors took place over the course of a single minibus trip.

Overcrowded vehicles

Drivers regularly transport more passengers than their vehicles are intended for. Transporting standing passengers and the installation of extra seats are illegal under Georgian legislation, with a GEL 300 fine for the former and a GEL 100 fine for the latter. Nonetheless, additional passengers ride minibuses both on retrofitted seats and in standing room. A total of 26% of minibuses observed had additional seats installed, and 9% of minibuses transported standing passengers.

This represents a serious problem for passenger safety. Standing passengers face a higher risk of injury in accidents compared to seated passengers, as they are less protected. Passengers on additional seats are also at risk, as the seats may be unstable.

Although drivers and station administrations report that they do not use additional seating or accept standing passengers in minibuses, because of the fines, violations were regularly observed. Some drivers report that this issue is particularly common on short routes and during holidays, when larger volumes of passengers seek out transportation.

Risky driving

Speeding is a common problem for road safety throughout the world.²⁰ Georgia's roadways and minibuses are no exception in this regard. Passengers report that intercity minibus drivers often exceed the

18 “ტექნიკური რეგლამენტი “ავტოსადგურის ფუნქციონირების წესისა და პირობების” დამტკიცების შესახებ.” [Technical Regulation “Rules and conditions for the functioning of auto-stations”]. August 18, 2011. <https://www.matsne.gov.ge/ka/document/view/1462431>.

19 The average trip distance was 123 km and lasted for 116 minutes

20 “General statistics.” IIHS. November 2015. <http://www.iihs.org/iihs/topics/t/general-statistics/fatalityfacts/overview-of-fatality-facts#Speeding>

speed limit.²¹ A number of factors encourage drivers to speed, including unfair competition between registered and unregistered drivers in tangent to stations scattered across the city and predictable speed enforcement zones.

Intercity transport in Georgia is not strictly regulated, and even when regulations exist, enforcement is often lacking. The lack of licensing is one issue in this regard, which leads to unfair competition. Anyone can transfer passengers between cities. Apart from the official intercity stations, unregistered operators depart from multiple unofficial stations.

In practice, the excessive number of stations leads drivers to being unable to find a sufficient number of customers to fill their minibuses. Hence, drivers often search for passengers on roadways. Knowing that other drivers are in the same situation, they often drive at excessive speeds to reach passengers before other drivers do.

Qualitative research suggests minibus drivers understand that driving at safe speeds is critical to safety. During focus groups, drivers stated that they usually comply with speed rules and do not speed. However, they admit to occasionally speeding and specifically mention unregistered operators as a cause of speeding, as they try to overtake and pick up passengers before them.

Besides unfair competition, predictable enforcement zones lead minibus drivers to speed. It is noteworthy that during a focus group passengers of the transportation company Metro noted that as soon as a vehicle leaves Georgia, drivers tend to slow down. Unlike when Georgian drivers are in foreign countries, within Georgia they know where speed radars are installed and where their speed is being monitored. Unsurprisingly, they act accordingly.

Aggressive driving and illegal passing

As with speeding, aggressive driving and illegal passing are likely to cause road accidents. The data collected within this project suggest that a majority of minibus drivers engage in one or the other. Besides a lack of enforcement, another cause of dangerous driving is driver fatigue. As noted above, the number of hours a driver can work is unregulated. According to minibus drivers, overtime driving is common. This practice reduces drivers' concentration and increases the risk of accidents.

Cell phone use while driving

Talking on a cell phone and text messaging are forms of distracted driving known to increase the likelihood of being in an accident. While estimates do not exist for Georgia for how many accidents are caused by distracted driving practices, they are very likely to contribute to the high fatality rates on the roads in Georgia. Studies from other contexts suggest that distracted driving increases a driver's chances of being in an accident and drivers using cell phones are four times more likely to get into an accident.²² Importantly, commercial vehicle drivers are also at increased risk of accident when distracted while driving.²³

Talking on a cell phone or texting while driving is a traffic violation in Georgia, as it distracts the driver from the roadway. However, hands-free phones are allowed. Drivers who talk on the phone while driving can be fined GEL 30.²⁴

Even though talking on the phone in Georgia is illegal without a hands-free set, during the first wave of observation, 67% of drivers talked on the telephone at least once, and 5% wrote an SMS at least once. Despite being forbidden, both drivers and passengers in focus groups confirmed that drivers frequently use

21 The maximum speed allowed in settlements is 60 km/h, 90 km/h on motorways, and 110 km/h on highways.

22 Ranney, Thomas A. "Driver Distraction: A Review of the Current State-of-Knowledge." Home - Transport Research International Documentation - TRID. March 31, 2008. <https://trid.trb.org/view.aspx?id=868221>

23 Olson, Rebecca L., Richard J. Hanowski, Jeffrey S. Hickman, and Joseph Bocanegra. DRIVER DISTRACTION IN COMMERCIAL VEHICLE OPERATIONS. Report. September 2009. <https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/FMCSA-RRR-09-042.pdf>

24 Ministry of Internal Affairs. "საქართველოს კანონი საგზაო მოძრაობის უსაფრთხოების შესახებ." [Law of Georgia on Roadway Safety.] 2016. http://police.ge/files/pdf/sakanonmdeblo%20baza/14.Law_on_Road_Traffic%281%29.pdf

cell phones while driving.

Drivers stated that they are sometimes obliged to use phones to respond to passengers' calls. Even when passengers request that drivers stop talking on the phone while driving, however, they are sometimes unsuccessful. Cell phone use while driving is clearly an issue among Georgia's minibus drivers.

Smoking

Smoking while driving is not only harmful to the health of and uncomfortable for passengers, but it also distracts drivers. Therefore, it reduces the level of safety on the roadways. According to our research, drivers often smoke during travel: 40% of drivers were observed smoking while driving at least once during the first wave of observation. Smoking during driving is not prohibited by Georgian legislation, although a recently introduced draft law would make smoking in commercial vehicles illegal.²⁵

Seatbelts

Seatbelts save lives. In Georgia, drivers and front seat passengers are obliged to wear them, however, sometimes drivers and passengers fail to do so. During the first wave of observation, 36% of drivers did not wear seatbelts at all or took the belt off and put it on again at some point.

Drivers, passengers and representatives of the station administration agree on the importance of using seat belts. Even though drivers agree with the importance of rear seat belts, there are very few minibuses equipped with them, since having rear seat belts is not legally obliged, in contrast to driver and front seat passenger belts. Importantly, seatbelts are sometimes improperly installed.

Rear seat passengers are not required to wear seat belts even though they are as vulnerable to injury as front seat passengers if an accident occurs. In intercity minibuses, even when seat belts are available, passengers often do not use them. This issue stems from the low level of awareness of the problems associated with not wearing seatbelts.

Minibus monitoring

A potentially simple way of decreasing dangerous driving among minibus drivers is to use anonymous monitoring with penalties for distracted or dangerous driving. Under such a policy, the government would hire a small number of monitors to ride on randomly selected minibuses throughout the country without informing the driver.

After the ride, the monitor would report on any serious road violation as well as the number of dangerous driving activities and safety violations carried out. If the driver committed serious traffic violations fines could be distributed. While the immediate impact would be on the driver that would receive the fine, if the system were broadly publicized, it could have a general impact, with drivers being incentivized to drive safer in order to avoid fines.

Although the above policy option is theoretically sound, theory and practice often diverge. Hence, CRRC-Georgia carried out a randomized control trial to test the potential impact of the policy. The results of the randomized control trial suggest that the combination of a potential award together with the knowledge that drivers may be monitored created a very strong immediate effect on drivers and potentially a lasting effect.

Overall, the group of drivers that knew they were being monitored made seven fewer dangerous driving behaviors on average per trip. The number of telephone calls, cigarettes smoked, aggressive maneuvers, and likely illegal passes drivers carried out significantly declined. Two weeks later, when the treatment drivers were observed, they maintained lower levels of dangerous driving. Notably, the control group too showed lower levels, though not significantly lower levels, of dangerous driving.²⁶ This data suggests that a small minibus monitoring program could be very effective at decreasing distracted and dangerous

25 “საქართველოს კანონი თამბაქოს კონტროლის შესახებ.” [“On Tobacco Control”]. January 1, 2013. <http://bit.ly/2tQvm0j>

26 For a more detailed discussion, please see the Appendix.

driving behaviors.

Conclusions and Recommendations

Road safety is a complex issue requiring a multidimensional approach. Some of the problems associated with road safety stem from legislative gaps, while others stem from ineffective monitoring or enforcement of existing regulations. While problems exist, the research suggests that a number of relatively simple policy changes have the potential to improve road safety in Georgia. We divide these into regulatory, monitoring and enforcement, and educative policy solutions.

Regulatory

A number of regulations are suggested by the above analysis. First, we recommend that:

- Smoking while driving be made illegal for commercial passenger transport

Smoking distracts drivers from the roadway and creates a health hazard for minibus passengers. Given the widespread practice of smoking while driving among minibus drivers, this recommendation has the benefit of improving public health through decreasing distracted driving as well as not exposing passengers to second hand smoke.

- Introduce zoning ordinances for stations

Due to the location of stations throughout Tbilisi many intercity vehicles have to cross a considerable distance within the city, thus contributing to high traffic density and increasing the risk of road accidents. Ordinances should require stations to be concentrated at the city entrances, so that intercity vehicle transit within the city is minimized. If stations were concentrated in specific locations, this would also decrease on-road competition between drivers as passengers would also concentrate. Given the feedback from minibus drivers above, this may reduce speeding.

- Introduce licensing for intercity passenger transport operators, including M1 operators

Licensing would ensure that all carriers who operate on intercity routes are subject to inspection and pay taxes. This will ensure that all commercial vehicles used for intercity transport are inspected. It will also eliminate unfair competition between registered and unregistered carriers.

- If medical exams are to be required, make all stations have medical facilities

Currently, legislation requires intercity drivers to undergo medical examination prior to driving. This requirement is somewhat unrealistic. However, if this is to actually be enforced, stations that are currently not required to have medical facilities should be required to have them.

- Define technical standards for intercity transport pre-trip inspections

The poor state of repair of vehicles is directly related to road safety. Currently intercity vehicles are subject to inspection every six months, however, the research shows that these inspections are clearly inadequate. More

over, inspections every six months,²⁷ even if properly monitored, would not guarantee that the vehicles are safe and in proper condition during each trip.

Pre-trip inspections are currently required by Georgian legislation. However, the standards for inspection are poorly defined. Specific criteria for inspections should be defined and become mandatory for all stations to conduct before each trip. This would minimize the safety risks associated with vehicle conditions.

- Define the maximum number of working hours for drivers and make tachographs legally required

²⁷ “ტექნიკური რეგლამენტი „ავტოსატრანსპორტო საშუალებებით ტვირთის გადაზიდვის წესის“ დამტკიცების თაობაზე.” [Technical Regulation on the confirmation of “On means of transport of cargo by road transport”] January 3, 2014. http://gov.ge/files/382_39888_927793_32030114.pdf.

for commercial drivers

Driver exhaustion is directly related to travel safety. The Georgia-EU Association Agreement suggests that by 2019, maximum driving hours should be regulated. The use of a tachographs will allow the police to monitor and fine drivers who work excessive hours, thus increasing passenger safety.²⁸

- Make access to rear seatbelts mandatory on commercial vehicles

Without access to rear seat belts, passengers cannot use them. Just as drivers and front seat passengers are at greater risk when not wearing a seatbelt in an accident, so too are passengers in the back seat.

Monitoring and enforcement

Based on the above evidence, a number of monitoring and enforcement efforts are suggested as well. We recommend that the government:

- Create an anonymous minibus monitoring program

Telling minibus drivers that they are being monitored for safe driving and may be punished for safety-violations may lead to safer, less distracted driving. The results of the experiment suggest such a program would be effective. This suggests that the government has an opportunity to implement a small program, which could have an important impact on making minibus driving safer and reduce the number of accidents related to dangerous driving.

If the government does in fact implement such a program, we recommend that the program:

- Fine unsafe minibus drivers

While our experiment could not test the impact of a potential fine for unsafe driving, the behavioral economics literature suggests that individuals are roughly twice as likely to avoid losses as they are to seek out gains.²⁹ Given that losses have stronger effects, this is also likely to ensure that there actually is an overall effect of the program. Importantly, this may offset costs associated with the program.

- Publicize the program in the lead up to implementation

Minibus drivers should be made aware of the program. If they do not know that they could be monitored, the program will be slower to encourage safe driving.

- Select routes for monitoring randomly on a daily basis

This would help prevent drivers from driving artificially safely in order to avoid a fine on a trip when they believe a monitor to be present based on prior information.

- Use few monitors, change them regularly

The success of such a monitoring program relies on monitors being able to maintain their anonymity. In a country like Georgia, with a small population and dense social networks, maintaining monitor anonymity will be challenging. Hence, the government should consider drawing monitors from one of the civil services with a relatively large staff. The Ministry of Internal Affairs Patrol Police Department would likely be an ideal institution given that patrol police officers are already aware of road safety legislation, and there are a sufficiently large number of officers who could participate in the program on a rolling basis.

Besides implementing a small minibus monitoring program, a number of other monitoring and enforcement related measures are likely to increase road safety.

When it comes to speeding, the government already has installed speed cameras which capture a driver's speed. However, since drivers are aware of the locations of speed cameras and drive slower around them,

28 "Regulation (EC) No 561/2006." Tachospeed. February 19, 2013. <http://tachospeed.com/legal/regulation-ec-no-5612006/>.

29 "Loss aversion." Behavioraleconomics.com | The BE Hub. <https://www.behavioraleconomics.com/mini-encyclopedia-of-be/loss-aversion/>

we recommend that the government:

- Install radars that estimate average speed between locations as well as speed at the time of measurement on Georgian motorways

By using speed radars that measure speed between destinations, the government will be able to better monitor speed and reduce the prevalence of speeding.

Education

Although Georgian legislation does not require seatbelts as mandatory for backseat passengers, their use would likely decrease the injuries associated with road accidents. In the absence of laws, a due measure would be conducting information campaigns about the advantages of using seat belts for both front and back seat passengers. Hence, we recommend that the government:

- Carry out awareness raising campaigns on using seatbelts for passengers.

The above recommendations are likely to help improve the safety of minibus driving in Georgia. Effective monitoring could help to ensure driver compliance with relevant regulations and lead to less dangerous driving. Ultimately, these efforts would likely decrease the number of accidents, injuries, and fatalities on roadways, leading to safer transit options for passengers.

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Annex: Detailed information on the design and analysis of the STOP RCT

In order to randomly assign minibuses to treatment and control groups, prior to observation, CRRC-Georgia collected schedules of minibus routes. CRRC-Georgia staff then identified the most similar routes based on distance of travel and roads taken. For each pair of routes, one was randomly assigned to the treatment group and the other to the control group.

Between September 20th and October 20th, CRRC-Georgia interviewers observed 360 minibus trips in three waves of observation. In the first wave of observation, minibus routes which had been randomly selected were observed without telling the driver that they were being monitored. This group forms the study's control group. In the second wave of observation, routes assigned to the treatment group were observed. In the third wave of observation, observers returned to both the control and treatment minibuses for anonymous observation.

Minibus drivers in the treatment group who drive along similar routes were informed that:

1. Their trip would be monitored for safety along a number of dimensions;
2. A monitor would return in the coming weeks and monitor their driving as well as other drivers again without telling them;
3. If they were found to be among the safest drivers, they would be rewarded with a petrol voucher.

Over the course of the trip, monitors in all three waves recorded how many times drivers:

1. Smoked;
2. Text messaged;
3. Had telephone conversations;
4. Did not wear a seat belt;
5. Passed in areas it was not legal to do so;
6. Made other aggressive driving maneuvers;
7. Behaved aggressively towards passengers;
8. Behaved aggressively towards non-passengers.

Monitors also recorded stop and travel time as well as a number of characteristics about the state of the minibus. Following the trip, the average speed of travel was calculated.

The above research design allows for a number of comparisons. First, by comparing the first wave control group to the second wave treatment group, we can test how the direct knowledge that one is being observed for safe driving effects driver safety. Second, by comparing the second wave treatment group to the third wave treatment group, we are able to tell whether the knowledge that one might be monitored again in the near future would have some lasting effect. Third, by comparing drivers in the first wave control group to drivers in the third wave control group, we can tell whether there was a contagion effect from the experiment i.e., whether the treated drivers talked to the non-treated drivers about the monitoring and they in turn also became safer drivers.

To test for the above types of effects, we used a statistical technique known as multivariate matching with genetic weights and difference in difference calculations of average treatment effect on the treated. This method allows us to compare the most similar minibuses and minibus routes. Moreover, these methods allow for calculations of both the size of an effect and the probability that it emerged by chance alone.

The results of the experiment suggest that there was a relatively large effect from drivers being aware of being monitored as well as potentially lasting effects on drivers. This section reports the frequency of distracted and dangerous driving among minibus drivers and then the results of the experiment.

To find out whether active knowledge that an individual was being monitored improved their driving, we compared the control group from the first wave with the treatment group observations from the second wave. The statistical analysis suggests that drivers made 1.5 fewer calls per trip, smoked 1.6 fewer cigarettes, made 2.1 fewer illegal passes, and 1.8 fewer aggressive maneuvers. Overall, in the group that was

directly aware that it was being monitored, there were 7.2 fewer incidents on average per trip. Other measures did not decline in a statistically significant manner following observation. Overall, a statistic called 95% confidence intervals suggests that the treatment lead to between a 17% and 70% decline in dangerous driving behaviors when compared with the first wave control group.

Based on these statistics we can conclude that direct knowledge of being monitored led to fewer distracted and other dangerous driving behaviors. However, did these effects last? To understand whether direct knowledge of being monitored and that one would again be monitored had a lasting effect, we compare the results of the drivers who knew they were being monitored to roughly two weeks later when they did not know they were being monitored. In this case, a lasting effect is present if there was a statistically significant decline in a behavior in the first round of monitoring and no significant change in the second round of monitoring.

The data suggests that drivers who knew they would be monitored maintained lower levels of smoking, telephone conversations, illegal passing, aggressive maneuvers, and number of incidents overall. However, it is important to note that the drivers did drive less safely than they did when they were aware of being monitored. The differences between waves are not statistically significant, suggesting that drivers did in fact drive safer two weeks after being aware that they were being observed and would be again. Overall, the drivers who were treated still carried out 15% fewer distracted and other dangerous driving behaviors two weeks after being informed they would be monitored than the control group in the original wave.

When it comes to contagion, the results of the statistical tests uniformly show no significant change except for in speed. Given that this is one in ten tests and that there was no significant effect from the first wave of monitoring on speed, we suspect that this test may have been found to be significant based on chance or other extraneous factors.

The table below presents the average treatment effect on the treated for each indicator with Abadie Imbens standard errors in parenthesis. In the line below a given indicator are the 95% confidence intervals for each measure. These indicate the range which we are 95% confident that the treatment effect was within. One star indicates that the estimate has less than a one in twenty chance of being due to chance alone. Two stars indicates that the estimate has less than a one in one hundred chance of being due to chance alone, and three stars indicates that the estimate has less than a one in one thousand chance of being due to chance alone.

Effects (standard errors)			
Indicator	Immediate effect	Lasting Effect	Contagion effect
Number of incidents total	-7.23***	2.60	-0.07
	(-10.58, -3.88)	(-1.76, 6.96)	(-4.45, 4.31)
Speed (km/hour)	-1.41	0.22	-5.77*
	(-8.41, 5.60)	(-6.63, 7.08)	(-11.24, -0.29)
Telephone calls	-1.50**	0.51	0.35
	(-0.49, -2.52)	(-0.49, 1.51)	(-0.78, 1.48)
Text messages	0.00	0.00	0.07
	(-0.04, 0.04)	(-0.08, 0.08)	(-0.06, 0.19)
Smoking	-1.60***	0.48	-0.09
	(-2.44, -0.77)	(-0.19, 1.14)	(-1.04, 0.86)
Seatbelt unworn	-0.28	0.36	0.36
	(-0.75, 0.20)	(-0.29, 1.00)	(-0.18, 0.89)
Illegal passes	-2.06	0.03	0.67
	(-4.14, 0.02)	(-3.27, 3.33)	(-1.80, 3.15)
Aggressive Maneuvers	-1.83**	1.22	-1.43
	(-3.05, -0.61)	(-0.28, 2.71)	(-2.89, 0.03)

Based on the above statistics we can conclude that direct knowledge of being monitored led to fewer distracted and other dangerous driving behaviors. However, the combination of the lack of significant contagion effect in combination with the increased but not significant increase between treatment groups suggests that a comparison of descriptive statistics is important to gain a sense of the lasting effect. The table below shows the average of each indicator given above.³⁰

	Control 1	Treatment 1	Control 2	Treatment 2
Total	12.78	5.4	10.9	10.97
Telephone	2.63	1.32	2.45	2.37
Texting	0.35	0.01	0.08	0.03
Smoking	1.59	0.34	1.14	0.7
Seat Belt	0.62	0.38	0.76	0.78
Illegal passing	4.76	2.31	4.96	4.88
Dangerous maneuvers	2.76	0.93	1.42	2.15

The average indicator for the second wave of treatment and control group observations are quite similar. The similarity between means suggests one of two things. First, there may have been a small contagion effect as well as a lasting effect that was not statistically significant. Supporting this conclusion is that both second wave means are lower than the mean in the first observation of the control group. Additionally, a conversation with a minibus driver following the experiment suggested that other drivers were in fact aware of the experiment. The second possibility, however, is a lack of lasting effect and that an external factor caused the lowering of indicators during the third wave of observation.

Overall, the results of the experiment suggest that direct knowledge of being observed lowers the number of dangerous and distracted driving behaviors by a significant amount. This experience may have lasting effect on drivers.

30 A close inspection of the means shows slight discrepancies between the differences in means between groups in the table below and the average treatment effect. For ease of understanding, we have presented the four means of the four groups in the table below as opposed to the six means that result from the matching process. For more information on the matching process as well as replication code and data, visit <http://caucasusbarometer.org/en/downloads/>.