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WHY DID KAZAKHSTAN'S ROAD DEATHS FALL FASTER THAN UZBEKISTAN'S? WHAT THE TIMING OF THE DECLINE SHOWS, 2010-2019

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Abstract: Between 2010 and 2019 the estimated road traffic death rate in Kazakhstan fell by 44.5%, from 24.5 to 13.6 per 100 000 population, while in neighbouring Uzbekistan it fell by only 6.7%, from 10.4 to 9.7. This study uses the timing of Kazakhstan's decline to check the explanation that it was driven by rebuilt transit highways and stricter enforcement. Annual national statistics show that the decline was not gradual: 81% of the fall in the registered death rate between 2010 and 2018 came in three years, 2014, 2015 and 2017, while the rate changed little in 2011-2013. It affected every broad age group, including children, while the number of registered cars grew by about a fifth between 2013 and 2016. The death rate fell by similar amounts in Almaty (−27%), Astana (−31%) and the country as a whole (−29%) between 2010-2014 and the following years. By 2013, 1 727 km of the 2 787 km Western Europe-Western China corridor had already opened, during a period when the death rate fell by only 8.6%. The timing fits the new national traffic law and code of administrative offences of 2014-2015 better than the construction of this corridor, although the link is by date only and the cause of the 2017 fall remains open.

Keywords: road traffic deaths, road safety, Kazakhstan, Uzbekistan, traffic enforcement, highways

1. Introduction

Road traffic deaths reached 1.35 million worldwide in 2016, and road traffic injury is the leading cause of death for children and young adults aged 5-29 years [4]. According to current WHO estimates, Kazakhstan's death rate rose from 13.9 per 100 000 in 2000 to 38.0 in 2006 and then fell to 24.5 in 2010 and 13.6 in 2019 [1]. Uzbekistan, a neighbouring post-Soviet country, started the decade much lower and stayed almost level, between 9.5 and 10.8 per 100 000 in every year from 2010 to 2019 [1].

A study of Kazakhstan's national statistics from 1999 to 2018 described the decline, linked the turn after 2008 to a law adopted that year which strengthened administrative penalties for not wearing seat belts, driving into oncoming traffic and drink-driving, and predicted that the decline would continue at a slower pace; it did not test that link [2]. In Russia, police data show that the road death rate in 2016 fell to a level not seen since 1971 and kept falling [8]. Research elsewhere has measured what single measures can do; for example, fixed speed cameras in England reduced collisions at camera sites by about 15% on average [7]. What is missing for Kazakhstan is a test of why its decline after 2010 was so much larger than its neighbour's.

2. Hypothesis

Before any results were computed, the author proposed (22 October 2026): "I think Kazakhstan's road deaths fell by half mainly because it rebuilt its main roads, especially the big transit highways with separated lanes, and added strict enforcement such as speed cameras and higher fines. Kazakhstan also started from a very high level (25.9), so the same safety changes could cut deaths a lot. Uzbekistan started lower (11.3), and its roads and rules changed less, so its rate stayed flat." (The figures 25.9 and 11.3 are the World Bank's earlier estimates for 2010; the current WHO estimates used below are 24.5 and 10.4.)

To test the hypothesis, two predictions follow from its two parts, and annual data can check them. If the decline came mainly from rebuilt transit highways, it should follow the opening of new road sections, gradually, and should be weaker in the largest cities, whose residents presumably travel mostly on city streets. If it came mainly from stricter national rules and enforcement, it should come in steps at the dates when they were introduced and should appear in cities and elsewhere alike. The study window starts in 2010 because that is the period named in the hypothesis; the earlier fall from the 2006-2007 peak has already been linked to the 2008 law [2].

3. Data and methods

Five sources were used. (1) WHO estimated road traffic death rates per 100 000 population for both sexes, 2000-2023, from the Global Health Observatory (indicator RS_198), read on 24 October 2026 [1]. (2) Kazakhstan's registered road traffic death rates by five-year age group, 1999-2018, from the national statistics table in [2]. (3) The country profiles of Kazakhstan and Uzbekistan in the WHO Global Status Reports on Road Safety of 2015 and 2018, which give registered vehicles, reported deaths, national road safety strategies, the main type of speed enforcement and government enforcement ratings from 0 to 10 [3, 4]. (4) Road traffic death rates per 100 000 in Almaty and Astana for 2010-2014 and 2015-2019, and annual road deaths registered in Astana, from the Demographic Yearbook of Kazakhstan as published in [5]. (5) World Bank data on GDP per capita in constant US dollars and the Logistics Performance Index score for the quality of trade and transport infrastructure, read on 28 October 2026 [6].

Dates of policy and road events were taken from the official records of the Law on Road Traffic (No. 194-V of 17 April 2014) [9] and the Code of Administrative Offences (No. 235-V of 5 July 2014, in force from 1 January 2015) [10], and from news reports of the time on "Sergek" traffic cameras in Astana [11] and on the construction of the Western Europe-Western China transit corridor [12, 13]. The content of the two legal acts was not analysed; they are used only for their dates.

Year-to-year changes in the registered national rate, the share of the 2010-2018 decline that fell in each year, changes by age group (the simple mean of the five-year rates in each group) and changes between periods were computed with a short Python script.

4. Results

4.1. The size and timing of the decline

Kazakhstan's WHO-estimated rate fell from 24.5 to 13.6 per 100 000 between 2010 and 2019 (−44.5%), while Uzbekistan's moved up and down around 10 and ended 6.7% lower (Table 1). The registered national rate shows that Kazakhstan's fall came in steps. It fell from 20.9 in 2010 to 19.5 in 2011 and then stayed at 19.1 in 2012 and 2013; it fell by 15.2% in 2014 and 10.5% in 2015, rose by 2.8% in 2016, fell by 17.4% in 2017 and by only 2.4% in 2018. The three years 2014, 2015 and 2017 account for 81% of the total fall between 2010 and 2018 (7.2 of 8.9 points). The WHO estimates, which are modelled from the same registration data, show the same two large steps, −15.7% in 2014 and −11.2% in 2017.

Table 1. Road traffic deaths per 100 000 population, 2010-2019 [1, 2]

Year	Kazakhstan, WHO estimate	Uzbekistan, WHO estimate	Kazakhstan, registered	Kazakhstan, registered: change

				from previous year
2010	24.5	10.4	20.9	-
2011	22.8	10.4	19.5	−6.7%
2012	22.2	9.5	19.1	−2.1%
2013	21.0	10.6	19.1	0.0%
2014	17.7	9.9	16.2	−15.2%
2015	16.8	10.8	14.5	−10.5%
2016	16.1	9.7	14.9	+2.8%
2017	14.3	10.4	12.3	−17.4%
2018	13.5	10.3	12.0	−2.4%
2019	13.6	9.7	-	-

Exposure to traffic did not fall. Registered cars and light vehicles in Kazakhstan increased from 3 190 057 in 2013 to 3 835 609 in 2016 (+20%), while deaths reported to WHO fell from 3 233 to 2 625; deaths per 10 000 registered vehicles of all types fell from 8.2 to 6.0 (−27%), although the vehicle categories were reported somewhat differently in the two reports [3, 4].

4.2. Cities and the rest of the country

Between 2010-2014 and 2015-2019 the road death rate fell from 13.0 to 9.5 per 100 000 in Almaty (−26.9%) and from 11.6 to 8.0 in Astana (−31.0%) [5]. Kazakhstan's registered rate fell from 19.0 in 2010-2014 to 13.4 in 2015-2018 (−29.2%) [2]. The two largest cities therefore saw about the same fall as the country as a whole (Table 2), although their residents presumably depend less on intercity highways.

Table 2. Road traffic death rate per 100 000, mean of each period [2, 5]

Area	2010-2014	2015-2019	Change
Almaty	13.0	9.5	−26.9%
Astana	11.6	8.0	−31.0%
Kazakhstan (registered; second period 2015-2018)	19.0	13.4	−29.2%

Astana illustrates the limits of what cameras in one city can show. More than a thousand new "Sergek" cameras recording speeding and bus-lane driving were added there in September 2017 [11]. Road deaths registered in Astana were 80 in 2016, 81 in 2017, 86 in 2018 and 74 in 2019 [5]. These counts are too small, and the cameras ran for too short a part of 2017, to show an effect of the size found in England [7]; and Astana, with about 3% of Kazakhstan's road deaths, cannot by itself explain the national fall of 2017.

4.3. Who stopped dying

Death rates fell in every broad age group between 2010 and 2018 (Table 3). The fall was largest among people aged 25-44 and among children, and smallest among people aged 65 and over; in both step years every broad group fell. Because children, who do not drive, fell as much as adults, the change reached non-drivers too, not only one group of drivers.

Table 3. Registered road traffic death rate in Kazakhstan by age group, per 100 000 (mean of five-year groups) [2]

Age group	2010	2018	Change 2010-2018	Change 2013-2014	Change 2016-2017
0-14	6.6	3.6	−45.2%	−7.1%	−16.0%
15-24	19.2	11.4	−40.4%	−14.8%	−20.0%
25-44	29.8	15.9	−46.7%	−12.9%	−13.2%
45-64	26.9	17.8	−33.7%	−19.7%	−19.9%
65 and over	16.9	12.6	−25.1%	−16.6%	−8.7%

4.4. Roads and enforcement in the two countries

From 2010 to 2013, 1 727 km of the Western Europe-Western China corridor in Kazakhstan were completed and opened to traffic [12], out of a total of 2 787 km; the last sections were finished in 2017 [13]. While most of this road was opening, the registered death rate fell by 8.6% (2010-2013); in the following four years, 2013-2017, it fell by 35.6%. The World Bank infrastructure

score for Kazakhstan was 2.66 in 2010 and 2.55 in 2018, and for Uzbekistan 2.54 and 2.57 (Table 4), so by this measure Kazakhstan's infrastructure did not pull ahead of its neighbour's.

Both governments rated their own enforcement highly, and the ratings were similar: Uzbekistan's were higher for speed in both reports and for drink-driving in 2018, and lower for seat belts in both reports and for drink-driving in 2015 (Table 4). Two other differences stand out in the WHO profiles: Kazakhstan reported automated speed enforcement as the main type in 2018, while Uzbekistan reported manual enforcement; and Kazakhstan had a national road safety strategy with numeric death-rate targets, while Uzbekistan had a strategy without a target in 2015 and no strategy in 2018 [3, 4].

Table 4. Roads, enforcement and economy in Kazakhstan and Uzbekistan [3, 4, 6]

Indicator	Kazakhstan	Uzbekistan
Infrastructure score (1-5), 2010 / 2018 [6]	2.66 / 2.55	2.54 / 2.57
Speed enforcement rating (0-10), 2015 / 2018 reports	8 / 7	9 / 8
Drink-driving enforcement rating, 2015 / 2018 reports	10 / 7	9 / 10
Seat-belt enforcement rating, 2015 / 2018 reports	10 / 7	9 / 5
Main type of speed enforcement, 2018 report	Automated	Manual
National strategy and death-rate target	Yes; 15.5 to 14 (2012-2014), 12 or less by 2020	Strategy without target (2015); no strategy (2018)
GDP per capita, constant US$, 2013 / 2014 / 2016 [6]	9 960 / 10 227 / 10 151	2 823 / 2 991 / 3 328

5. Discussion

The results support only part of the hypothesis. The pattern does not fit the highway explanation well: most of the new transit road opened in 2010-2013, when the death rate fell much less than in the following years; the decline came in sudden steps rather than gradually; it was about as large in Almaty and Astana as in the country as a whole; and the infrastructure score did not improve. Better roads may still have contributed in ways that national annual data cannot show, for example on particular dangerous stretches, and road programmes other than this corridor were not examined.

The rules-and-enforcement part fits the timing of the first step better. The new Law on Road Traffic was adopted in April 2014 and the new Code of Administrative Offences took effect on 1 January 2015, and the registered death rate fell by 15.2% and 10.5% in those two years, in every broad age group. This matches the earlier suggestion that the turn after 2008 followed a law strengthening penalties [2]. Kazakhstan also differed from Uzbekistan in having a strategy with numeric targets and automated speed enforcement. The economy is a competing explanation only for 2015: Kazakhstan's GDP per capita still grew in 2014 and then fell slightly in 2015-2016, while Uzbekistan's kept growing, and less economic activity can mean less driving. These data cannot tell whether the 2017 fall is linked to the last corridor section (Almaty-Khorgos, opened that year [13]), and the Astana cameras cover too small a share of deaths to explain it.

In the author's view, the sharp fall in 2017 most likely came from stricter and more visible enforcement, especially automated cameras, which make drivers slow down everywhere, not only where a camera stands. Drivers learn the rule quickly once fines become certain, so the effect can appear in one year rather than gradually. This is only an explanation, and these data cannot confirm it.

Limitations. The study uses national annual data, about ten points per country, and links events to changes by date only; it shows timing, not cause, and the content of the 2014 law and the 2015 code was not examined. The city rates are period means from a secondary source and count deaths registered among city residents, wherever the crash happened. The WHO estimates for Kazakhstan are modelled from the same registration data and do not confirm it independently. The

government enforcement ratings are self-assessments. The Logistics Performance Index is a survey of trade logistics, not a measure of roads alone, and it moved up and down between editions. Road sections opened in 2012-2013 may have shown their effect only a year later, which annual national data cannot separate. A comparison of provinces on and off the transit corridor, using provincial death counts, would test the highway explanation directly. The 2020-2023 period was left out because traffic fell during the COVID-19 pandemic; in those years Kazakhstan's estimated rate fell to 10.9 in 2020 and rose again to 13.3 in 2023 [1].

6. Conclusion

Kazakhstan's road death rate fell by about 44% between 2010 and 2019, more than six times as much as Uzbekistan's. The decline came in sudden steps in 2014-2015 and 2017, affected every broad age group and was about as large in the two biggest cities as in the country as a whole, even though the number of cars grew. Its timing fits the new national traffic law and code of 2014-2015 better than the construction of the Western Europe-Western China corridor, which was mostly finished earlier. Finding what caused the 2017 fall, and testing the highway explanation with provincial data, are the next steps.

Data availability

All data come from the public sources listed in the references. The analysis script and the extracted tables are available from the author or his mentoring team on request.

Author contributions and use of AI tools

The author, who plans to study civil engineering, chose this research question from two directions proposed by his mentor, proposed the hypothesis quoted in Section 2 before any results were computed, selected the speed-camera study [7] as the work closest to his question, and wrote the explanation of the 2017 fall in Section 5. The data were collected and analysed and the text was drafted by his mentor with the help of a generative AI assistant (Claude, Anthropic). No number, quotation or reference was produced by a language model without being checked: every statistic is computed by the analysis script from the sources described above, and each statement about a cited work was checked against its published text.

Conflicts of interest

The author declares no conflicts of interest. No funding was received for this study.

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