KAZAKHSTAN ROAD CRASH DATA REVIEW AND REPORTING

STATUS AND RECOMMENDATIONS

MARCH 2025

CAREC
Central Asia Regional Economic Cooperation Program

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Cover photos (left to right): Sunset over trac on the bypass road in Merke–Taraz highway, Zhambyl Oblast, Astana bridge over the Ishim River.

Cover design by Josef Ilumin.

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Abbreviations

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway Transportation Officials
ADaMS	Accident Data Management System
ADB	Asian Development Bank
AIS	Abbreviated Injury Scale
APRSO	Asia Pacific Road Safety Observatory
BAAC	Bulletin d'Analyse des Accidents Corporels
CADaS	Common Crash Data Set
CARE	Community Database on Road Accidents
CAREC	Central Asia Regional Economic Cooperation
EC	European Commission
ESCAP	Economic and Social Commission for Asia and the Pacific
ETSC	European Transport Safety Commission
FIA	Fédération Internationale de l'Automobile
GDP	Gross Domestic Product
GIS	Geographic Information System
GRSF	Global Road Safety Facility
ICD	International Classification of Diseases
iRAP	International Road Assessment Programme
ITF	International Transport Forum
LAU	Local Administrative Units
MAIS	Maximum Abbreviated Injury Scale
MoH	Ministry of Health
MoT	Ministry of Transport
MoIA	Ministry of Internal Affairs
NUTS	Nomenclature of Territorial Units for Statistics
ONISR	Observatoire National Interministériel de la Sécurité Routière
SPI	Safety Performance Indicators
STBA	Statistisches Bundesamt
UN	United Nations
WB	World Bank
WHO	World Health Organization

1 Introduction

This report presents an overview of the current road crash data management situation in **Kazakhstan**, offering strategic recommendations for improvement based on the best globally recognized practices. The report is prepared as part of the consultancy Enhancing Road Safety for Central Asia Regional Economic Cooperation Member Countries (Phase 2) - IC7 Road Crash Data Review and Reporting, funded by the Asian Development Bank (ADB).

The consultancy aims to assess road crash data management practices for 10 countries of the Central Asia Regional Economic Cooperation (CAREC)[1] and develop guidance and tools to improve road crash data management and move toward greater harmonization of crash data across the region.

Especially, the consultancy is part of the effort from ADB and other international stakeholders[2] to develop the **Asia Pacific Road Safety Observatory** (APRSO); i.e., the regional forum on road safety data, policies and practices to ensure the protection of human life on the roads across Asia and the Pacific.

Reliable safety and traffic data are essential to assess the full nature of the road safety problem, measure the real economic costs associated with road crashes, and design the most cost-effective road safety interventions. As well, the establishment of road safety observatories (e.g., at national and/or regional level) helps to strategically deal with high quality road crash data.

A road safety observatory can be seen as a formal network of government representatives sharing and exchanging road safety data and experience to reduce traffic injuries across the country or within a region. Moreover, an observatory can provide reliable and comparable data on road crashes, in-depth analysis and information on road safety practices and policies. An observatory typically provides **evidence base on road safety**, composed, for instance, of statistical reports, country/region profiles, thematic analysis and key performance indicators. In other terms an observatory can help to:

- measure progress toward reducing deaths and serious injuries on national roads,
- identify and quantify road safety problems,
- develop and evaluate the effectiveness of road safety measure, and
- facilitate the exchange of experience between regions or countries.

Since a road safety observatory strongly depends on safety and traffic data, a prerequisite is thus to design and implement of a reliable **road crash data management system**, which is the strategic objective of this consultancy.

[1] Afghanistan, Azerbaijan, the People's Republic of China, Georgia, Kazakhstan, the Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan. https://www.carecprogram.org/. ADB placed its regular assistance to Afghanistan on hold effective 15 August 2021.

[2] World Bank, Fédération Internationale de l'Automobile (FIA), International Transport Forum (ITF), United Nations (UN), Economic and Social Commission for Asia and the Pacific (ESCAP), WHO, Global Road Safety Facility (GRSF).

To assess road crash data management practices, and to recommend improvements in view of **country-wide systems for road crash data management**, strategic guidelines issued by World Health Organization (WHO), by World Bank[3] and by European Commission (EC), such as the Community database on road accidents (CARE),[4] have been considered.

Accordingly, within this report, recommendations for the improvement of the current road crash data collection process are provided, and main data sources and collection procedures are assessed and considered to define a specific and tailored **road crash data management framework for Kazakhstan**.

[3] Martensen H., G. Duchamp, V. Feypell, V. I. Raffo, F. A. Burlacu, B. Turner, and M. Paala. 2021. *Guidelines for Conducting Road Safety Data Reviews.* World Bank.

[4] CARE database.

2 Reference Standards

The importance of road safety data and information and of **data-driven approaches to road safety** improvement is widely recognized at international level.

According to the European Transport Safety Commission (ETSC, 2001), the main emphasis of a road safety information system has shifted from a single focus on road crash data recording to the collection of data and information required to support different levels of the road safety management system, as visualized in the pyramid in Figure 1.

Figure 1: Essential Elements of a Road Safety Information System

Source: Wegman 2001.

According to World Bank Guidelines for Conducting Road Safety Data Reviews (footnote 3),

> *Road safety data are not just about crash data (or outcome data – the observed crashes and injuries), but also about the safety performance of the road traffic system, and about interventions to improve road safety. These data are best used when combined with other information, such as traffic volumes and distances travelled, or split between different transport modalities. For an evidence-based approach to the management of road safety, these data can be used by policy makers, traffic engineers, police, the health sector, the research community, insurance companies, prosecutors, vehicle manufacturers, and others.*

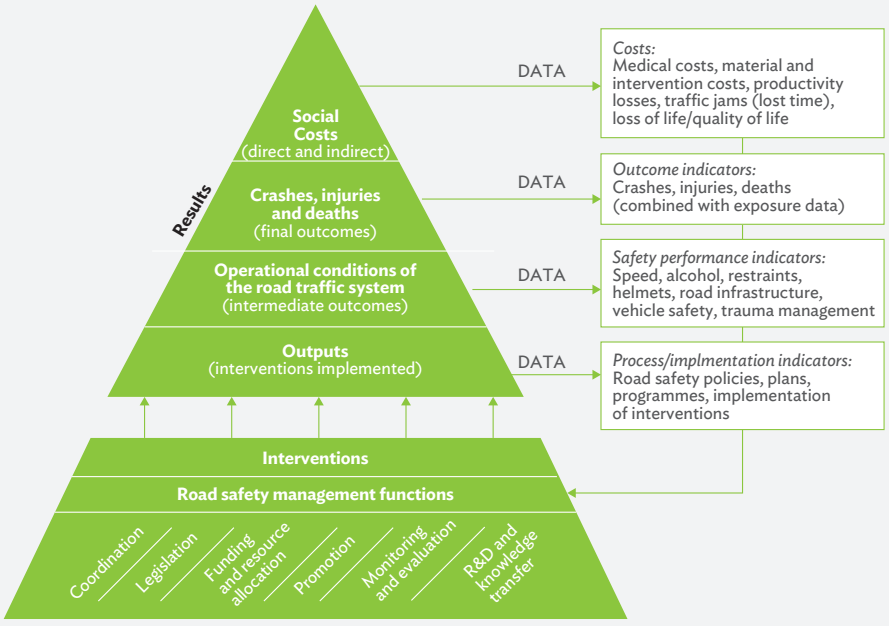
The rationale is that data at all levels of the pyramid is necessary to describe and understand the process leading to crashes. This knowledge then serves as the basis for evidence-based road safety management. The road safety information framework according to this philosophy is visualized in Figure 2.

The pyramid has four levels. In the bottom level, road safety interventions can be found (policy, programs, and initiatives). If implemented effectively, and at scale, improved government road safety policy delivery should result in certain changes in road traffic (the next level). For example: a lower percentage of drivers and passengers traveling without wearing a helmet or seatbelt, a higher proportion of vehicles obeying speed limits, a shorter time interval that medically qualified personnel need to reach a crash location, etc. These are known as **safety performance indicators.** These are parameters that have a causal relationship with crashes and casualties/victims. They are not used instead of crash and injury data, but in addition to them. The purpose is to be able to assess the effectiveness (and risk-reduction effectiveness) of specific programs and to understand better the impact of policy interventions.

The next level contains the features of crashes and victims; possibly related to exposure quantities to calculate road safety risks. These contain the (national) crash registration data, that, nearly everywhere in the world, is based on the police crash data. This data is then processed into national road crash statistics.

The top level of the pyramid contains data that express the social cost of crashes. This concerns the damage that society judges to be negative (hospitalization cost, loss of earnings etc.), and to be prevented.

Figure 2: Outcomes of Road Safety Management



Source: WHO. 2010.

When data at all four levels are available and actively used, the process leading to crashes can be described, analyzed, and understood. This knowledge can then serve as a basis for a rational road safety management system to lower the social costs.

A road crash data collection system is usually characterized by three main elements: (i) a data collection process (i.e., a set of operations or phases carried out for the purpose of data collection); (ii) the data collection techniques and tools; and (iii) the actors who carry out the operations foreseen within the process.

The ultimate purpose of road crash data should be to support the process of improving road safety. As such, a safety-oriented data collection system should:

- make the data accessible to road safety managers, in particular road management bodies and territorial administrative bodies,
- provide relevant information, in particular to:
  - locate road crashes on the road network,
  - understanding crash patterns and contributory factors,
  - understand the outcomes of crashes,
- provide complete and reliable information in a timely manner, and
- allow linkage between different data sources (e.g., police, health services, insurance, etc.).

A road crash data management framework should be organized according to some basic topics to which some standards are connected to ensure reliability and completeness of information:

- Road crash data collection.
- Storage, processing, and use of road crash data.
- Other road safety data.

Road crash data collection is the basic function to be ensured since it provides information about the final outcomes' indicators (crashes, injuries, deaths). The collection of crash data concerns mainly the police bodies attending the scenes of crashes with victims. However, other actors can provide important complementary data. Health services (mainly hospitals) can provide data used for statistics on road traffic casualties and victims follow up. Insurance companies can complement police data with information about history of vehicles and drivers, as well as road crashes without victims.

A reliable road crash data collection can be ensured when:

- A common nationwide notification system is in place, ensuring that police bodies and emergency services are rapidly informed about the crash. The use of a central emergency number is usually a good practice.
- Police bodies and emergency services have sufficient resources to attend all scenes of road crash with victims.
- A unique and comprehensive road crash registration system is in place, allowing for collection of at least a minimum set of crash attributes and variables, preferably by using IT devices rather than paper-based forms.
- Procedures for almost immediately storing the road crash data into a jurisdiction-wide (e.g., provincial, national) database exist and allow for an easy retrieval of data. This feature should be made via a centralized information system (e.g., road crash data management system).
- The persons in charge of road crash data collection and storage are adequately trained about the importance of road crash data and about the practices to be followed.

All these aspects can greatly influence the amount and quality of data collected and can lead to important underreporting of data.

When it comes to the specific road crash attributes and variables to be collected, it is important to ensure that data are complete, of good quality, and collected uniformly throughout the country.

World Bank Guidelines for Conducting Road Safety Data Reviews recommend to:

- Attend at least every crash scene resulting in serious or fatal injuries.
- When possible, record causation and aggravation factors such as speeding, driving under the influence, seatbelt use, and other violations.
- Report the severity of the victims' injuries since the initial data collection at the scene and update the initial assessment based on medical records.
- Ensure the road crash fatality count includes the victims who die in hospital.
- Record a minimum set of information on eventual road crashes not investigated by police (e.g., those without victims).

The **minimum set of crash attributes and variables** should include information about the location, the road infrastructure, road users, and vehicles involved as well as variables characterizing the maneuvers and the consequences of the crash. For instance, the World Bank Guidelines for Conducting Road Safety Data Reviews refer to a set of 28 road crash attributes derived from the Common Accident Data Set (CADaS) of the EC (Table 1).

Table 1: Minimum Set of Crash Attributes

Crash	Traffic unit	Person
Crash ID		Person ID
Date	Traffic unit type (e.g., pedestrian, cyclist, passenger car)	Date of birth
Time	Special function vehicle	Gender
Weather conditions	Registration year	Road user type (pedestrian, driver, passenger)
Lighting conditions (daylight, dark, with/without lighting, dusk/dawn)	Country of registration (e.g., foreign, national)	Injury severity (slight, more than 24 hours in hospital, fatal)
Crash type (e.g., with pedestrian, single, two vehicles turning, two vehicles no turning)	Vehicle maneuver (e.g., turning, overtaking, etc.)	Alcohol test (not tested, not applicable, positive, negative, unknown)
Location: X coordinate (latitude) and Y coordinate (longitude)		Drug use
Road type (e.g., motorway, expressway, national road, local road)		Safety equipment
Section type (e.g., bridge, tunnel, bend, gradient, straight)		Nationality (national, foreigner – possibly by relevant country grouping)
Junction type (not at junction, crossroad, roundabout)		MAIS injury severity
Speed limit		
Surface conditions (dry, snow/ice, wet, slippery)		
Crash severity		

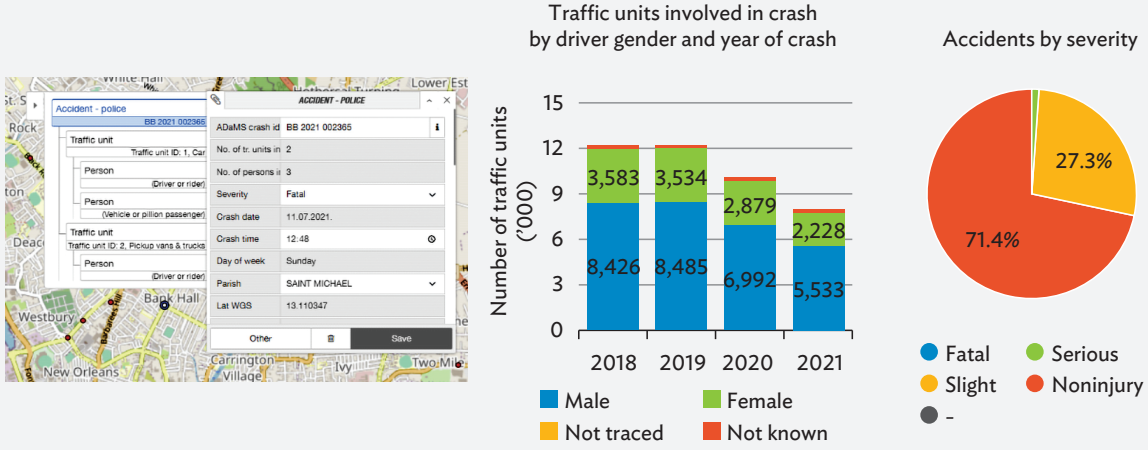
Source: World Bank Guidelines for conducting road safety data reviews.

The international standards give specific attention to the **crash location** due to its importance for identifying road safety interventions. Knowing the location of road crashes on geographic information system (GIS) allows for identification of high-risk sites and road sections and, consequently, for selection of road safety interventions.

Storage, processing, and use of road crash data into a national database is also highly important to ensure that a reliable process is established a national level, involving all the stakeholders having a role on road safety. The following aspects should be considered to ensure that data are properly stored and can be used for road safety analysis:

- The data should be recorded in a **common system** (directly from the crash scene or from office by transferring paper-based forms into the database).
- The data should be regularly transferred to a central data repository where all crash data are consolidated (**national road crash database**).
- The national database and the common system should be **accessible** both by actors charged of data collection (e.g., police, health services) and by actors charged of selecting road safety interventions or developing road safety policies. This is highly important for **data-driven** decision-making.
- The database should feed into **analysis tools**. The data per se are useless if they cannot be analyzed and used to inform decision-makers. A **road crash data management system** should be in place allowing for a number of analyses: querying of data (by combining different crash variables), mapping the data, assessing the single crash data, obtaining graphics and reports, etc. (Figure 3).

Figure 3: Screenshot of ADaMS - Accident Data Management System



Source: FRED Engineering.

Other road safety data should be included in the process and, when possible, embedded in a road crash data management system. Main additional data (possibly to be added into a road crash data management system) refer to:

- Risk exposure data, usually measured in terms of number of crashes or victims by population, number of vehicles, road length, distance traveled, etc. The specific measurements of risk exposure depend on the availability of specific mobility data in the country (for instance, data on traffic volumes may not

always be available). In some cases, using surrogate measures to compensate missing information is also possible.

- Safety Performance Indicators (SPIs) causally linked to road safety. SPIs can be linked to conditions of road infrastructure, vehicle used, road user behavior, post-crash care. The selection of SPIs to be considered (and when possible, added to a road crash data management system) depends on country road safety policies and on the main risks of crashes. Some examples are:
  - Road infrastructure: level of risk related to road attributes (e.g., iRAP star rating[5]).
  - Road users: percentage of vehicles' occupants wearing a seatbelt, percentage of motorcycles' riders wearing a helmet, percentage of drivers using mobile phone while driving, etc.
  - Vehicles: percentage of vehicles equipped with active safety features (e.g., ABS, ESC, etc.).

It is to note that other road safety data can be difficult to collect on a regular basis. When available in a country they can lack a full national coverage or in some cases being outdated. These data should thus be treated carefully and coherently with the road crash data available to avoid misleading interpretations of road crash contributory factors. That said, these data can be valuable for deeper road safety considerations, especially for planning purposes.

Table 2 synthesizes the reference standards described above, that will be considered when assessing the existing road crash data framework of Kazakhstan.

Table 2: Synthesis of Reference Standards for a Road Crash Data Framework

Topic	#	Reference Standard
Road crash data collection	A.1	Common / unique crash notification system
	A.2	Road crash and injury definitions compliant with international standards.
	A.3	All road crash scenes with victims attended by police and emergency services
	A.4	Unique and comprehensive road crash registration system
	A.5	Collected road crash attributes and variables allows for data analysis
	A.6	System allowing for precise location of road crashes on map
Storage, processing and use of road crash data	B.1	Data registered by all actors in a common information system
	B.2	Data regularly transferred to a national road crash database
	B.3	Data accessible by all actors involved in data collection and analysis
	B.4	Road crash data management system available including analysis tools
Other road safety data	C.1	Risk exposure data included in data collection and storage (minimum data: population, traffic volumes)
	C.2	SPIs included in data collection and storage (minimum data: road risk assessment, use of mobile phone while driving, use of seatbelts, use of helmets, driving over speed limit)
Data analysis	D.1	Comprehensive analysis of road crash data and other road safety data oriented to planning and decision-making

Source: FRED Engineering

[5] The International Road Assessment Programme (iRAP) is a registered charity dedicated to saving lives by eliminating high risk roads throughout the world. iRAP Star Ratings are used for road safety inspections and road safety impact assessments. They provide a measure of the risk to which vehicle occupants, motorcyclists, cyclists and pedestrians are exposed. Risk is rated on a scale of 1 to 5; 1-Star roads have the highest risk and 5-Star roads the lowest risk.

3 Background

The Republic of Kazakhstan is in Central Asia and, to a lesser extent, in Eastern Europe (Figure 4). It borders with Russia, the People's Republic of China, Kyrgyz Republic, Uzbekistan, Turkmenistan, and the Caspian Sea. Its capital is Astana, while the largest city as well as the main cultural and commercial hub is Almaty.

Kazakhstan holds 60% of the Central Asia gross domestic product (GDP), mainly due to its oil and gas industry and mineral resources. It also holds the highest Human Development Index ranking in the region.

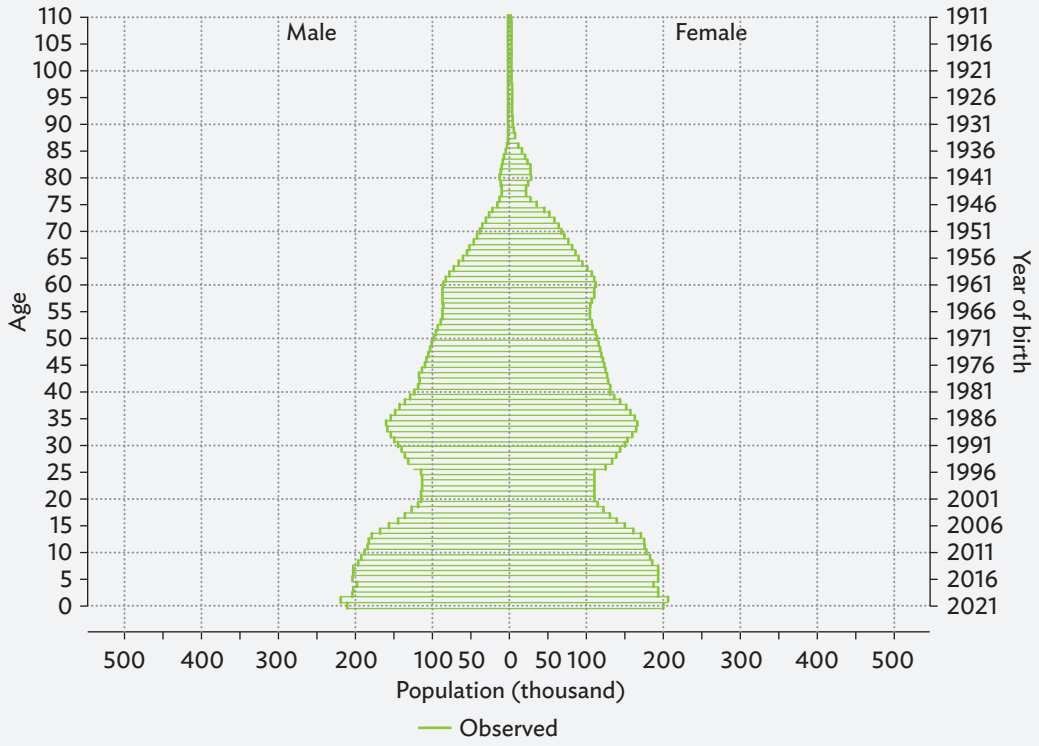
Figure 4: Map of Kazakhstan

Source: Asian Development Bank.

Population

According to the Kazakhstan Statistics Agency, the country's population as of 1 January was about 20 million inhabitants. The population has an estimated growth rate of 6.1%. Men make up 48.3% and women 51.7% of the population. Figure 5 shows the distribution of the population by gender and age.

Figure 5: Population by Age and Gender in Kazakhstan (2022)



Source: Kazakhstan Statistics Agency.

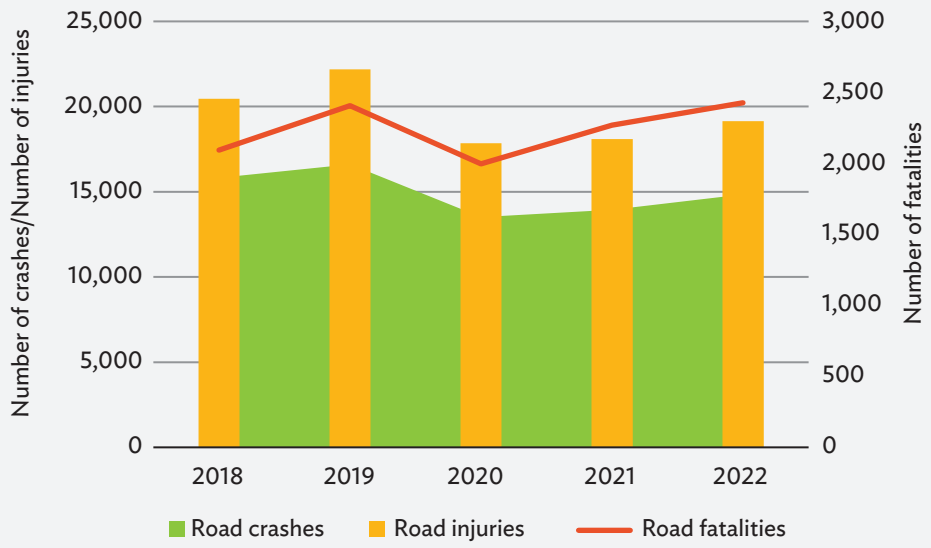
Roads

According to the *Road Safety Report Card for the CAREC Region*, in Kazakhstan, the total network length is 148,000 kilometers (km), of which 93,600 km are public roads classified as national or local. Most of the road network is in poor condition; about 40% of national roads require rehabilitation and maintenance. The feeder road network serving the rural population is not fully developed. Roads on the six main international corridors are mostly paved with asphalt, but their technical design is below international standards.

Road Crashes

Between 2018 and 2022, the number of recorded road crashes and of their victims did not change significantly, except for a reduction in 2020 likely to be due to travel restrictions during the coronavirus disease (COVID-19) pandemic (Figure 6). Each year, in the period from 2018 to 2022, an average of 14,945 road crashes, 2,237 fatalities and 19,539 injuries have been recorded in Kazakhstan (Table 3).

Figure 6: Trends in the Number of Crashes, Injuries, and Fatalities in Kazakhstan (2018–2022)



Source: Kazakhstan Statistics Agency.

Table 3: Number of Road Crashes, Injuries, and Fatalities (2018–2022)

Year	No. of crashes	No. of fatalities	No. of injuries
2018	15,821	2,092	20,445
2019	16,614	2,405	22,180
2020	13,515	1,997	17,844
2021	13,940	2,268	18,092
2022	14,834	2,425	19,135
Average	**14,945**	**2,237**	**19,539**
Total	**74,724**	**11,187**	**97,696**

Source: Kazakhstan Statistics Agency.

Table 4 shows the rate of change in the number of crashes over the reporting period. During the period from 2018 to 2022, a decrease of about 6% in the number of road crashes and of injuries has been recorded. However, the number of recorded fatalities has increased by about 16%. The risk of being fatally injured has thus increased from 2018 to 2022 which highlights the need to look more deeply into road safety issues so that appropriate interventions can be planned.

Table 4: Trend in the Number of Crashes (2018–2022)

From 2018 up to 2022
No. of crashes decreased by **6.2%**.
No. of fatalities increased by **15.9%**.
No. of injuries decreased by **6.4%**.

Source: Elaboration on Kazakhstan Statistics Agency.

Legislative Framework

The main laws relating to road safety and road traffic in general, approved by Presidential Decrees, are as follows:

- The Law of the Republic of Kazakhstan No. 273-IV dated 31 December 2009 "On Ratification of the United Nations Convention on Road Traffic."
- The Law of the Republic of Kazakhstan No. 236-IV dated 31 December 2009 "On Ratification of the United Nations Convention on Road Signs and Signals."
- The Law of the Republic of Kazakhstan dated 30 June 2010 "On Ratification of the Agreement on the adoption of uniform technical requirements for wheeled vehicles, equipment and parts that may be fitted and used on wheeled vehicles and on the conditions for mutual acceptance of approvals issued on the basis of these requirements."
- The Law of the Republic of Kazakhstan dated 30 June 2010 "On Ratification of the Agreement on the adoption of uniform conditions for periodic technical inspections of wheeled vehicles and on mutual acceptance of such inspections."
- The Law of the Republic of Kazakhstan dated 10 January 2011 "On Ratification of the European Convention on Road Traffic."
- The Law of the Republic of Kazakhstan dated 11 January 2011 "On Ratification of the Agreement establishing global technical regulations for wheeled vehicles, equipment and parts that can be fitted and/or used on wheeled vehicles."
- The Law of the Republic of Kazakhstan dated 28 February 2011 "On Ratification of the Protocol on Road Markings to the European Agreement supplementing the Convention on Road Signs and Signals."
- The Law of the Republic of Kazakhstan "On Ratification of the European Agreement supplementing the Convention on Road Signs and Signals."
- The Law of the Republic of Kazakhstan dated 17 April 2014, No. 195-V ZRK "On road traffic."
- The Law of the Republic of Kazakhstan dated 17 April 2014, No. 194-V ZRK "On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on Road Traffic."

4 Assessment of the Existing Road Crash Data Management Framework

In Kazakhstan Republic, various stakeholders have a role on road crash data collection and management. The Ministry of Internal Affairs (MOIA) is the leading agency in Kazakhstan; its main functions include coordination, legislation, monitoring, and evaluation of road safety strategies. The MOIA manages road crash data collection procedures through the traffic police.

The actors involved in the road crash data management process in Kazakhstan are shown in Figure 7.

Figure 7: Agencies Involved in Road Crash Data Management Process in Kazakhstan

Source: FRED Engineering. Consultations conducted with local stakeholders.

Consultations have been conducted with some agencies to deepen about the current procedures for collecting, managing, and analyzing road crash data in Kazakhstan.

Table 5 lists the stakeholders engaged in the consultations and the focus of the meetings.

Table 5: Stakeholders Consulted

Stakeholder Agency	Meeting Focus
Road Safety Division of Committee for Administrative Police (subordinate to the MoIA)	Definitions of road traffic crashes
	Emergency numbers for crash reporting
	Procedures followed by the police units to intervene at crash scenes
	Forms used by the police units to collect crash data
	Use of database for the collection and storage of crash data
	Coordination between the police and Medical Facilities to update the crash database
	Crash analyses performed by the police
	Cooperation between the police and the MOT to perform road safety activities
	Organization of the department
	Recommendations for improving current data collection procedures
Committee of Roads (subordinate to the MOT)	Organization of the Committee
	Procedures for collecting crash data
	Cooperation between the Committee of Roads and other stakeholders (traffic police, MOIA, etc.)
	Access and use of information about road crashes
	Collection of other road safety data
	Knowledge and use of Safety Performance Indicators
	Development of road safety inspections and road safety audits
	Recommendations for improving current data collection procedures
Research Institute for Traumatology (subordinate to the MOH)	Organization of the Institute
	Procedures for attending a crash scene
	Emergency numbers for crash reporting
	Road crash data collection
	Definitions of road crashes
	Use of injury classifications systems
	Cooperation between the MOH and the MOIA
	Analyses performed on road crash injuries
	Recommendations for improving current data collection procedures
National Company KazAutoZhol (Kazakhstan National Highway Authority)	Emergency numbers for crash reporting
	Procedures for collecting crash data
	Use and transfer of crash data collection forms
	Cooperation between KazAutoZhol and the police
	Cooperation between KazAutoZhol and other stakeholders such as Medical Facilities
	Use of GPS coordinates and mapping tools
	Road crash analyses performed
	Road safety data collection
	Recommendations for improving current data collection procedures

GPS = global positioning system, MOH = Ministry of Health, MOIA = Ministry of Internal Affairs, MOT = Ministry of Transport.

Source: FRED Engineering. Consultations conducted with local stakeholders.

An overview of current procedures adopted in Kazakhstan for road crash data collection and management is described below by considering the reference standards described in Chapter 2.

4.1 Road Crash Data Collection

A.1 – Is a common/unique crash notification system in place?

Currently, there is no unique notification system in place in Kazakhstan. In case of a road crash, victims or witnesses can call the following numbers:

- 112: nationwide unified emergency number that can also be used for reporting road crashes.
- 102: emergency number used to contact the police.
- 103: emergency number used to contact the ambulance.

The absence of a common notification system is a possible source of underreporting since some crashes may not be reported to the traffic police. In general, a single notification system reduces the reporting time and thus the likelihood of serious injuries becoming disabling or fatal. Early intervention at the crash scene is also beneficial for the collection of road crash data as the scene is likely to be less affected by external factors that could pollute it.

Currently, there is no call center or unified control room for reporting and recording all road crashes.

Box 1: Emergency Number – Best Practice Example

Several countries use a unique emergency number to manage all emergency calls flow, which are then transferred to the body in charge of managing the specific emergency (e.g. police, fire brigade, health emergency).

In Saudi Arabia, for instance, the police are notified about the occurrence of a road crash through a call to a unique emergency number: 911. Moreover, the Government of Saudi Arabia has set a specific performance indicator concerning the dispatch time of an emergency from notification to 911.

Source: World Health Organization (WHO).

A.2 – Are road crash and injury definitions compliant with international standards?

Each country must have a clear definition of a road traffic crash based on the location of the crash, the types of road users involved, the nature of injuries sustained by the victims and the damage to vehicles and property.

Similarly, it is necessary to define the severity of road traffic injuries. Ideally, definitions should be based on injury scaling techniques, such as Abbreviated Injury Scale (AIS). When injury scaling techniques are not used, the following definitions may be considered:

- Fatal injury – death occurred within 30 days of the crash.
- Serious injury – injury requiring hospitalization of the victim for more than 24 hours.
- Minor injury – injury involving discharge of the victim from hospital within 24 hours.
- No injury – no visible injuries sustained by the victims.

According to the Law of Republic of Kazakhstan of April 17, 2014, No. 194-V, a road crash is defined as:

> *An event that occurs along the road and implies death, damage to human health, vehicles, or buildings, as well as other material damage.*

According to consultations with the MOIA and the Research Institute for Traumatology:

> *Any crash that results in the death of the victim within 30 days is considered a fatal crash.*

Based on these statements, there are some gaps in the definition of road crashes:

- The definition of a crash fatality is not reflected in any existing legislation.
- There is no definition of a crash injury; therefore, there is no criterion for distinguishing between serious and minor injuries.

A.3 – Are all road crash scenes with victims attended by police and emergency services?

When a road crash occurs, a traffic police patrol is always dispatched to the crash scene. The police officer in charge of data collection draws a diagram of the crash scene, interviews the persons involved and check whether drugs or alcohol have been consumed by the drivers. The investigation may also involve the use of fixed cameras, when available.

An ambulance is also required to rush to the crash scene to provide first aid and transport the victim(s) to the hospital. According to consultation with the Research Institute for Traumatology, the average time for an ambulance to arrive at the crash scene is 8 minutes in urban areas and 12 minutes in rural areas; the average time to transport a patient to a medical facility is half an hour.

According to the Law of the Republic of Kazakhstan dated April 17, 2014, No. 194-V, medical assistance to victims of road traffic crashes must include the provision of:

- Emergency medical care at the crash scene, on the way to a medical facility and within the medical facility.
- Specialized medical care for victims of a road crash in outpatient, hospital-replacing and inpatient conditions in Medical Facilities.

A.4 – Is there a unique and comprehensive road crash registration system?

When a road crash occurs, a traffic police officer fills in a paper-based form (Annex 1). This form includes a section with a scheme of the crash scene, which allow for the crash dynamics to be accurately reconstructed.

However, it is unclear if standard crash configurations are currently adopted.

The collected data are transferred to a database hosted by MOIA and accessed by police, insurance companies and the court (which uses it for prosecution purposes).

It is unclear if MOIA has an online access to driver and vehicle registries to complement the data collected on road traffic crashes.

Box 2: Crash Data Management - Best Practice Example

In France, the national database of road crashes is managed by the Interministerial Observatory for Road Safety (ONISR).

The data are collected by the various police forces operating in the different areas (urban, suburban, motorway). The information collected is based on the common Bulletin d'Analyse des Accidents Corporels (BAAC) form. The BAAC form is filled in digitally.

ONISR is responsible for validating the data, checking their consistency, and for publishing and disseminating the road crash information.

Source: International Transport Forum (ITF).

Work is currently being carried out in Kazakhstan to equip the traffic police with IT devices to record more details of the crashes, such as GPS coordinates.

Medical Facilities record information on the condition of hospitalized persons in their own database. The traffic police do not have direct access to this database and are informed about the status of the patients in writing or by telephone.

According to the Order of the General Prosecutor from 24/08/2023, the paper-based form used by the traffic police in Kazakhstan distinguishes the following 15 categories of road crashes:

1. Frontal collision.
2. Side collision.
3. Hit-and-run collision.
4. Passenger fall.
5. Rollover.
6. Collision with a standing vehicle.
7. Collision with an obstacle.
8. Collision with a pedestrian.
9. Collision with a cyclist.
10. Collision with a walking vehicle.
11. Collision with an animal.
12. Collision with a moped driver.
13. Collision with an electric scooter.
14. Collision with small electric vehicles.
15. Other types of crashes.

Although this list may seem rather exhaustive, the categories listed do not refer to any legislative framework, which could lead to underreporting of crash data during the data collection phase.

Table 6 shows the road crash variables collected at crash scenes in Kazakhstan and compares them with the European Union standards (common fields are highlighted). In particular, the Common Crash Data Set (CADaS) is used for comparison (both full and simplified CADaS variables are listed).

Table 6: Road Crash Variables Collected in Kazakhstan Compared to CADaS

Variable	CADaS	MINI-CADaS	Republic of Kazakhstan
CRASH			
Crash ID	✓	✓	✓
Crash date	✓	✓	✓
Crash time	✓	✓	✓
Nomenclature of Territorial Units for Statistics (NUTS)	✓	✓	
Local Administrative Units (LAU)	✓		
Weather conditions	✓	✓	✓
Light conditions	✓	✓	✓
Traffic crash type / category	✓	✓	✓
Cause	✓	✓	✓
ROAD			
Latitude	✓	✓	
Longitude	✓	✓	
Road name	✓	✓	✓
Road kilometer	✓		✓
Functional class – 1st road	✓	✓	✓
Functional class – 2nd road	✓	✓	
AADT – 1st road	✓		
AADT – 2nd road	✓		
Speed limit – 1st road	✓	✓	✓
Speed limit – 2nd road	✓	✓	
Motorway	✓	✓	
Urban area	✓	✓	
Junction	✓	✓	✓
Rel.to junction / interchange	✓		
Junction in control	✓		
Surface conditions	✓	✓	✓
Obstacles	✓	✓	✓
Carriageway type	✓	✓	
Number of lanes	✓	✓	✓
Emergency lane	✓		
Markings	✓		✓
Tunnel	✓		
Bridge	✓		✓
Work zone related	✓	✓	
Road curve	✓		
Road segment grade	✓		

continued on next page

Table 6 *continued*

Variable	CADaS	MINI-CADaS	Republic of Kazakhstan
TRAFFIC UNIT			
Traffic unit ID	✓	✓	
Traffic unit type	✓	✓	
Vehicle special function	✓		
Trailer	✓	✓	
Engine power	✓		
Active safety equipment	✓		
Vehicle drive	✓		
Make	✓		
Model	✓		✓
Registration year	✓	✓	✓
Traffic unit maneuver	✓	✓	
First point of impact	✓		
First object hit in	✓		
First object hit off	✓		
Insurance	✓		
Hit & Run	✓	✓	
Registration country	✓	✓	
PERSON			
Person ID	✓	✓	✓
Year of birth	✓	✓	✓
Gender	✓	✓	✓
Nationality	✓	✓	✓
Injury severity as reported	✓	✓	✓
Road user type	✓	✓	✓
Alcotest	✓		
Alcotest sample type	✓	✓	
Alcotest result	✓	✓	
Drug test	✓		
Driving license issue date	✓	✓	✓
Driving license validity	✓		
Safety equipment	✓	✓	✓
Seating position in/on vehicle	✓	✓	✓
Distracted by device	✓		
Psychophysical/physical impairment or condition	✓		✓
Trip/Journey purpose	✓		
Injury MAIS Scale	✓		

CADaS = Common Crash Data Set, MAIS = Maximum Abbreviated Injury Scale.

Source: Mobility and Transport Department, European Commission.

Injury information can be gathered by the police directly at the crash scene or from the medical facilities where the victims have been admitted. Medical personnel records the patient's data in a medical register, with double coding according to the ICD-10[6] protocol. In this regard, mandatory training courses for medical personnel are planned; these courses concern advanced cardiac surgery and pre-hospital trauma support.

Discussions are ongoing to combine police and hospital data, which are processed separately. Currently, communication between the two agencies can take place in different ways (in writing, by telephone, etc.). Police officers do not station in hospitals to observe victims' progress. Hospitals are obliged by law to keep police updated about the condition of crash victims. The follow-up of patients transported to a hospital is carried out by the police for up to 30 days and involves updating the crash database of the MOIA.

A.5 – Does the collected road crash attributes and variables allow for data analysis?

In Kazakhstan, several stakeholders are involved in road crash analyses:

- The traffic police is responsible for producing statistical analyses about road crashes and victims, which are generally carried out on a daily or monthly basis. Based on these analyses, each police division identifies interventions to be implemented, such as installing cameras or carrying out road traffic controls.
- The MOH focuses on analyzing certain road crash dynamics such as the number of fatal and disabling crashes, the location of crashes and the concentration of crashes in high-risk sites.
- The MOT performs quarterly reports not only on road crashes, but also on the number of vehicles and traffic volumes; this information is collected through surveys, although the aim for the future is to switch to the use of cameras. Based on the analyses performed, action plans are prepared to deal with the problems found during the surveys.
- KazAutoZhol carries out analyses on sites with a high concentration of crashes; based on these analyses, interventions are taken to prevent road crashes.

Analyses on road crashes are incomplete and unreliable because the current crash data collection procedures do not allow for enough variables to be collected and there is no single database for recording and using crash data.

A.6 – Does the system allow for precise location of road crashes on map?

The current crash data management procedures do not allow for crashes to be identified on a map using GPS coordinates, which makes difficult to plan actions to ensure safety improvements at high-risk sites.

Nowadays, the use of mobile devices (e.g., smartphones, tablets) makes it easy to indicate the location of a crash directly on a map. Using geographical coordinates to report a crash is not only easy, but also recommended by international good practices.

[6] International Statistical Classification of Diseases and Related Health Problems: 10th Revision.

4.2 Storage, Processing, and Use of Road Crash Data

B.1 – Are the data by all actors registered in a common information system?

Currently, there is no single system for storing crash data collected by the various actors involved in road safety.

Crash data collected by the traffic police are stored in a database maintained by the MOIA and are shared with insurance companies and with the court. These data can also be consulted by the MOT to support the police in carrying out road safety activities.

Medical facilities have their own registry where information about road crashes with injuries or fatalities are recorded. It is mandatory for the traffic police to make a follow-up of the victims carried to the hospital after a crash. Medical facilities keep the police informed of the status of victims in writing or by telephone. Since there is no system for sharing data between the two agencies, there is a risk of underreporting of data on crash victims, which could then lead to incorrect analyses.

B.2 – Are data regularly transferred to a national road crash database?

Crash data collected by the traffic police are regularly transferred to the database held by the MOIA; however, this system cannot be considered a national **road crash database**.

In fact, medical facilities, which together with the traffic police are the main source of crash data, use a separate database, where they record trends in the number of deaths and injuries caused by road crashes.

Box 3: Crash Data Flow – Best Practice Example

In Germany, the road crash national database management body is the Federal Statistics Office (STBA). The data source is constituted by the data collected by police.

STBA is also responsible for verifying the data quality, consolidating the data and for publishing and disseminating road crash information.

The police officers survey road crashes and fill in a standard form at the Regional Statistical Office (Lander). In turn, the regional statistical offices are responsible for sending the data to the Federal Statistical Office.

Source: European Road Safety Observatory.

Moreover, the mentioned databases only allow for the collection of crash data and no other road safety data, such as SPIs or other risk exposure data. This shortcoming does not allow effective road safety strategies to be planned on Kazakhstan's infrastructure network.

B.3 – Are data accessible by all actors involved in data collection and analysis?

The database maintained by the MOIA is used by the police department to carry out statistical analyses, on a monthly basis, on the number of road crashes, injuries, and fatalities. This database is also used by the court for prosecution purposes and by insurance companies.

Databases held by medical facilities allow similar investigations to be carried out concerning persons injured and deaths as a consequence of a road crash. These data cannot be compared with those of the MOIA since the police do not have access to the database of Medical Facilities.

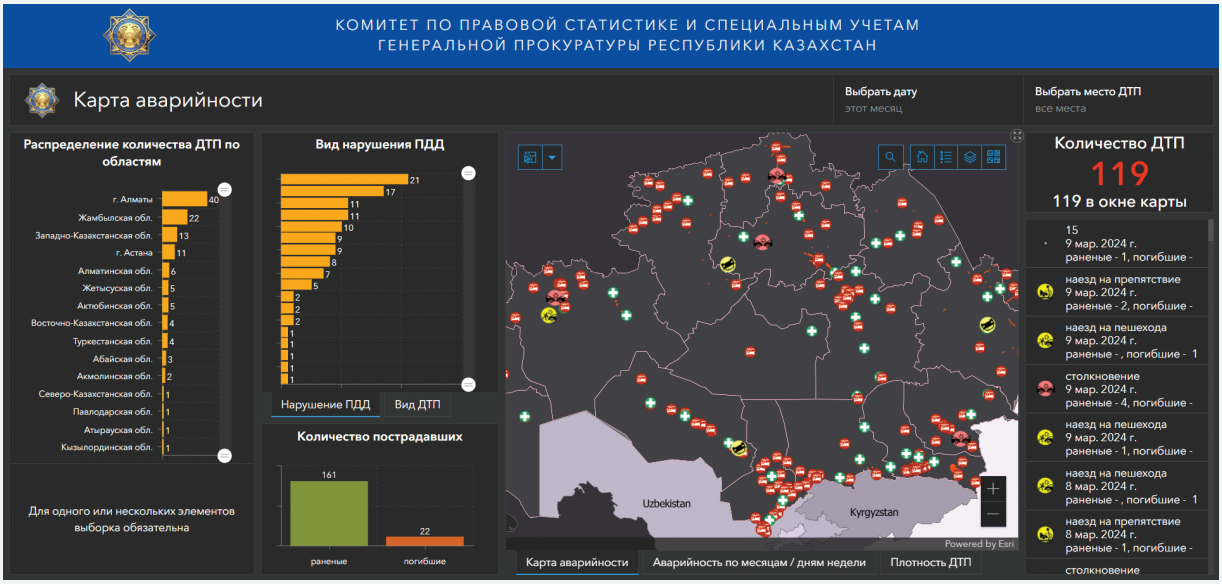
While the police collects data on the entire road network of Kazakhstan, including regional and local roads, KazAutoZhol only collects data on the main highways. These data are synchronized with those collected by the police and allow for statistical analyses of road crashes on this category of roads. Specific analyses are also performed for locations showing a high concentration of road crashes.

Road crash data collected by the traffic police is sent quarterly to the MOT, which uses it to increase road traffic monitoring at high-risk sites. This MOT also conducts surveys to collect data on traffic volumes, which are used to implement road safety strategies.

B.4 – Is a road crash data management system available including analysis tools?

The current framework has limitations since crashes are not identified via GPS coordinates but only by the kilometer of the road where the crash occurred. However, the MOIA maintains an open portal[7] including real-time data and maps where road crashes can be visualized (Figure 8).

Figure 8: MOIA Open Portal on Road Crashes

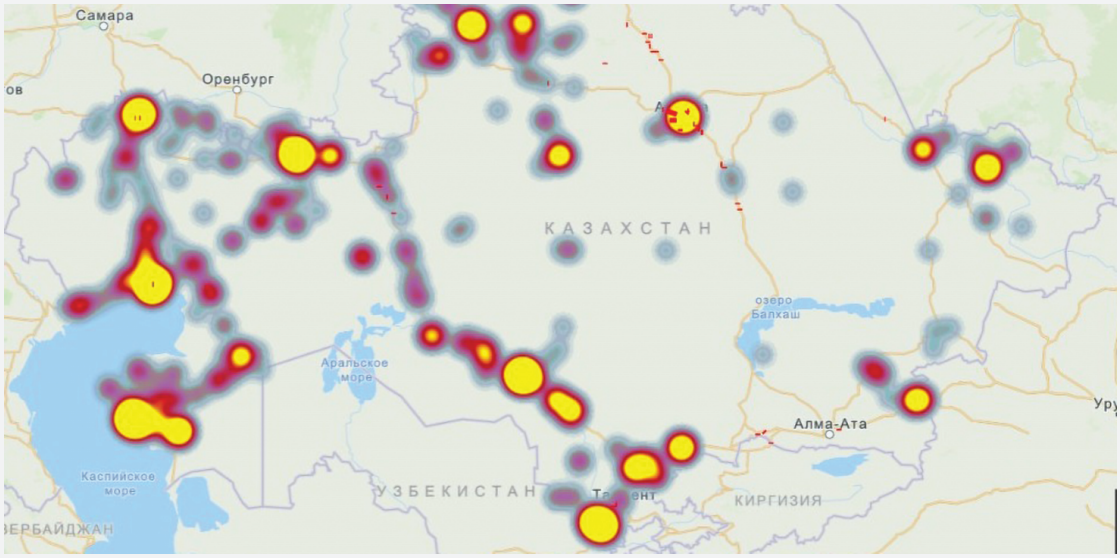


Source: Open Portal of Ministry of Internal Affairs (MoIA).

[7] Ministry of Internal Affairs Open Portal. https://gis.kgp.kz/arcgis/apps/experiencebuilder/experience/?id=c048e1f975084dc1957108c00c9fb4d7&page=%D0%BA%D0%B0%D1%80%D1%82%D0%B0-%D0%B0%D0%B2%D1%80%D0%B8%D0%B9%D0%BD%D0%BE%D1%81%D1%82%D0%B8

Other maps are maintained by the general prosecutor which, based on data received from the traffic police, allow to depict the concentration of road crashes along Kazakhstan's road network. Figure 9 shows the concentration of road crashes in 2023.

Figure 9: Road Crash Concentration Map on Kazakhstan's Road Network (2023)



Source: Kazakhstan's General Prosecutor.

4.3 Other Road Safety Data

C.1 – Are risk exposure data included in data collection and storage?

The traffic police collects data on road crashes, injuries, and fatalities, while the MOT collects data on the number of vehicles and the traffic volumes. In the quarterly reports prepared by the MOT, these two types of data are combined to analyze crash risk exposure. However, these analyses are not exhaustive: no correlation is made, for instance, between the number of crashes and traffic data such as distance traveled annually by vehicles or passengers.

C.2 – Are SPIs included in data collection and storage?

In Kazakhstan, SPIs are not systematically collected and stored in the databases of the various stakeholders, as they are only partially known.

However, it is worth mentioning that in Kazakhstan there is a system developed and created by the police department to monitor (using fixed cameras) compliance with traffic rules such as the use of seat belts, the wearing of helmets by motorcyclists, etc.; based on these checks, fines are imposed. This system, mainly installed on urban roads, could support and facilitate the registration of the SPIs.

4.4 Data Analysis

D.1 – Are data on road crashes and other road safety data systematically analyzed for planning and decision-making?

Based on the analyses described, the traffic police cooperate with the MOT to carry out activities related to road safety. More specifically, road safety inspections are conducted to link crash data with specific road-related problems and thus identify the most appropriate countermeasures. Currently, work is being done in Kazakhstan to implement a road safety audit methodology, so that assessments can be performed on road infrastructure projects and the occurrence of certain types of road crashes can be prevented.

5 Recommendations to Improve Road Crash Data Management

The current framework of crash data management in Kazakhstan has some shortcomings:

- There is no single emergency number, which creates unnecessary delays in case of a road crash and increases the risk of an injury becoming disabling or even fatal.
- As there is no legislative framework clearly defining road crashes, injuries, and fatalities, there is a risk of underreporting.
- There is no possibility to automatically share road crash data between the different stakeholders, which does not allow for accurate crash analyses.
- The crash variables collected on the field by the traffic police are only partially in line with those recognized by international best practices (e.g., CADaS variables).
- The forms used by traffic police officers to collect crash data are in paper-based, which does not allow, among other things, to record the GPS coordinates of the crash.
- SPIs and other risk exposure data are only partially processed and in any case are not recorded in the databases, which does not allow for effective road safety interventions.

A summary of recommendations for improving the road crash data collection process is reported below. Implementing these recommendations can increase the quantity of data collected, the quality of the analyses performed, and thus the effectiveness of the actions implemented to ensure the reduction of crashes and, more generally, the improvement of road safety:

- A **single emergency number** should be provided so that, depending on the severity of the crash, the dispatcher can assess which units must be sent to the crash scene.
- There is a need for a **legislative framework** that provides **clear and unambiguous definitions** of road crashes, injuries, and fatalities, as well as of the types of crashes listed in section A.4 of this report.
- Crash data should be collected by **electronic forms** so that the GPS coordinates of the crash can be recorded; the variables collected through these forms must be in line with **internationally recognized references** such as the **CADaS variables**. The forms should also include procedures to identify crash contributing factors (for instance using a Haddon Matrix as described in Chapter 5.1, section A.5).
- It is necessary to adopt a **single national database** enabling all the stakeholders to automatically share crash data; other **road safety data** (such as the SPIs) should also be recorded in the database.
- The whole process and system should be considered as an initial phase for the development of a **national road safety observatory** and for data source to the **Asia Pacific Road Safety Observatory**.

A description of the recommended process for collecting and managing road crash data is provided in the following chapters by taking into consideration the reference standards described in Chapter 2.

5.1 Road Crash Data Collection

A.1 – Common/unique crash notification system

International best practice provides for a single emergency number. Since the establishment of a single notification system at national level may require time and a broader decision-making approach, not necessarily limited to road safety aspects, it is recommended to set up a mechanism for sharing the notification among the actors involved in data collection (traffic police, medical aid, emergency services, etc.). The mechanism could be facilitated by the adoption of a software solution (possibly integrated into the road crash data management system) through which the notified actor in turn forward the notification to the other actors.

A.2 – Road crash and injury definitions compliant with international standards

The definitions currently used in Kazakhstan for road crashes as well as fatal and non-fatal injuries do not meet international standards.

The definitions currently used in the Kazakhstan for road fatal and non-fatal injuries are not completely in line with the international standards. A revision of the current national standards should be implemented according to the following definitions (Table 7). Since AIS system is currently not in place in Kazakhstan, a gradual approach is recommended to distinguish between serious and minor injuries. Currently, hospitals code patients' disease using the ICD 10 protocol. Consequently, the use of AIS can be feasible. Anyway, the use of MAIS should be started only after the system is fully operational across all the country.

Table 7: Definitions of Road Crash and Injury

Category	Internationally agreed definition
Fatalities	People who die immediately or within 30 days as a result of a road crash.
Serious injuries	People with a Maximum Abbreviated Injury Scale (MAIS) equal or higher than three. If MAIS is not available: people hospitalized for more than 24 hours.
Minor injuries	People with a MAIS lower than three. If MAIS is not available: people given first aid at scene or treated in a medical facility as outpatient or discharged from hospital within 24 hours.

Source: Mobility and Transport Department, European Commission

A.3 – All road crash scenes with victims attended by police and emergency services

The procedure currently used in Kazakhstan for attending crash scenes is quite effective since:

- Whenever a road crash occurs, a traffic police patrol is sent to the scene of the crash.
- An ambulance rushes to all those crashes where is at least one injured person in need of first aid treatment.

- The traffic police are informed if a person, after being involved in a road crash, goes directly to the hospital.

Further reducing the time for first aid treatment could help to reduce the likelihood of an injury becoming disabling or fatal. For this purpose, increasing the number of emergency vehicles and organizing refresher courses for medical personnel about first aid treatment would be beneficial.

A.4 – Unique and comprehensive road crash registration system

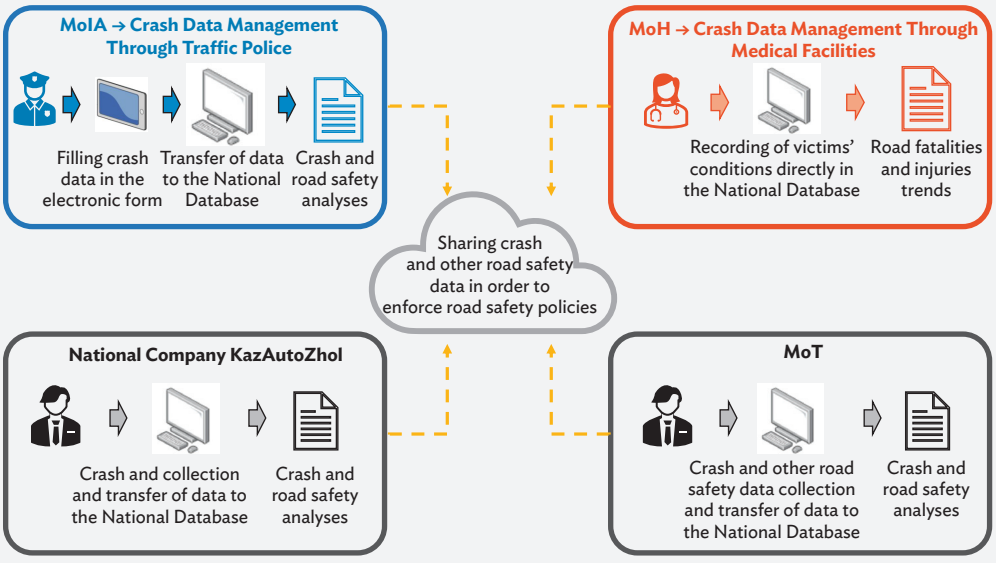
Figure 10 shows the recommended road crash data collection process for Kazakhstan. The illustrated framework proposes to collect crash and other road safety data in a **single national road crash database**, so that there is automatic sharing between the different agencies involved in road safety issues.

This conceptual framework provides for a **web-based system** that allows for the automatic and standardized collection, storage, and analysis of crash data. The exchange of information between different stakeholders should be protected by appropriate computer security mechanisms to ensure confidentiality, integrity, authentication and non-repudiation of hardware, software, and data.

According to the proposed framework:

- The traffic police are informed of the status of victims admitted to the medical facilities automatically, which minimizes, compared to the current situation, the possibility of underreporting of crash data.
- The National Company KazAutoZhol and the MOT also have access to this automated data-sharing system so that correct crash analyses can be carried out and effective road safety strategies implemented.

Figure 10: Recommended Road Crash Data Management Framework



Source: FRED Engineering

For statistical analysis purposes, the database should be updated by the different stakeholders daily.

Medical facilities should be able to track road crash victims up to 30 days after the crash and send the updated information to the national database, so that the severity of persons involved in road crashes can be automatically updated.

A.5 – Collect road crash attributes and variables allowing for data analysis

The limitations of the data collection methodology in Kazakhstan do not allow a full understanding of the factors that determine road crashes.

A comprehensive and reliable road crash data collection process should enable:

- The collection of a sufficient set of crash data elements needed for analysis.
- The use of a single, standardized format for data collection by all entities involved in this task.
- The establishment of reliable and agreed links between stakeholders involved in road safety issues (traffic police, Medical Facilities, etc.).

A. Traffic Police

The recommended dataset for the traffic police is based on the minimum set of standardized data elements of the Common Accident Data Set (CADaS) recommended by EC.

The CADaS data elements are divided into four basic categories:

- Crash - related variables.
- Road - related variables.
- Traffic Unit - related variables.
- Person - related variables.

The recommended data collection form for Kazakhstan should initially comply with a minimum set consistent with both the traffic police data collection form and the CADaS.

Table 8 shows the road crash attributes included in the traffic police data collection form and those recommended to be added.

The recommended form should include some important information that allows not only to perform road crash statistics but also to identify crash contributing factors, thus supporting the selection of reactive and preventive interventions. In addition to the attributes listed in Table 8, the following aspects should be considered:

- Crash configuration, which allows the type of crash to be described in terms of parties involved, type of collision, vehicle / pedestrian maneuver immediately before the crash and hit and run crash.
- Crash diagrams, which allow visualization of the configuration after the crash, including the position of vehicles, description of the road environment, any tracks on the road, etc.
- Description of crash contributing factors using the Haddon Matrix (see below for specific example).

The possibility of major crash reconstruction should also be considered for future developments, after the data collection process is adopted in a standardized manner throughout the country. Crash reconstruction should involve the training of dedicated teams (with possibly different skills) in in-depth investigation techniques.

Table 8: Recommended Dataset for Traffic Police Compared with Current Dataset

Attributes	Notes
Police Department	
Report/Crash ID	
Officer name	
Report date	
Crash-related variables	
Date	
Time	
Region	
City	
Street	
Road name or code	
GPS coordinates	
Crash and impact type	Specific variables to describe a specific crash type, while more than one type can be applicable in the same crash. In such crashes (e.g., collision between two vehicles, one of which finally hits a pedestrian) more than one variable can be selected; each one describing the respective crash type.
Crash severity	
Weather conditions	
Light conditions	
Road-related variables	
Functional class – 1st road	
Functional class – 2nd road (if intersection)	
Carriageway type	
Number of lanes	
Surface conditions and status	
Street lighting	
Road type	
Speed limit – 1st road	
Speed limit – 2nd road (if intersection)	
Type of intersection	
Type of intersection management	

continued on next page

Table 8 *continued*

Attributes	Notes
Work zone related	
Urban area	
Traffic-unit related variables	
Traffic Unit ID	
Vehicle class	
Vehicle brand	
Vehicle model	
Manufacturing year	
Registration year	
Vehicle type	
Vehicle special function	
Vehicle maneuver	
Vehicle runaway	
N° passengers allowed	
N° passengers on board	
Vehicle load allowed	
Overloading	
Person attributes	
Name	
Person ID	
Traffic unit linked to the person	
Date of birth	
Gender	
Nationality	
Road user type	
Seating position in/on vehicle	
Pedestrian maneuver (if pedestrian)	
Driving license data	
Injury severity at the time of crash	
Hospital transfer to	
Time of death	Informed by hospital
Days of stay in hospital	Informed by hospital
Alcohol use	
Drug use	
Safety equipment use	
Communication devices use	

Source: Mobility and Transport Department, European Commission.

To identify the factors contributing to the occurrence of the crashes, it is recommended to use the Haddon Matrix (or similar procedure), which allows the human, vehicle, and infrastructure factors to be divided into three-time phases: pre-crash, crash, and post-crash (Table 9).

Based on the factors contributing to the occurrence of each crash in each phase, solutions to the problem can be determined.

Some solutions may be specific to a particular crash site and can be implemented immediately such as road signs, markings, removal of obstructions to vision, and basic enforcement activities. Other solutions, such as making two-wheelers more stable or safer, require more data for research and development and may take more time, effort, and resources for implementation.

Table 9: Haddon Matrix

PHASES		FACTORS		
		HUMAN	VEHICLE	INFRASTRACTURE
PRE-CRASH	Crash prevention	- Information - Attitudes - Impairment - Police enforcement	- Roadworthiness - Working lights - Good brakes - Handling - Speed control	- Road design and layout - Speed limits - Pedestrian facilities
CRASH	Injury prevention during the crash	- Use of safety systems	- Crash worthiness - Crash protective design - Occupant restraints - Other safety devices	- Crash protective roadside objects
POST-CRASH	Life sustaining	- First aid skill - Access to medics	- Ease of access - Fire risk	- Rescue facilities - Congestion

Source: 1st Highway Safety Manual, American Association of State Highway Transportation Officials (AASHTO).

B. Health Services

The data collection module for Medical Facilities should allow to cross-reference hospital information with that collected by the traffic police at the crash scene to monitor the status of road crash victims. This is useful for identifying the level of injuries sustained by persons involved in road crashes. The proposed module adopts the MAIS3+ standard.

Figure 11 shows the attributes and variables that Medical Facilities are recommended to use when treating injured persons. The form can be completed by extracting data from existing hospital information systems, if available.

Figure 11: Recommended Dataset for Health Services

HEALTH SERVICE DATA FORM			
Hospital name			
P0 - Name		**P2 - Birth date**	
P1 - Person ID		**P3 - Gender**	
P5 - Crash date		1	Male
P6 - Crash time		2	Female
P7 - Admission date		3	Unknown
P8 - Admission time		**P4 - Nationality**	
P9 - Type of injury		**P10 - Injury severity**	
1	Injury to the spine	1	Fatally injured
2	Head injury	2	Seriously injured
3	Leg fracture	3	Slightly injured
4	Multiple fracture	**P11 - First responders**	
5	Minor injury other than previous	1	Red cross
6	Other	2	Civil defense
99	Unknown	3	Police
P12 - Date of exit		4	Doctor
P13 - Time of exit		5	Nurse
		6	Other

Source: Mobility and Transport Department. European Commission.

C. Insurance Companies

Like for health agencies, the data collection form proposed for insurance companies should allow the cross-referencing of information with that collected by traffic police. The objective in this case is to complement the traffic police data with information about vehicles and persons involved in crashes, as well as to collect a minimum set of data for crashes without victims.

Figure 12 shows the recommended attributes and variables for insurance companies. The form can be filled in by extracting data from existing information systems, when available.

A.6 – System allowing for precise location of road crashes on map

The current data collection procedures adopted by the traffic police do not allow road crashes to be located accurately. It is therefore recommended that the geographical coordinates of road crashes be included in the future traffic police data collection module.

To increase the accuracy of road crash localization, it is also recommended to collect data at the crash scene using a specially designed information system. The use of Apps for mobile devices is useful for locating road crashes directly on a map.

Figure 12: Recommended Dataset for Insurance Companies

INFORMATION COLLECTED FROM INSURANCES			
P0 - Name		**P2 - Birth date**	
P1 - Person ID		**P3 - Gender**	
P4 - Nationality		1	Male
P5- Crash date		2	Female
P6 - Crash time		3	Unknown
V1 - Type of vehicle		**V2 - Insurance details**	
1	Motorcycle < 125cc	1	Against others - Material
2	Motorcycle > 125cc	2	Against others - Compulsory
3	Car	3	Comprehensive
4	4 x 4	4	All risk
5	Mini-bus	5	No insurance
6	Bus	**V3 - Registration year**	
7	Truck	**V4 - Registration country**	
8	Pick-up	**V5 - Vehicle make**	
9	Tractor	**V6 - Vehicle model**	
10	Trailer truck	**V7 - Manufacturing year**	
V8 - Chassis		**V9 - Engine power**	
P7 - Driving license (if driver or rider)		**P8 - Injury severity**	
Number		1	Fatally injured
Category: private		2	Seriously injured
Category: public transportation		3	Slightly injured
Category: military		4	Injured (unknown level)
Category: international		5	Not injured
Category: foreign		99	Unknown
Issue date		**P9 - Hospital for transfer (if any)**	
Expiry date			

Source: Mobility and Transport Department. European Commission.

5.2 Storage, Processing, and Use of Road Crash Data

B.1 – Data by all actors registered in a common information system

The development of a road crash data management system is an important pre-requisite to enable all actors to store information in a single national road crash database. The system should be accessible to all actors authorized to collect data, i.e., traffic police and medical facilities.

The software should be structured to provide various functionalities that can be grouped into the following modules:

- **Data collection module**, which consists of two elements:
  - A mobile application to collect data at the crash scene. This application should allow information to be sent automatically to a central server hosting the Road crash data management system, without the need to download the data from the computer. In the event of a temporary absence of internet connection, the application should be able to store the collected information and send it autonomously as soon as connection is re-established.
  - Web-based software for desktop data entry (usually used when portable data collection devices are not available). This function also offers the possibility of continuing to use paper-based data collection forms, as well as importing data from other information systems already used by stakeholders.
- **Analysis module**, which produces graphs and tables automatically (default output) or as a result of ad hoc queries by the operator. This module should also allow to merge data collected by different actors (e.g., merge victim data collected by Traffic Police and Medical Facilities). This function could also be implemented by connecting the system with external data analysis tools such as PowerBI.
- **Administration module**, which assigns different access authorizations to system functions depending on the user. This module also manages the national road crash database, which is hosted on a physical or virtual server.

It is recommended that the system be **web-based** (thus allowing to users to access the software via internet or intranet, without having to install it on local computers and devices) and **GIS-based** (thus allowing data to be visualized and analyzed through maps that can overlay different layers of information).

B.2 – Data regularly transferred to a national road crash database

Systematic archiving of data and their transfer to the national road crash database is essential for up-to-date, evidence-based analyses. The use of a road crash data management system is recommended as it would ensure the regularity of data transfer.

It is also recommended that the system adopted includes an application for mobile devices and that the operators in charge of data collection use it directly at the crash scene. An intermediate period may be foreseen before the full use of mobile devices for data collection; during this period data should be transferred from paper to an information system.

B.3 – Data accessible by all actors involved in data collection and analysis

The use of a common (web-based) road crash data management system would greatly facilitate the accessibility of data by all stakeholders. The system should allow authorizations to be set according to the roles and functions of the different actors involved.

B.4 – Road crash data management system including analysis tools

The use of an information system to manage the national road crash database also allows data to be used directly in that system. Assessing road safety conditions and adopting a data-driven approach to road safety interventions

means performing a series of analyses by combining information road crash information with other road safety data.

It is recommended to adopt a framework for road crash data analysis based on best international practices. Reference can be made, for instance, to the annual report on road casualties from United Kingdom (Department of Transport, 2017) and to the CARE reports included in the European Road Safety Observatory (European Commission, 2018).

5.3 Other Road Safety Data

C.1 – Risk exposure data included in data collection and storage

Risk exposure data allow to explain road safety outcomes. The most relevant indicator is usually the distance traveled annually. Since data on distance traveled (by travel mode, by age) are usually difficult to collect, approximations can be used, such as fleet size or road length.

Data on risk exposure can be divided into three categories referring to: road users, vehicles, and road infrastructure.

Road User

It is recommended that the road crash data management system should include traffic and multimodal traffic information, such as:

- **Vehicle distance traveled** (expressed in km) in total and by transport mode. The indicator should be "Vehicle-kilometer," which represents the movement of a vehicle over one kilometer.
- **Person distance traveled** (expressed in km) in total, by transport mode and by age and gender of the user. The indicator should be "Passenger-kilometer," which represents the transport of one passenger over one kilometer.

The main source of these data should be the MOT.

Vehicle

The road crash data management system should include information on the composition of the vehicle fleet by number and type.

These data should be easily available in the vehicle registers.

Road Infrastructure

A comprehensive analysis of road safety also involves data on the characteristics of the road network. The composition of the road infrastructure by length and road type should be included in the Road crash data management system.

The main source of these data should be the MOT.

C.2 – SPIs included in data collection and storage

Data on **Safety Performance Indicators** illustrate which factors contribute to road crashes.

These data make it possible to assess the risks to which road users are exposed, e.g., the average speed of vehicles, the rate of use of protective equipment (seat belts, helmets, child restraint systems, etc.), the rate of alcohol consumption while driving, etc. These data can be collected through field surveys or from the analysis of traffic police reports.

The following indicators should be included in the road crash data management system (Table 10).

Table 10: Recommended Safety Performance Indicators and Sources of Information

Safety Performance Indicators (SPI)
Seatbelt use rate total and stratified by vehicle occupant
Helmet use rate total and stratified by vehicle occupant
Rate of driving under the influence of alcohol
Rate of driving under the influence of drugs
Rat of driving while using a mobile device
Rate of driving over speed limits
Driving time and rest periods for professional drivers
Risk levels associated to road infrastructures
Average response time to emergencies

Source: Mobility and Transport Department, European Commission.

5.4 Data Analysis

D.1 – Systematic analysis of road crash and road safety data for planning and decision-making

Stakeholders currently carry out analyses based on crash data collected. However, road crash data (and other road safety data) in general are not systematically analyzed by all agencies involved in road safety.

The implementation of the new Road crash data management system and the subsequent creation of a data-sharing system among stakeholders would certainly facilitate a systematic analysis of road crashes and other road safety data.

It is recommended that each stakeholder carry out analyses in line with their own activities and roles. Training activities should also be implemented to ensure that people working with data in the various institutions involved in road safety perform reliable and explanatory analyses.

Annex 1: Road Crash Registration Form

1. Card No. /__/__/__/__/__/__/__/__/__/__/__/__/__/__/__/__/
Registration authority _____.

2. First registration: Information logbook (1); Alphabetical log (2); Register of incoming correspondence (3); other resources (4); № ___ "__" _____ 20__ year.

3. Date of road traffic accident: "__" _____ 20__ year.

4. Weekday of the road traffic accident: Monday (1), Tuesday (2), Wednesday (3), Thursday (4), Friday (5), Saturday (6), Sunday (7).

5. Time of road traffic accident: "_____" hours "_____" minutes.

6. Location of the road traffic accident: locality (1) name of the locality _____, street _____; on the international road, republican road (2); on a regional or district road (3); fenced and protected areas (4); in areas not designated for cut-through traffic (5).

6.1. Kilometer, meter, highway No. _____.
6.2. Street, road elements: bridge (overpass) (1), viaduct (02), overpass (3), public transport stopping area (4), regulated pedestrian crossing (5), unregulated pedestrian crossing (6), regulated intersection (7), unregulated intersection (8), railway crossing with barrier (9), railway crossing without barrier (10), roundabouts (11).

7. Road conditions: surface - wet (1), snow-covered (2), icy (3), road repair (4), dry (5), muddy (6), freshly paved (7), surface treatment (including anti-icing material) (8); lighting: day (9), twilight (10), night (11); in dark time external lighting: switched on (12), not switched on (13), absent (14).

7.1. Fixed deficiencies of the street and road network: slippery pavement (1); uneven pavement (2), rutting (3), potholes (4), unsatisfactory condition of the shoulder (5), discrepancy of the overpass dimension with the road width (6), discrepancy of the railway crossing with the requirements (7), trees (8), lamp supports (in cases of collision, visibility limitation) (9), lack of pavements (10), lack of pedestrian paths (11), lack of fencing at dangerous areas (12), lack of lighting of the roadway (13), lack of fencing and signaling in places of work (14), lack of road signs or improper use of them (15), defective technical facilities for road traffic management or poor visibility of them (16), lack of road markings or poor visibility of them (17), other conditions (18), are absent (19).
7.2. Weather conditions: clear (1), cloudy (2), fog (3), rain (4), snow (5).
7.3. Total traffic lanes on the road: ____.
7.4. Speed limit on the road section: ____.

8. Type of road traffic accident: head-on collision (1), side collision (2), hit-and-run collision (3), passenger fall (4), overturning (5), collision with a standing vehicle (hereinafter - Vehicle) (6), collision with an obstacle (7), collision with a pedestrian (8), collision with a cyclist (9), collision with a walking vehicle (10), collision with an animal (11), other types of accidents (12), collision with a moped driver (13), collision with an electric scooter (14), small electric vehicle (15).

9. Violation of the Road Traffic Rules (hereinafter - RTR): exceeding the speed set by the traffic rules or road signs (1); driving at a prohibited traffic light signal or at a prohibiting gesture of an traffic regulator (2); failure to comply with the requirements prescribed by road signs or roadway markings (3); failure to give advantage in traffic to pedestrians or other road users (4); failure to comply with the rules of transporting passengers (5); transporting cargo (6); stopping vehicles (7), driving in residential areas (8), towing vehicles (9); other gross violations of traffic rules (10); violation of the rules for passing intersections or crossing the roadway (11); maneuvering (12); positioning vehicles on the roadway (13); oncoming or overtaking (14); stopping or parking vehicles (15); failure to give traffic advantage to vehicles of operational and special services with special light and sound signals switched on (16); use of external light devices (17); use of emergency signaling (18); violation by a road user of traffic rules and regulations resulting in the creation of an emergency situation (19); passing railway passes (20); failure to observe the distance (21); driving the vehicle by a driver in a sick or fatigued state that endangers road safety (22); driving a vehicle by a driver who is under the influence of alcohol, drugs and/or toxic substances (23); violation by drivers of the vehicle of the established rules of road safety (24); failure to fulfill the driver's duties in connection with an accident (25); driving a vehicle with faults that prohibit its operation (26); violation of traffic rules by pedestrians and other road users (27).

10. Quantity of vehicles involved in road accidents: _____.

11. Details of the vehicle: vehicle number (1); vehicle category (2); right/left steering position (3); state registration (4); vehicle identification number (5); vehicle brand, model (6); year of issue (7); last name, first name, middle name (if available) of the driver (8); driver's age (9); right to drive this category of vehicle (10); driving license number, date of issue (11); leaving the scene of the accident – yes/no (12); number of passengers (13).

12. Background to the accident: _____.

13. Quantity: injured _____, dead _____.

13.1. Time of calling emergency services _____.
13.2. Arrival time of emergency services_____.

14. Accident guilty party: driver (1), pedestrian (2), escaped from the accident zone (3), minor (4), foreigner/ stateless person (5), road services (6), contractors carrying out repair and construction works (7), public utilities (8), cyclist (9), moped driver (10), electric scooter driver (11), small electric vehicle driver (12).

14.1. The accident perpetrator's condition: no signs of intoxication, sober (1); alcohol intoxication (2); narcotic intoxication (3); toxigenic intoxication (4); sharp deterioration of health (5); time of continuous traveling (6).

14.2. Full name (if any) of the guilty pedestrian _____.

14.3. Date of birth _____, age at the time of accident _____, individual identification number (hereinafter– IIN), gender of the guilty driver, pedestrian: ___/___/___/___/___/___/___/___/___/___/___/___/___/___/.

15. Full name (if any), position of the officer of the administrative police department who filled in the card

_____.

16. Decision taken on the road traffic accident: number of the protocol on the case of administrative offense _____ or The Unified Register of Pre-Trial Investigations (URPI) _____, clause, part, article of the law.

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Kazakhstan Road Crash Data Review and Reporting

Status and Recommendations

This report presents an overview of the current road crash data management situation in Kazakhstan offering strategic recommendations for improvement based on the best globally recognized practices. The report develops guidance and tools in an effort to improve road crash data management and move toward greater harmonization of crash data across the region.

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