



UIC SAFETY UNIT
UIC Safety Report 2023
Significant Accidents 2022
Public Report

October 2023



INTERNATIONAL UNION
OF RAILWAYS

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UIC Safety Report 2023

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Foreword

This is the 17th edition of the UIC Safety Report.

This year again, with the endorsement of its members, UIC has collected and analysed the available data on significant accidents from 34 members in 32 different countries. We are pleased to announce that a new member joined the Safety Database this year, so I would like to extend a warm welcome to LDZ from Latvia. UIC is continuing its efforts to expand its scope, inviting and embracing collaboration from infrastructure managers all over the world.

Thanks to a cooperative endeavour, this year's report goes beyond its typical sections, with an analysis of trespass versus suicides, which is a topic of high importance for all railway stakeholders. Sharing data about this sensitive safety topic is crucial and we thank each contributor for its efforts. After all, between 2011 and 2013, UIC coordinated the European research project RESTRAIL, which both analysed the causes of suicide and trespass, and proposed a practical guide to mitigate their consequences. Therefore, the report's focus this year serves to remind us of a core safety value, which is the preservation of human life.

As expected, holistically, the safety indicators in 2022 returned to pre-pandemic levels. Thus, what can be perceived as an increase in 2022, would be better referred to as a "back-to-normal", as this is the first genuine post-pandemic year. Moreover, the UIC Relative Safety Index 2022 proves the statement above, showing its best result in the past 6 years.

UIC stands for its values of unity, solidarity, and universality. In terms of the Safety Database and Report, it means to carry on its mission to harmonise the collection of safety data and the related taxonomy as well as spreading knowledge across the world.

François Davenne

UIC Director General

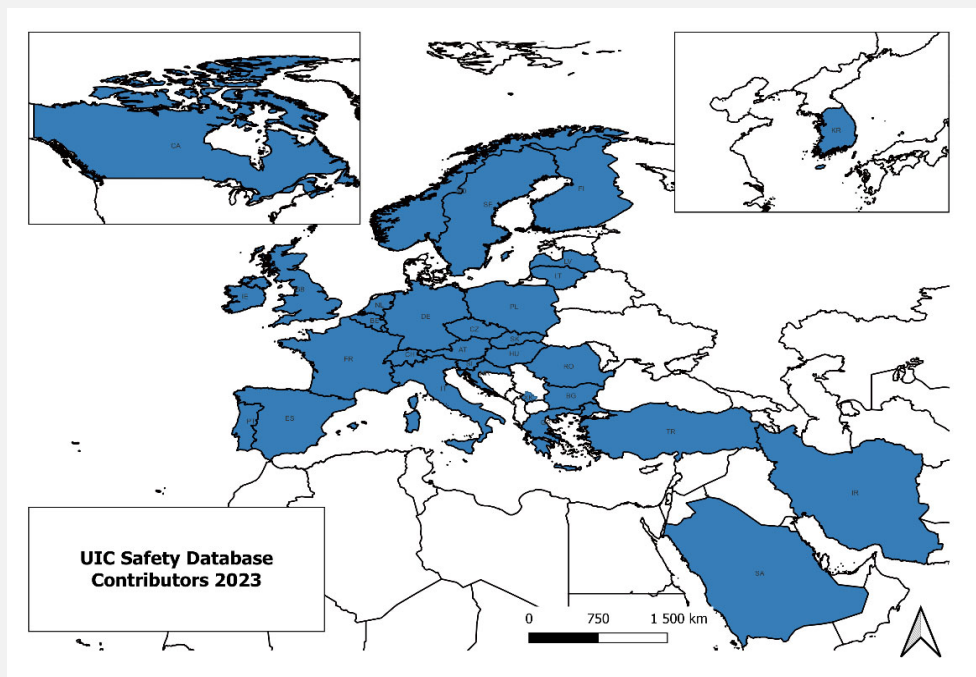
UIC Safety database members and data availability in 2022

Company	Country	Code
ADIF ¹	Spain	ES
Bane NOR SF	Norway	NO
CANADA ²	Canada	CA
CFL	Luxembourg	LU
CFR SA	Romania	RO
CIE	Ireland	IE
DB AG ²	Germany	DE
EUSKOTREN ¹	Spain	ES
FGC	Spain	ES
FTIA	Finland	FI
HZ	Croatia	HR
Infrabel ²	Belgium	BE
Infrakos	Kosovo	XK
IP	Portugal	PT
KRRI	South Korea	KR
LTG	Lithuania	LT
MÁV ¹	Hungary	HU

Company	Country	Code
NRIC	Bulgaria	BG
ÖBB	Austria	AT
OSE	Greece	GR
PKP	Poland	PL
PRORAIL	Netherlands	NL
RAI	Iran	IR
RFI	Italy	IT
RSSB ¹	United Kingdom	GB
SAR	Saudi Arabia	SA
SBB CFF FFS	Switzerland	CH
SNCF Réseau	France	FR
SŽ (si)	Slovenia	SI
SŽ (cz)	Czechia	CZ
TCDD	Turkey	TR
Trafikverket ¹	Sweden	SE
ŽSR	Slovakia	SK
LDZ	Latvia	LV

¹ Members of the Safety Performance Group

²Data extracted from the TSB website: www.tsb.gc.ca/fra/stats/rail/data-5.html



Executive summary

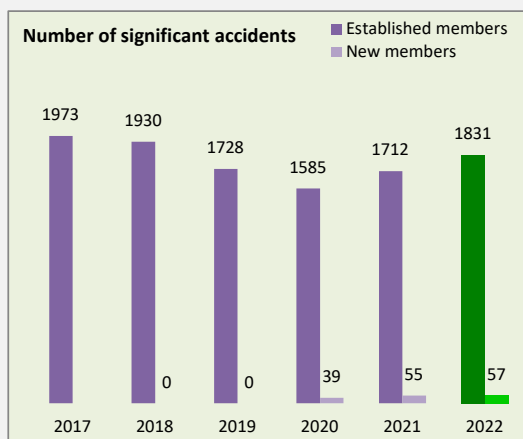
The perimeter of this report has been extended with one new infrastructure manager. As a consequence of the ongoing war in Ukraine we were not able this year again to include the information of two networks. Therefore absolute numbers are different, but it is still possible to evaluate trends and ratios.

The year 2022 has been the first post pandemic year, after two years of restrictions due to COVID-19. Train traffic grew back to pre-pandemic levels, as well as the volumes of passengers. In 2022 there were two major train derailments, resulting in more than 20 victims each, which increased victims number significantly especially compared to 2021 with no registered major derailements or collisions.

Number of significant accidents

From 2006 till 2014 the annual number of significant accidents has decreased with around 25%. In the period of 2017-2020 we see a slow decrease of significant accidents with its lowest level in 2020.

2020 being an exceptional year due to COVID-19 restrictions, the significant accidents slowly increase in 2021 with 1709 records which is comparable to the pre COVID-19 year 2019 (-1%). An increase of significant accidents for the established members in 2022 can be explained by a significant rise of traffic.

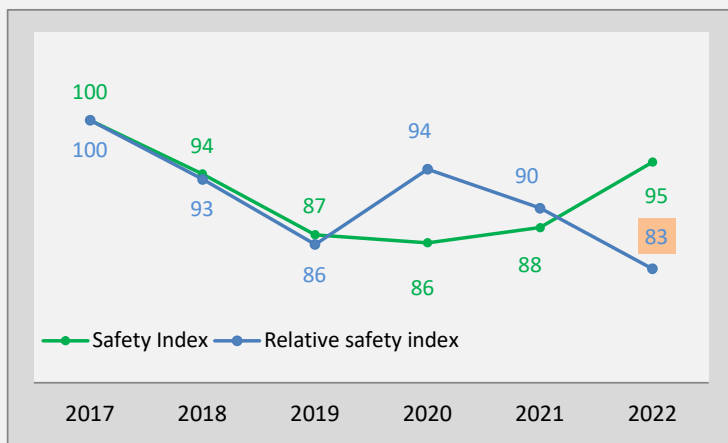


Number of fatalities (excepting Latvia, Lithuania, Bulgaria and Kosovo)

In 2022 we recorded 999 fatalities, which is on the rise compared to two previous COVID years. However, it is close to pre-pandemic level: in 2019 the total fatalities was 966. Two large scale derailements in 2022 has a direct consequence in the rise of fatalities. As to the fatalities on level crossings we see a rise in 2022 compared to COVID years, where the mobility restrictions were in place. However there is a 16% drop compared to 2019, which is a good news. Compared to 2019, the year 2022 has an overall rise in fatalities of 3%.

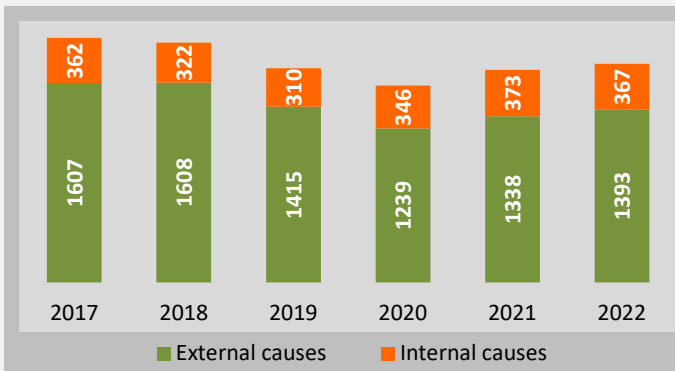
Fatalities	2019	2020	2021	2022	Diff 2019-2022
Individual hit by train or falling from a train (outside LC)	614	606	584	674	10%
Level crossing accidents	319	239	271	269	-16%
Other accidents (train collisions, derailments, fires and shunting operations)	33	34	20	56	65%
Total	966	879	875	999	3%

UIC Safety Index (established members)



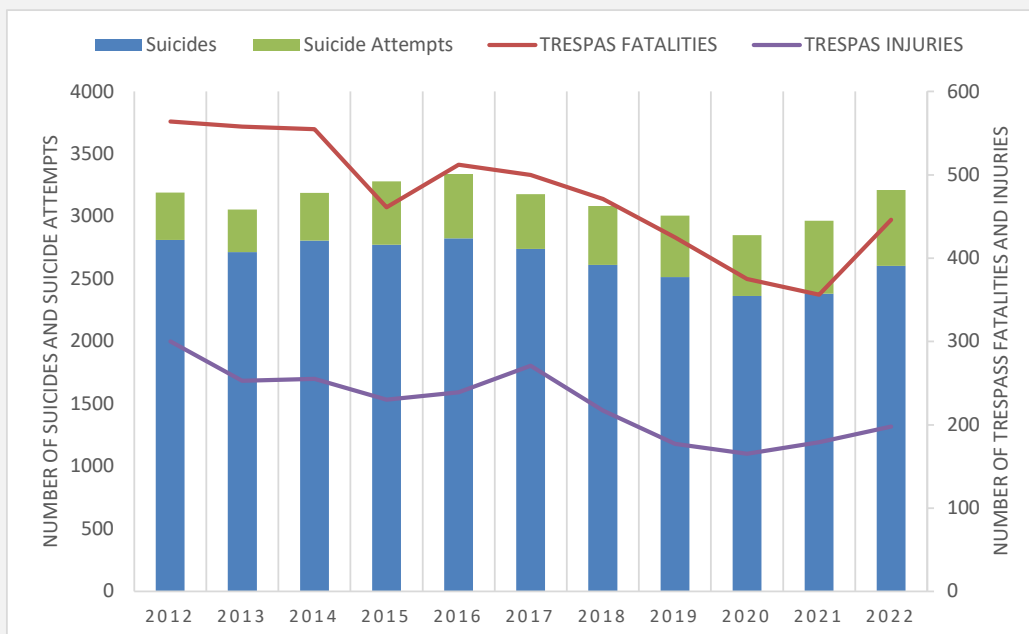
The UIC Safety Index is a weighted number of accidents, whereby passenger and staff victims and internal causes are weighted more heavily than trespasser victims and external causes. In addition, a higher number of victims is weighted more heavily than a lower number. We see a steady improvement of the safety index in the period 2016-2019, and the two indexes being quite close to each other. However, in 2020 the expected decrease of indexes is not seen, mostly due to low numbers of train-kilometers. The inverse is observed in 2022: the safety index is higher than in previous years, due to increase in victims. However, a significant rise in train-kilometers in 2022 makes the 2022 RSI at its lowest over the past 6 years.

Causes of accidents



Numbers of significant accidents with external causes have been decreasing since 2016, with an extra dip in 2020 due to the COVID-pandemic. But it is worrying to see the number of accidents with internal causes have increased in the last two years. Internal causes are infrastructure, rolling stock, human factors and railway users. Human factors being the most abundant.

Suicides versus Trespass events



This year focus is Suicides versus Trespass events. Indeed, both suicides and trespass events are two painful aspects of railway reality. Railway stakeholders are constantly searching for the optimal ways for both suicides and trespass events to be avoided.

Studying an eventual correlation between them over the past 10 years would contribute to a better understanding of the phenomena. 2022 report tried to look into suicides, suicide attempts and trespass events' dynamics over the years and also examine the seasonal trends as well as light conditions in which they took place.

Luca Maria Granieri

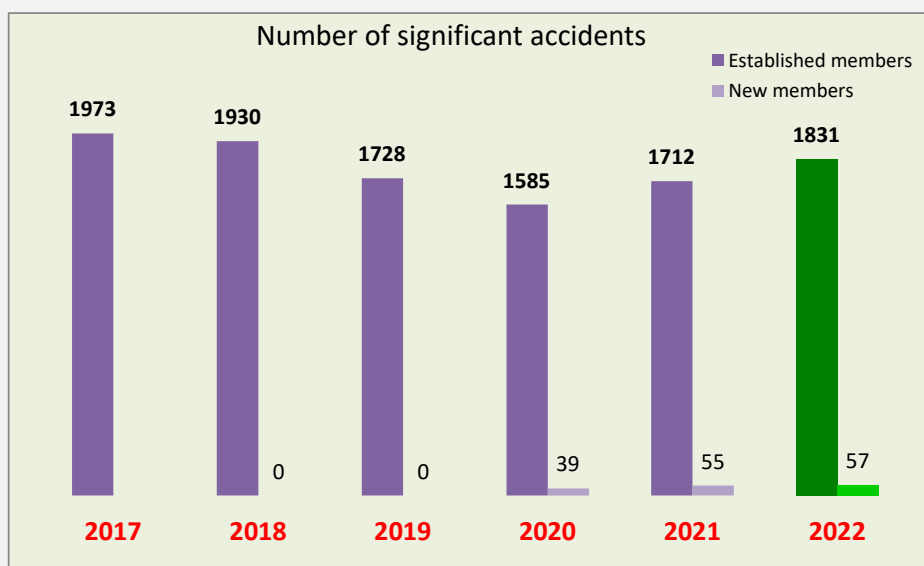
Chairperson of Safety Performance Group

Part 1 - General Safety Indicators for the year 2022

- 1.01 Evolution of significant accidents and UIC Safety Index
- 1.02 Types of accidents according to UIC-SDB and EU definitions
- 1.03 Main causes of accidents
- 1.04 Trend of accidents and rates for the last six years
- 1.05 Accidents by type
- 1.06 Fatalities and serious injuries by type of accident
- 1.07 Distribution of victims
- 1.08 Victims by type of accident according to Safety Directive definitions
- 1.09 Accidents by location details
- 1.10 Accidents at level crossings
- 1.11 Number of accidents and victims by type of accident
- 1.12 Passenger victims by type of accident and location
- 1.13 Staff victims by type of accident and location
- 1.14 Victims by type of traffic
- 1.15 Accidents by type and number of victims
- 1.16 UIC Safety Index
- 1.17 Normalized UIC Safety Index
- 1.18 Accidents and victims by type of accident, causes and location

NB: the number 0 is indicated by the sign "-"

1.01 Evolution of significant accidents and UIC Safety Index

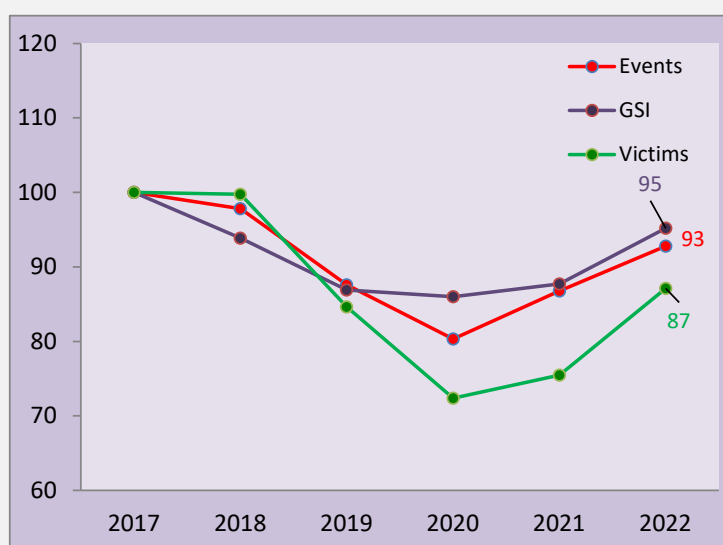


“Significant accident” means any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic, excluding accidents in workshops, warehouses and depots.

We consider as established members, railway companies that provided data on the whole six-years period. New members are listed below:

Country	Data provider	Period
Bulgaria	NRIC	2020-2022
Lithuania	LTG	2020-2022
Kosovo	Infrakos	2021-2022
Latvia	LDZ	2022

For the established members, the number of events had a 7% increase compared to 2021. The graph compares the trends of the UIC Safety Index (GSI) with the trends of number of events and number of victims (Base 100 in 2017) for Established members.



1.02 Types of accidents according to UIC-SDB and EU definitions

Types of accidents as defined in UIC – SDB	Additional information from UIC -SDB	Types of accidents as defined in EU Safety Directive
6,7%	Derailment of trains	6,7% Derailment of trains
1,5%	Train collision with another train	1,5% Train collision with another train
24,0% Train collision with an obstacle	6,6% Train collision with an obstacle not at LC	6,6% Train collision with an obstacle not at LC
	17,5% Train collision with an obstacle at LC	24,2% LC accidents, including accidents involving pedestrians at LC
59,2% Individual hit by a train	6,7% Individual hit by a train at LC	
	52,5% Individual hit by a train not at LC	55,0% Accidents to persons caused by rolling stock in motion, with the exception of suicides.
2,5%	Individual falling from a train	
1,3%	Fire in rolling stock	1,3% Fire in rolling stock
0,2%	Electrocution by overhead line or third rail	4,8% Other types of accidents
0,2%	Accident involving dangerous goods	
4,4%	Shunting operations	
0,1%	Runaway vehicles	

- More than 60% of accidents involved individuals hit by a train or falling from a train.
- Collision with an obstacle was the second most common accident (24% of all accidents).
- Accidents at level crossings accounted for 24,2% of all significant accidents.
- Accidents during shunting operations and involving runaway vehicles are separated to better fit with the EU definitions.
- Within the accidents at level crossings, the UIC database makes distinction between collisions with a motorized vehicle (collision with an obstacle) and pedestrians/cyclists hit by a train.

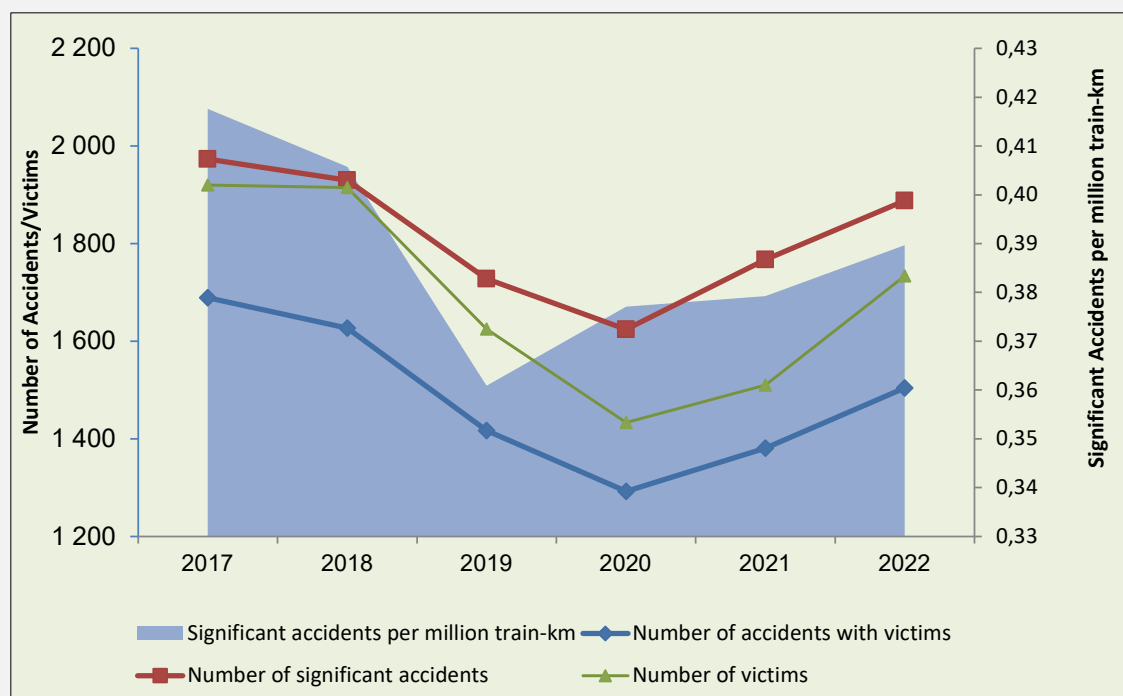
1.03 Main causes of accidents

2022	Causes at first level	Causes at second level	
EXTERNAL CAUSES	THIRD PARTIES 74,6%	Trespassing	48,8%
		Vehicle (LC accident)	16,2%
		Pedestrian (LC accident)	7,5%
		Pedestrian on public railway area	1,6%
		Other or not specified	0,6%
	WEATHER & ENVIRONMENT 3,5%	Environment	2,5%
78,1%		Weather	1,0%
INTERNAL CAUSES	INFRASTRUCTURES 3,3%	Tracks and structures	2,1%
		Energy system	1,0%
		Other or not specified	0,3%
	ROLLING STOCK 3,2%	Running gear	1,7%
		Other or not specified	1,5%
	HUMAN FACTORS (Railway staff & subcontractors) 10,2%	Track and switch maintenance staff	1,5%
		Traffic operating and signalling staff	2,3%
		Train drivers	3,0%
		Other or not specified	3,5%
	RAILWAY USERS 3,5%	Passengers	2,4%
		Other or not specified	1,1%
20,3%			
CAUSES NOT IDENTIFIED			1,6%

- External causes are responsible for 78% of accidents.
- Internal causes relate to both the infrastructure manager and railway undertakings.

1.04 Trend of accidents and rates for the last six years

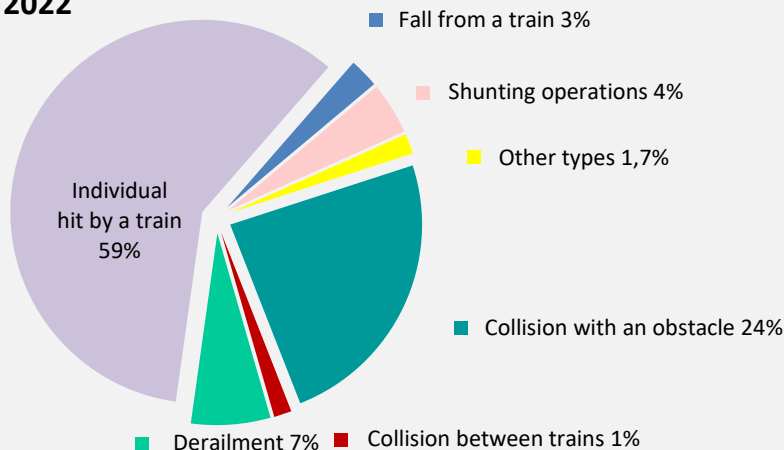
ALL RAILWAYS	2017	2018	2019	2020	2021	2022
Number of significant accidents	1 973	1 930	1 728	1 624	1 767	1 888
Significant accidents per million train-km	0,42	0,41	0,36	0,38	0,38	0,39
Number of accidents with victims	1 689	1 627	1 417	1 292	1 381	1 504
Accidents with victims per million train-km	0,36	0,34	0,30	0,30	0,30	0,31
Number of victims	1 920	1 915	1 625	1 433	1 510	1 734
Victims per million train-km	0,41	0,40	0,34	0,33	0,32	0,36
Number of fatalities	1 086	1 081	966	905	897	1 034
Fatalities per million train-km	0,23	0,23	0,20	0,21	0,19	0,21
Number of million train-kilometres	4 724	4 757	4 788	4 307	4 660	4 845



There is a general increase of all indicators in 2022 compared to 2021. Nevertheless, as the traffic increased considerably in 2022 as well, the significant accidents normalized by train-km shows a very little increase, compared to 2021: +0,01.

1.05 Accidents by type

2022



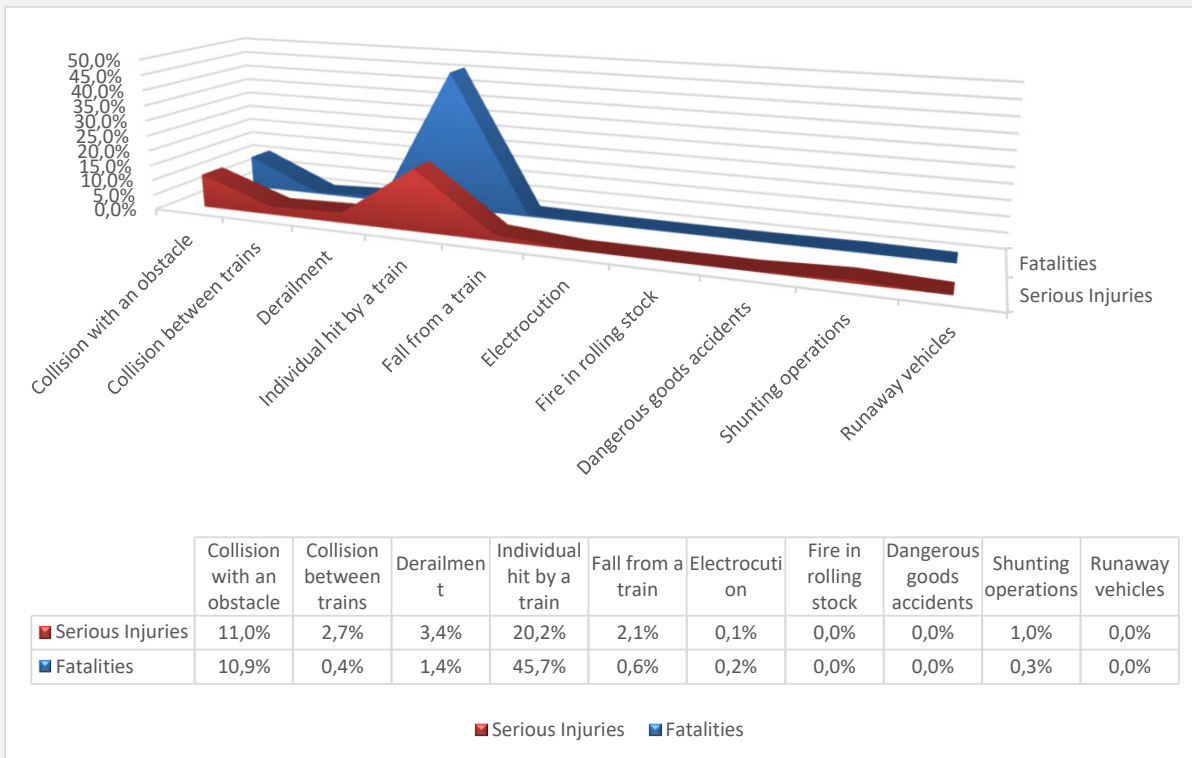
- "Collision with an obstacle" includes collisions at LC.
- "Individual hit by a train" includes pedestrians at LC.
- "Other types": electrocutions, fires in rolling stock, dangerous goods and runaway vehicles
- For LC accidents, refer to graph 1.10.



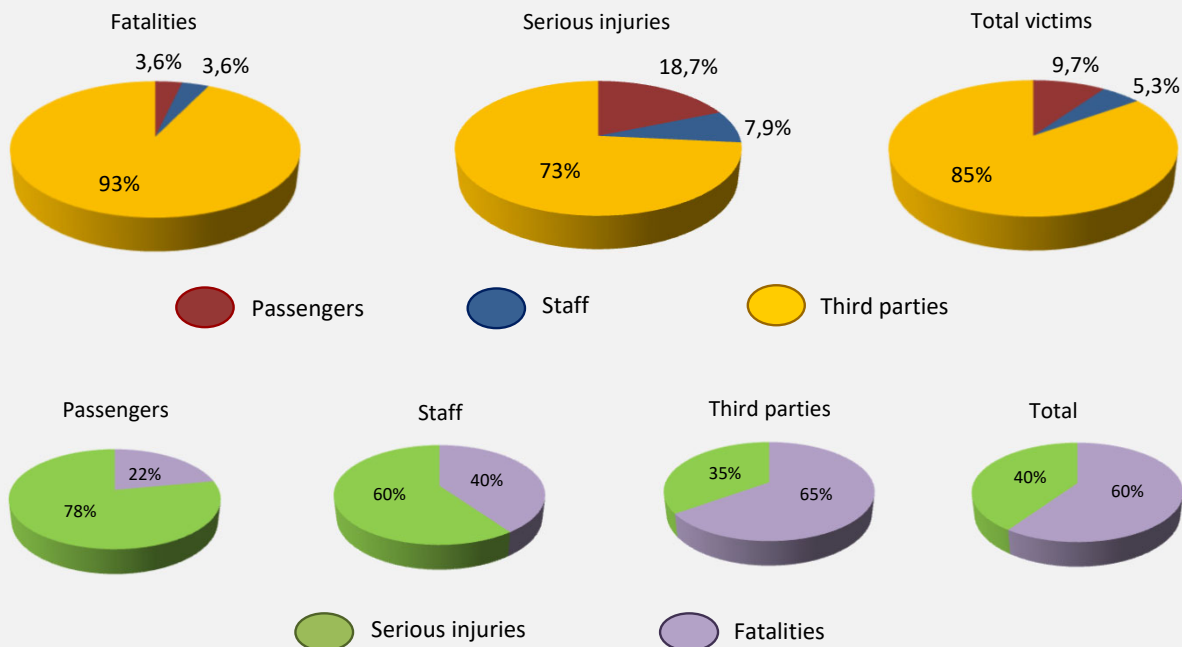
<https://uic.org/safety/trespass-and-suicide-prevention>
[#TrespassSuicidePrevention](https://twitter.com/TrespassSuicidePrevention)



1.06 Fatalities and serious injuries by type of accident



1.07 Distribution of victims



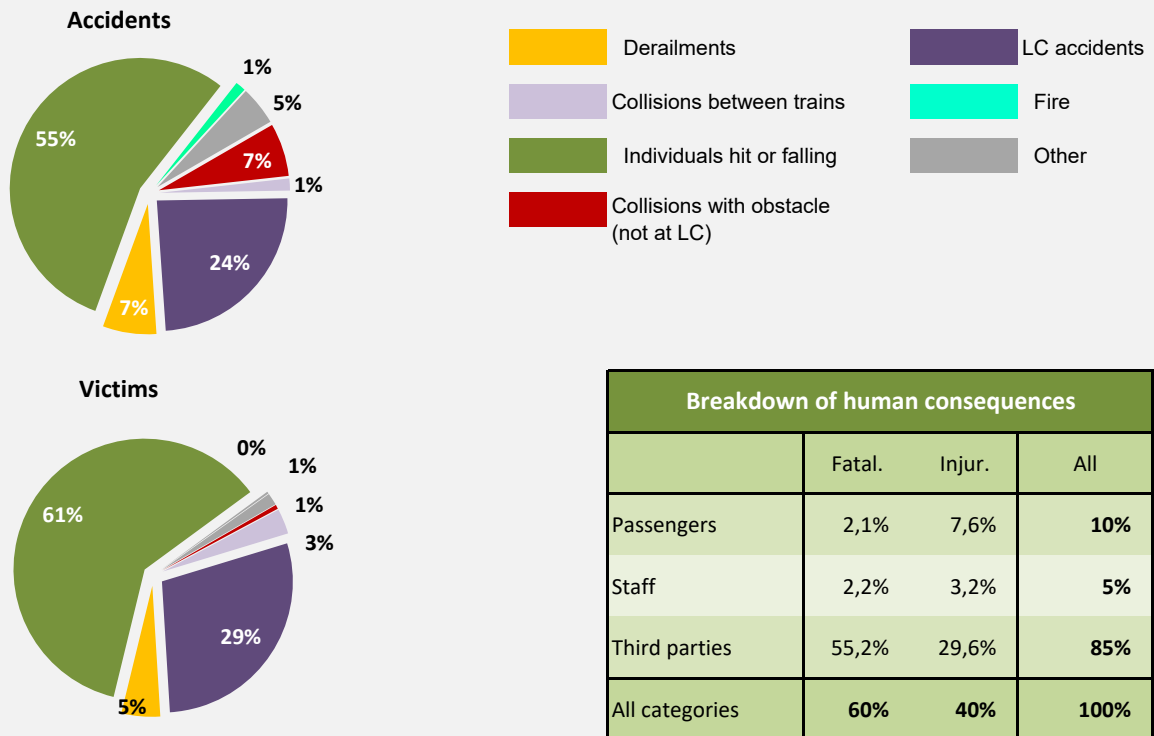
Reading method: fatalities account for 22% of passenger victims and passengers represent 3,6% of total fatalities.

➤ Third parties represented 93% of all fatalities and 73% of serious injuries.

➤ Fatalities accounted for 60% of victims.

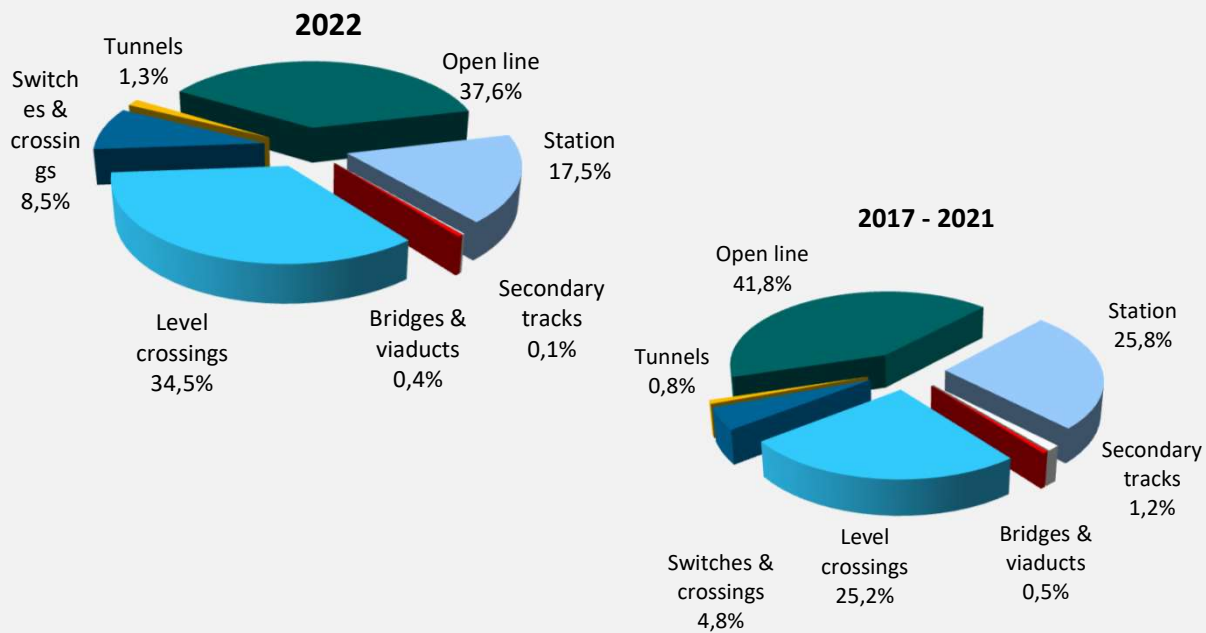
Third parties include: Unauthorized, LC users and Others

1.08 Victims by type of accident according to Safety Directive definitions

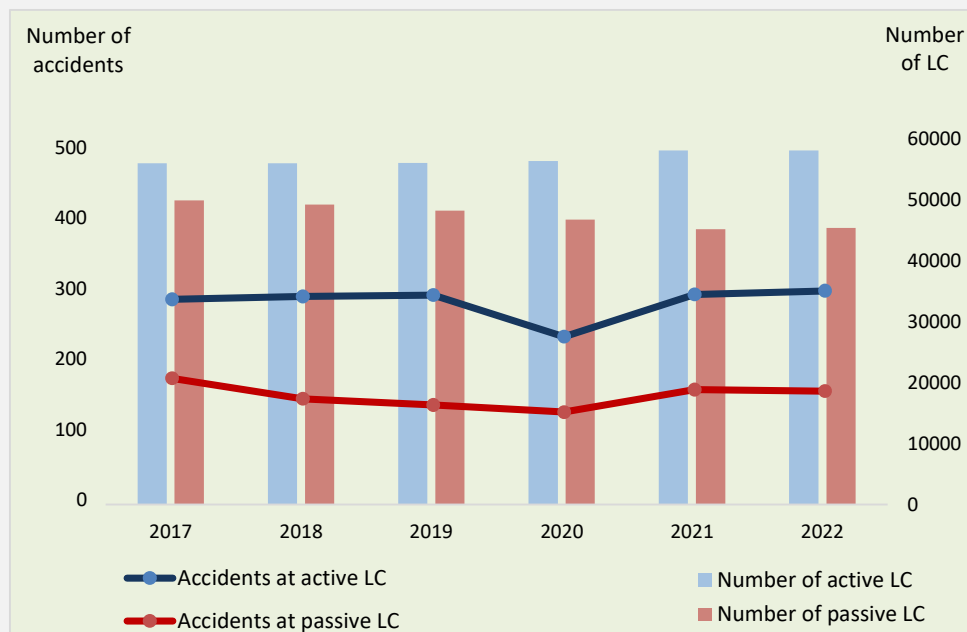


Type of accident	Number of events	%	Fatalities			Serious injuries		
			Passengers	Staff	3rd parties	Passengers	Staff	3rd parties
Collisions with obstacle (not at LC)	124	6,6%	-	-	2	1	4	2
Collisions between trains	28	1,5%	2	5	-	38	9	-
Level crossings	457	24,2%	1	3	278	8	6	202
Derailment	126	6,7%	21	1	3	56	2	-
Individuals & rolling stock in motion (not at LC)	1 038	55,0%	11	25	670	28	19	307
Fire	24	1,3%	-	2	2	-	-	-
Other types	91	4,8%	2	3	3	-	15	3
Total	1 888		37	39	958	131	55	514

1.09 Accidents by location details



1.10 Accidents at level crossings



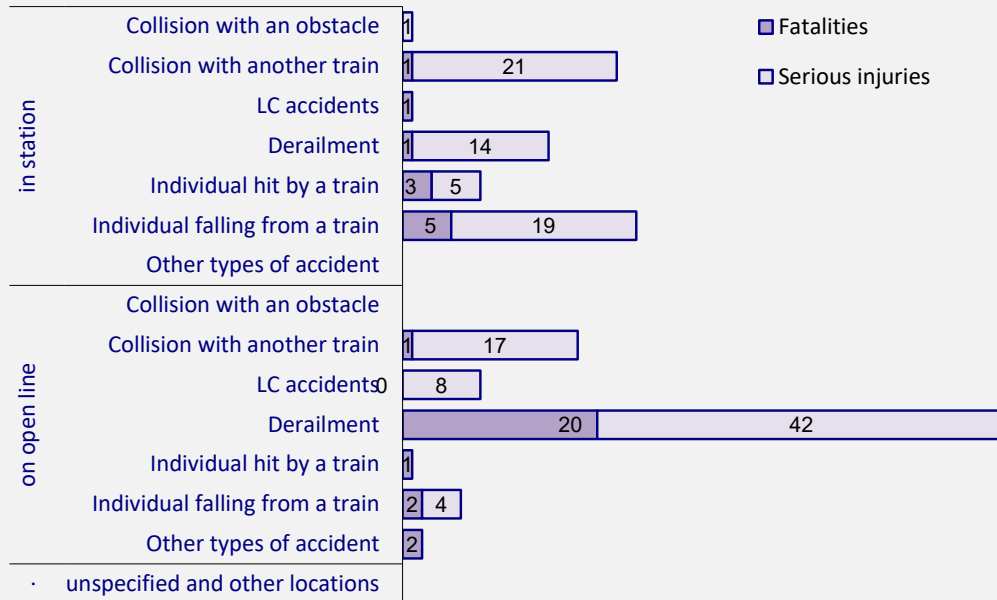
- This graph excludes Canada (split between passive and active level crossings unavailable).
- Accidents at active LC remained stable until 2019. There is a clear drop in 2020 due to mobility restrictions, and a return to its usual rate in 2022.
- Accidents at passive LC show little variations: 2022 rate is close to the previous year.

1.11 Number of accidents and victims by type of accident

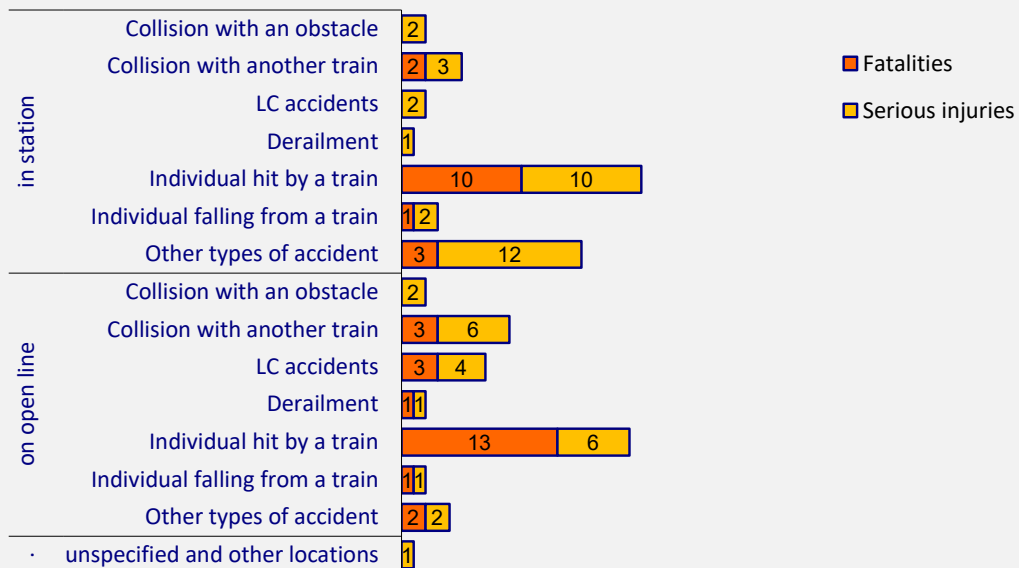
2022		Number of accidents	FATALITIES			SERIOUS INJURIES			ALL VICTIMS
			Passengers	Staff	3rd parties	Passengers	Staff	3rd parties	
In station	Collisions with an obstacle (not at LC)	29	-	-	-	1	2	-	3
	Collisions between trains	14	1	2	-	21	3	-	27
	LC accidents	63	1	-	45	-	2	23	71
	Deraillments	53	1	-	-	14	1	-	16
	Hit by a train (not at LC)	371	3	10	210	5	10	139	377
	Falling from a train	36	5	1	2	19	2	8	37
	Other accidents	88	-	3	5	-	12	3	23
	Total at station	654	11	16	262	60	32	173	554
On open line	Collisions with an obstacle (not at LC)	94	-	-	2	-	2	2	6
	Collisions between trains	14	1	3	-	17	6	-	27
	LC accidents	382	-	3	221	8	4	179	415
	Deraillments	66	20	1	3	42	1	-	67
	Hit by a train (not at LC)	618	1	13	456	-	6	158	634
	Falling from a train	11	2	1	-	4	1	2	10
	Other accidents	18	2	2	-	-	2	-	6
	Total in open line	1203	26	23	682	71	22	341	1165
not specified		31	-	-	14	-	1	-	15
GRAND TOTAL		1888	37	39	958	131	55	514	1734

- 64% of accidents occurred on open line, whilst 35% happened in stations and yards.
- 71% of fatalities occurred on open line.
- Persons hit by a train and LC accidents represented 93% of all fatalities.

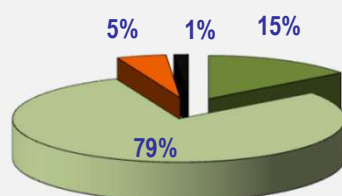
1.12 Passenger victims by type of accident and location



1.13 Staff victims by type of accident and location



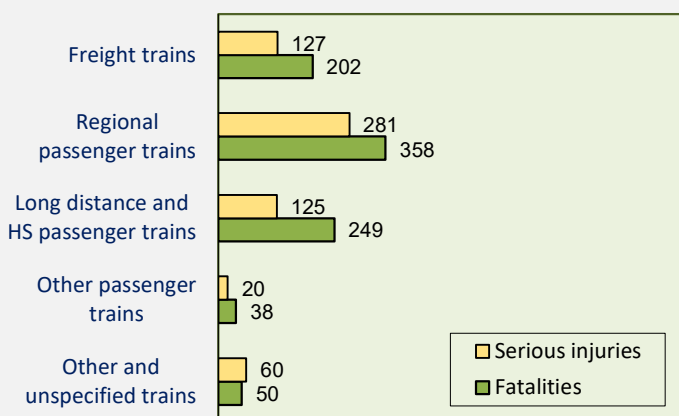
1.14 Victims by type of traffic



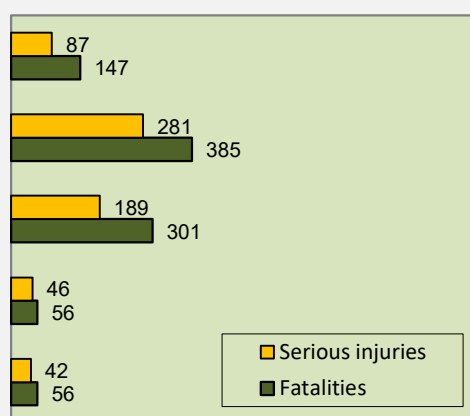
- Freight trains
- Passenger trains
- Locomotives running light, infrastructure trains, unspecified trains
- Shunting and runaway vehicles

Type of accident 2022	Freight trains	Passenger trains	Locomotives running light, infrastructure trains, unspecified trains	Shunting and runaway vehicles
Collision	5	49	6	4
Derailment	3	79	1	3
Level crossing accidents	61	390	10	-
Accidents to persons caused by rolling stock in motion	161	737	59	15
Other accidents	4	3	-	-
TOTAL victims	234	1258	76	22

2021



2022



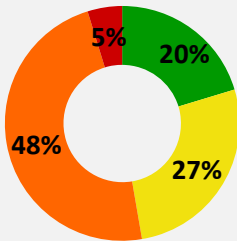
There is a decrease in fatalities and serious injuries in accidents involving freight trains.

Unfortunately, serious injuries and fatalities are on the rise in accidents involving passenger trains.

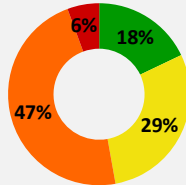
Among accidents where the type of train is registered, passenger trains are involved in accidents leading to 84% of victims in 2022.

1.15 Accidents by type and number of victims

**All accidents 2022
(1841 events)**



**2017 - 2021
(9022 events)**



■ no victim *

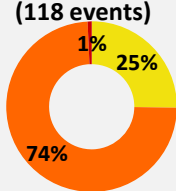
■ 1 serious injury

■ 1 fatality

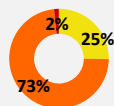
■ 2 or more victims *

* a victim is a fatality or a serious injury

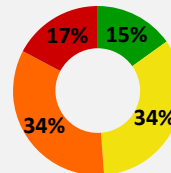
**Individual hit by a train at
LC 2022
(118 events)**



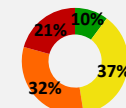
**2017 - 2021
(736 events)**



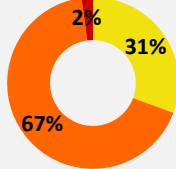
**Collision with an obstacle
at LC 2022
(319 events)**



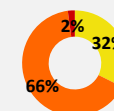
**2017 - 2021
(1545 events)**



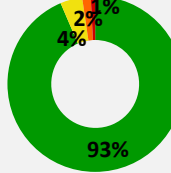
**Individual hit by a train
not at LC 2022
(973 events)**



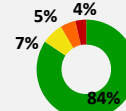
**2017 - 2021
(4730 events)**



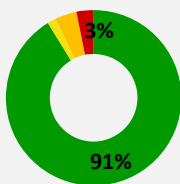
**Collision with an obstacle
not at LC 2022
(119 events)**



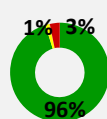
**2017 - 2021
(618 events)**



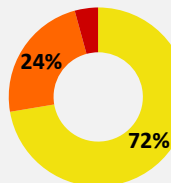
**Derailment 2022
(121 events)**



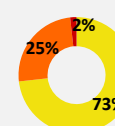
**2017 - 2021
(557 events)**



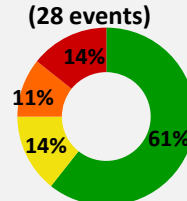
**Fall from a train 2022
(47 events)**



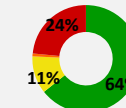
**2017 - 2021
(224 events)**



**Collision between trains
2022
(28 events)**

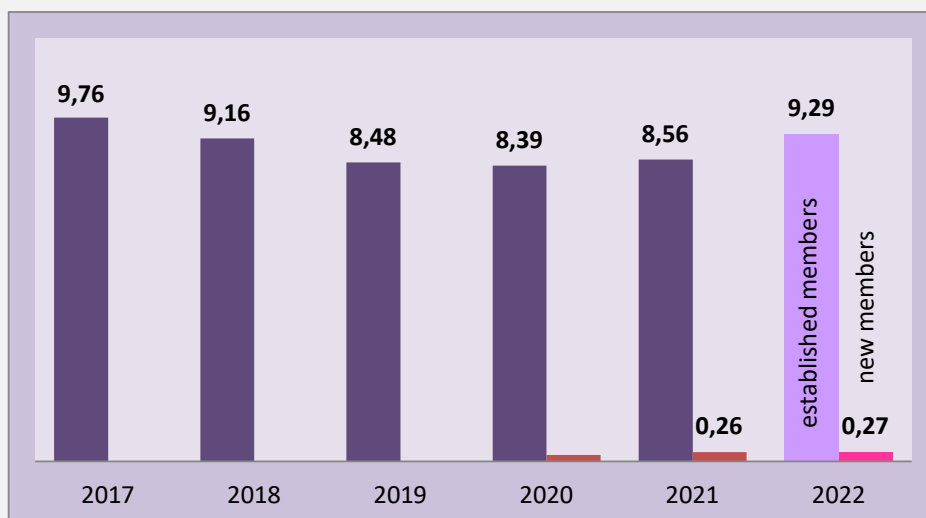


**2017 - 2021
(115 events)**



- Fires in RS: 24 events (4 fatalities)
- Electrocutions: 4 events (3 fatalities and 1 serious injury)

1.16 UIC Safety Index



The UIC Safety Index was created in 2015 by the Safety performance Group. It reflects more aspects than the sole number of events. Each event is weighted following the type of accident, the category of victim, the number of victims and the cause. Its general formula is as follows:

$$GSI = \sum (Cv \times Cn) + Ca \times Cr$$

where:

→ Cv is the coefficient for the category of victim, from 1 (a serious trespasser injury) to 8 (a passenger fatality);

→ Cn is the coefficient for the number of victims, from 0 (no victim) to 5 (more than 5 victims);

→ Ca is the coefficient for the type of accident, from 1 (a person hit by a train) to 7 (a derailment or a collision between trains);

→ Cr is the coefficient for the railway system responsibility, from 1 (external causes) to 2 (internal causes).

1.17 Normalized UIC Safety Index



This graph shows the change of UIC Safety Index normalized by the total number of train-km on the networks of the established members (members that delivered data at least since 2017).

Basis 100 = year 2017

1.18 Accidents and victims by type of accident, causes and location

Type of accidents	Causes			Location				Victims				
				Type of location		Location details						
Individual hit by a train 1118 1141	INF	-	-	OL	716	732	LC	127	128	P	4	5
	RS	-	-				SC	16	16			
	HF	36	38	S	399	406	BV	4	5	S	23	16
	RU	27	27				T	11	12			
	WE	-	-	Ot	3	3	O	577	588	T	764	329
	TP	1052	1073									
Train collision with an obstacle 454 379	INF	17	-	OL	378	323	LC	330	370	P	1	9
	RS	9	-				SC	11	-			
	HF	31	8	S	64	45	BV	1	-	S	3	10
	RU	-	-				T	1	-			
	WE	59	5	Ot	12	11	O	39	5	T	184	172
	TP	331	363									
Individual falling from a train 47 47	INF	-	-	OL	11	10	LC	-	-	P	7	23
	RS	1	1				SC	1	1			
	HF	5	4	S	36	37	BV	-	-	S	2	3
	RU	30	31				T	2	2			
	WE	-	-	Ot	-	-	O	20	19	T	2	10
	TP	11	11									
Train collision with another train 28 54	INF	-	-	OL	14	27	LC	-	-	P	2	38
	RS	-	-				SC	6	20			
	HF	24	32	S	14	27	BV	-	-	S	5	9
	RU	-	-				T	-	-			
	WE	-	-	Ot	-	-	O	13	30	T	-	-
	TP	-	-									
Derailment 126 83	INF	39	13	OL	66	67	LC	5	2	P	21	56
	RS	33	-				SC	46	1			
	HF	27	45	S	53	16	BV	1	-	S	1	2
	RU	6	-				T	3	-			
	WE	7	-	Ot	7	-	O	58	58	T	3	-
	TP	5	3									
Electrocution 4 4	INF	1	1	OL	2	2	LC	-	-	P	2	-
	RS	-	-				SC	-	-			
	HF	-	-	S	2	2	BV	-	-	S	-	1
	RU	-	-				T	-	-			
	WE	-	-	Ot	-	-	O	1	1	T	1	-
	TP	3	3									
Fires 24 4	INF	2	-	OL	13	2	LC	-	-	P	-	-
	RS	14	2				SC	-	-			
	HF	2	-	S	11	2	BV	-	-	S	2	-
	RU	1	-				T	1	-			
	WE	-	-	Ot	-	-	O	18	4	T	2	-
	TP	1	1									

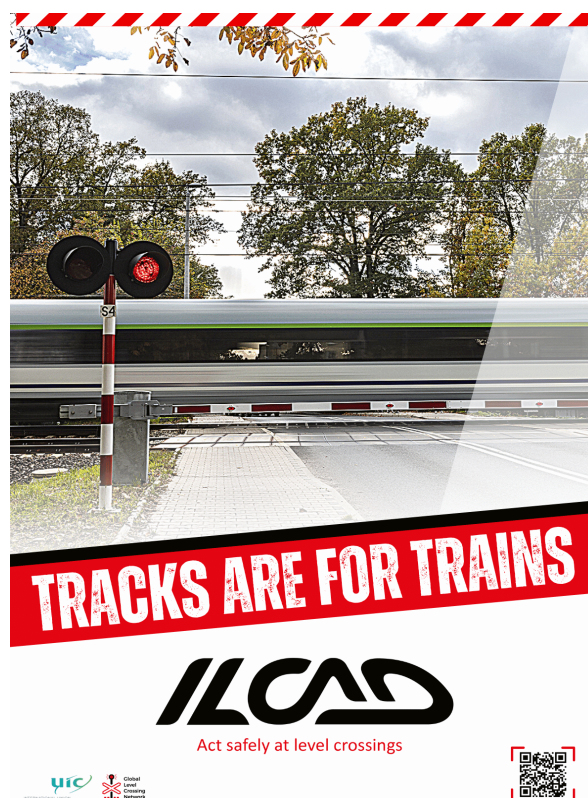
Type of accidents	Causes			Location						Victims Fatal. S. Inj.		
				Type of location			Location details					
Accident involving dangerous goods without release 3 -	INF	-	-	OL	-	-	LC	-	-	P	-	-
	RS	1	-				SC	2	-			
	HF	2	-	S	-	-	BV	-	-	S	-	-
	RU	-	-				T	-	-			
	WE	-	-	Ot	3	-	O	1	-	T	-	-
	TP	-	-									
Accident involving dangerous goods with release - -	INF	-	-	OL	-	-	LC	-	-	P	-	-
	RS	-	-				SC	-	-			
	HF	-	-	S	-	-	BV	-	-	S	-	-
	RU	-	-				T	-	-			
	WE	-	-	Ot	-	-	O	-	-	T	-	-
	TP	-	-									
Shunting operations 83 22	INF	4	-	OL	3	2	LC	-	-	P	-	-
	RS	3	-				SC	32	2			
	HF	66	14	S	74	19	BV	-	-	S	3	14
	RU	2	2				T	-	-			
	WE	-	-	Ot	6	1	O	17	10	T	2	3
	TP	5	5									
Runaway vehicles 1 -	INF	-	-	OL	-	-	LC	-	-	P	-	-
	RS	-	-				SC	-	-			
	HF	-	-	S	1	-	BV	-	-	S	-	-
	RU	-	-				T	-	-			
	WE	1	-	Ot	-	-	O	1	-	T	-	-
	TP	-	-									

TOTAL 1888 1734	INF	63	14	OL	1203	1165	LC	462	500	P	37	131
	RS	61	3				SC	114	40			
	HF	193	141	S	654	554	BV	6	5	S	39	55
	RU	66	60				T	18	14			
	WE	67	5	Ot	31	15	O	745	715	T	958	514
	TP	1408	1459									
										1034	700	

number of accidents	INF: Infrastructures RS: Rolling stock HF: Human Factors RU: Railway users WE: Weather-Environment TP: Third Parties	OL: Open line S: At station Ot: Other locations	LC: Level crossings SC: Switches & Crossings BV: Bridges & Viaducts T: Tunnels O: Other or unidentified	P: passengers S: Staff T: Third parties
number of victims				

Part 2

Time series and trends 2017-2022



Part 2 - Time series and trends 2017-2022

excluding NRIC (Bulgaria), INFRAKOS (Kosovo), LTG (Lithuania) and LDZ (Latvia)
(full time series unavailable)

	2.00 Traffic in train-km
	2.01 Significant accidents
CAUSES	2.02 Causes
	2.03 Internal causes
	2.04 External causes
	2.05 Third parties
HUMAN CONSEQUENCES	2.06 Human consequences
	2.07 Severe accidents (two and more victims)
	2.08 Passengers
	2.09 Staff
	2.10 Third parties
TYPE OF ACCIDENT	2.11 Collisions with an obstacle
	2.12 Collisions between trains
	2.13 Derailments
	2.14 Individuals hit by a train
	2.15 Individuals falling from a train
	2.16 Accidents at level crossings
INDICATORS	2.17 Significant accidents and victims per million train-km

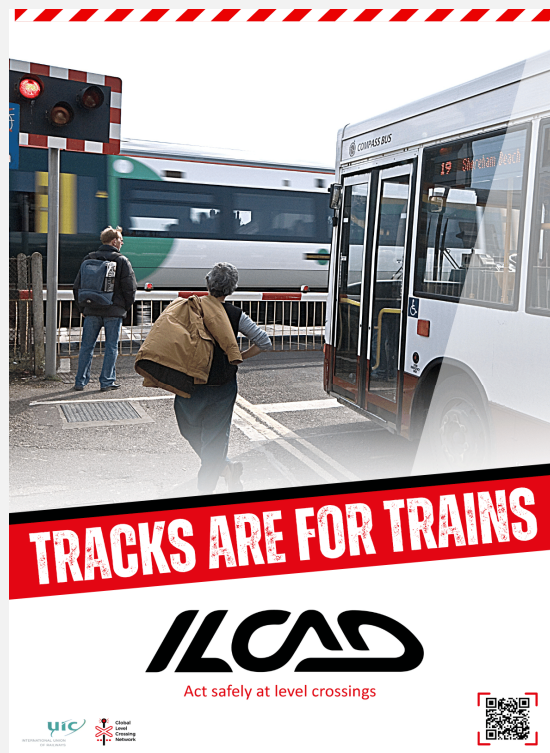
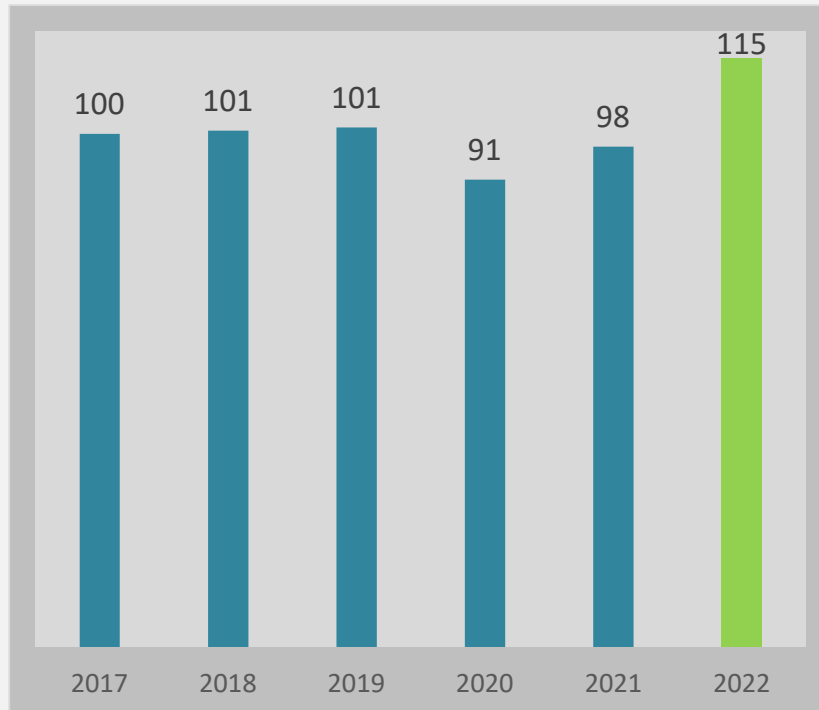
2.00 Railway traffic in million train-km (basis 100 = year 2017)

Railway traffic is measured in train-kilometres, which means the total number of kilometres run by trains on railway networks.

The traffic is in constant rise except for the COVID years: 2020 and 2021: the drop due to the pandemic and the measures of mobility restriction taken by most governments.

Most railway companies were obliged to reduce the rail traffic, especially during lockdown periods.

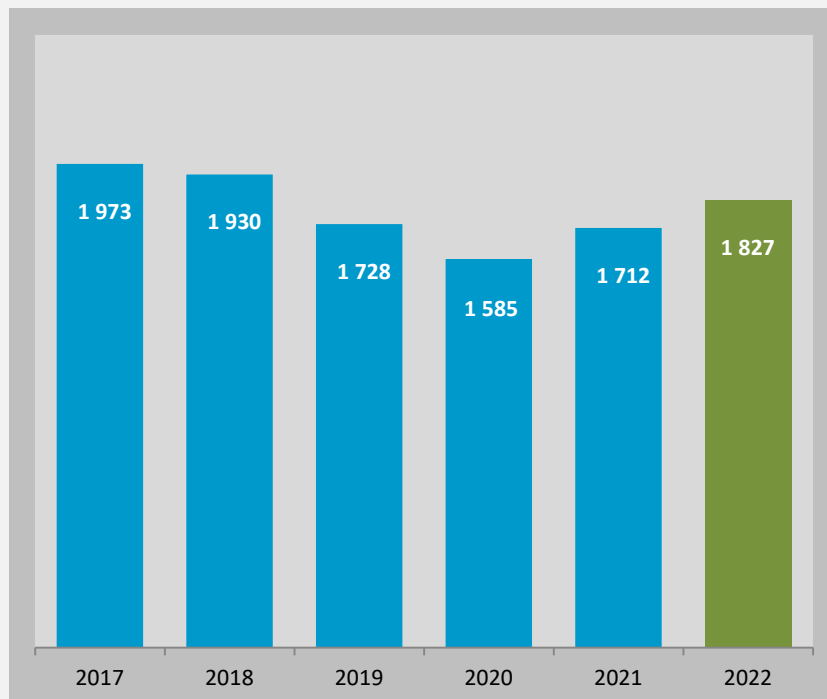
In 2022, the rail traffic increased significantly, largely surpassing the prepandemic years.



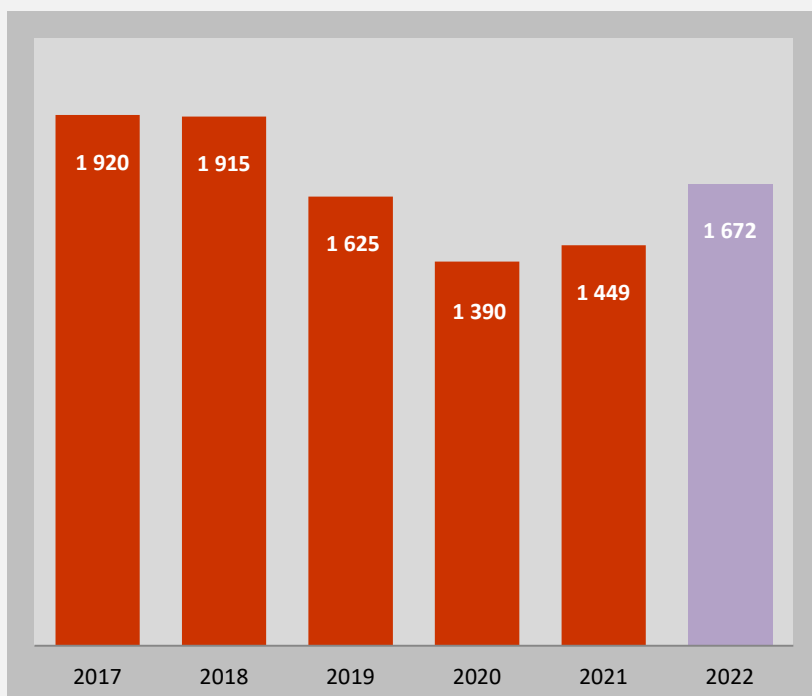
2.01a All significant accidents

Significant accidents declared by railway members of the Safety Database dropped from 2006 in the year 2016 to 1584 in the year 2020, which means a decrease of - 21%. With the rise of rail traffic, after the COVID drop, there is a rise in significant accidents as well.

“Significant accident” means any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic, excluding accidents in workshops, warehouses and depots.



2.01b Victims of rail accidents



Due to the rail traffic reduction as well as to the mobility restrictions due to the pandemic, 2020 and 2021 are the years with the lowest victims rate.

This number increases in 2022, but remains significantly lower compared to 2017 and 2018.

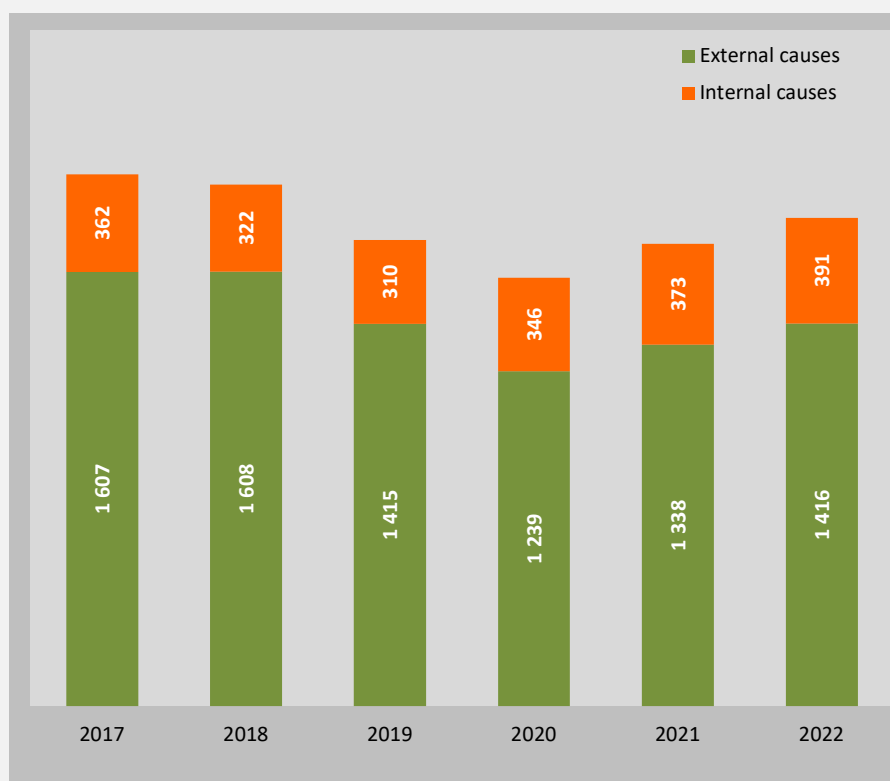
2.02a Accidents per internal / external causes

The number of accidents with internal causes decreased from 2017 to 2019, and increased since 2020.

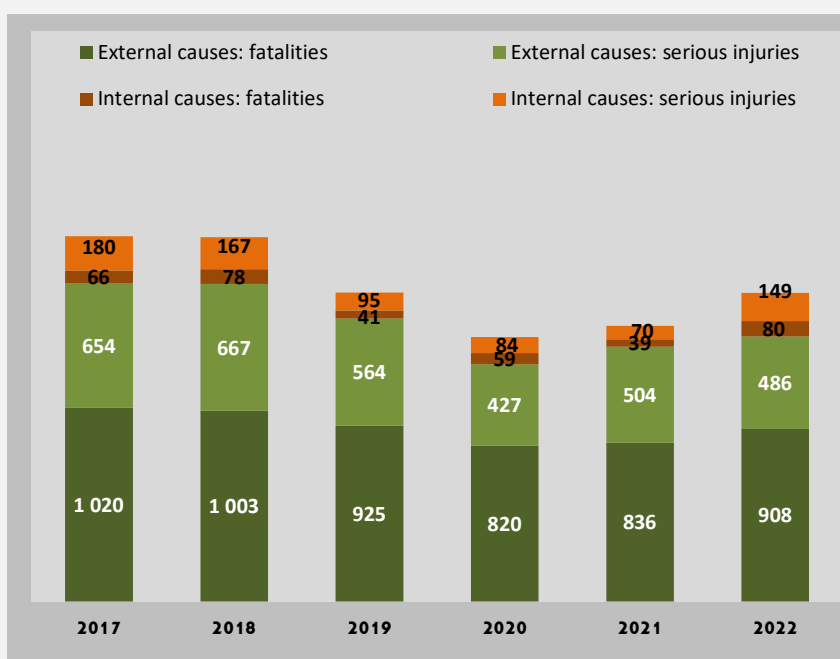
The number of accidents with external causes decreased -12% between 2018 and 2019, and again -12% between 2019 and 2020, but increased +8% in 2021 and +6% in 2022.

Reminder:

- Internal causes: infrastructure, rolling stock, human factors and railway users.
- External causes: third parties, weather and environment.
- Some accidents have unidentified causes. They are excluded from the graph.



2.02b Victims per internal / external causes



External causes

The number of external causes victims increased by +6% between 2021 and 2022 but is still 16% lower than in 2017.

Internal causes

The number of victims due to internal causes more than doubled in 2022 compared to 2021 and is close to 2017 level.

In the year 2022:

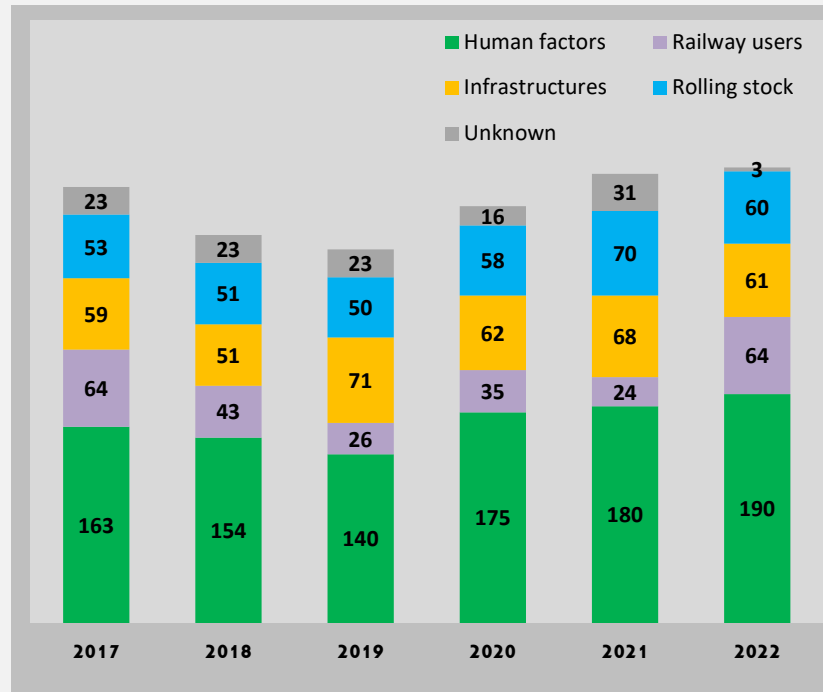
- ✓ External causes are responsible for 84% of all victims and 91% of all fatalities.
- ✓ 65% of victims of accidents with external causes are fatalities.
- ✓ 65 % of victims of accidents with internal causes are serious injuries.

2.03a Accidents per internal causes

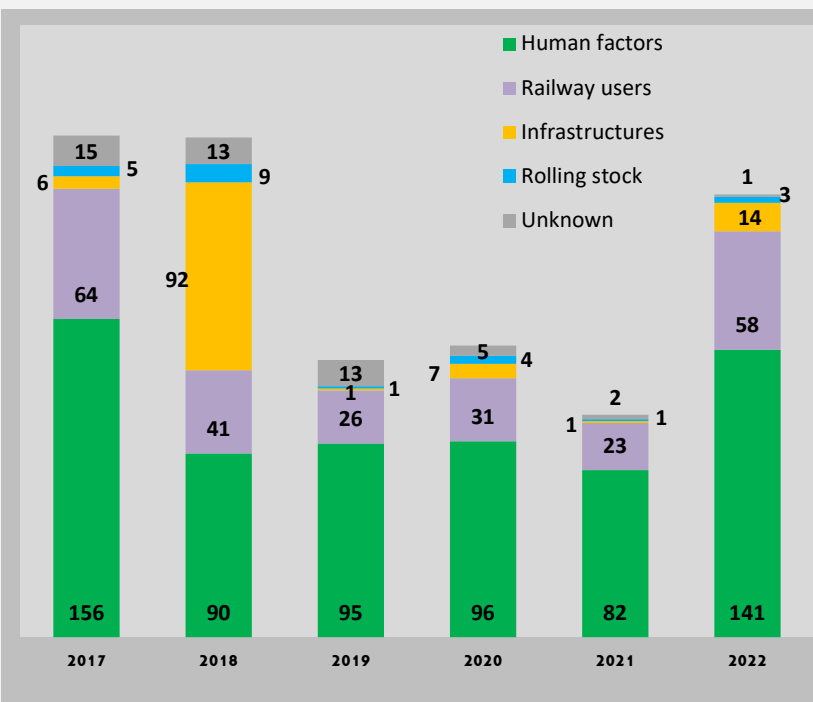
The 2022 indicators are quite close to 2017 levels. What can appear as an increase comparing to 2017, might be a better classification of the internal accidents: there is 13% less internal causes accidents in 2022 than in 2017.

After a significant drop in 2019-2021 years, *Railway Users* as internal cause is at its highest in 2022.

There is a steady increase of accidents due to *Human Factors* with its highest level in 2022.



2.03b Victims per internal causes



The number of victims due to internal causes had a 83% increase comparing to 2021.

Number of accidents and number of victims are quite disconnected. A few severe accidents may have a huge number of victims (year 2017, for instance).

In 2022, there were 3 major accidents due to an internal cause with more than 10 victims each.

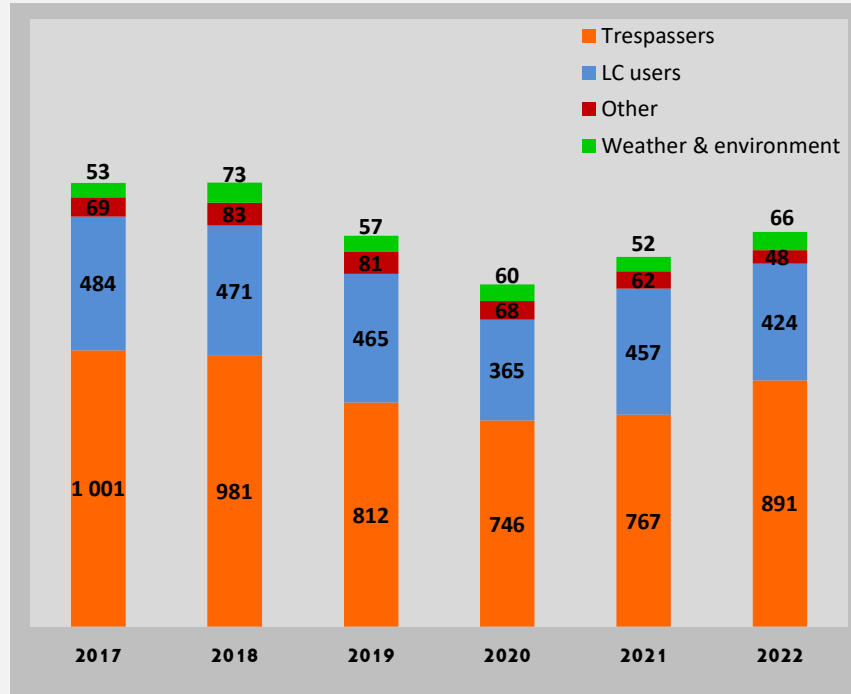
For the total of 390 events, 137 (35%) led to 1 injury and 243 events (62%) made no victims. The remaining 10 events (3%) made 2 victims and more.

2.04a Accidents per external causes

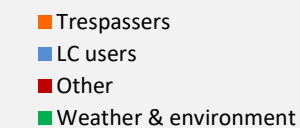
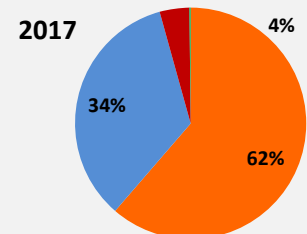
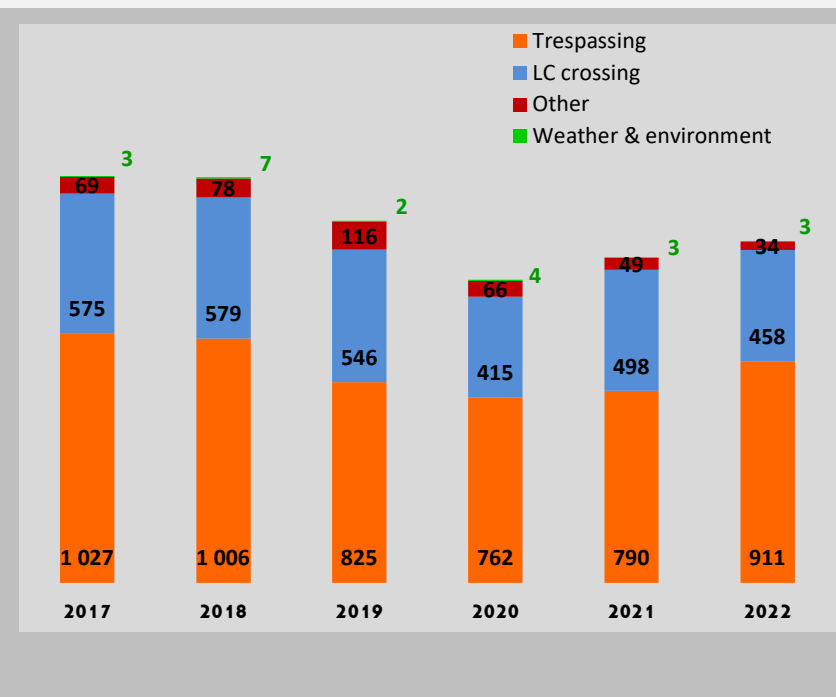
The number of accidents with external cause decreased -12% between 2017 and 2022.

Trespassers remain the major cause of significant accidents: 63% of all accidents with external causes in 2022.

LC users are causing 30% of all accidents with external causes in 2022. It's 7% less than in 2021.



2.04b Victims per external causes



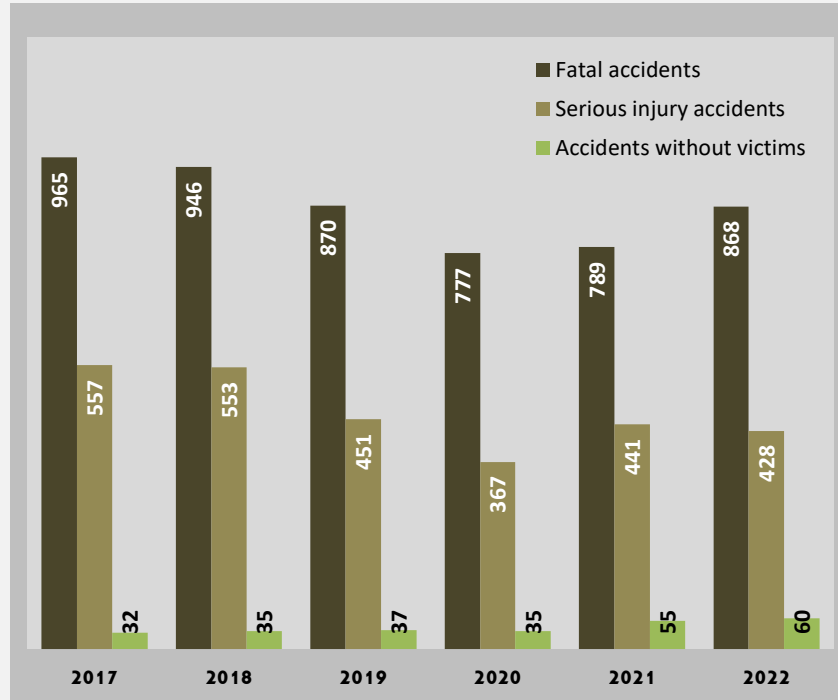
2.05a Accidents caused by third parties

Accidents caused by third parties decreased -13% between 2017 and 2022.

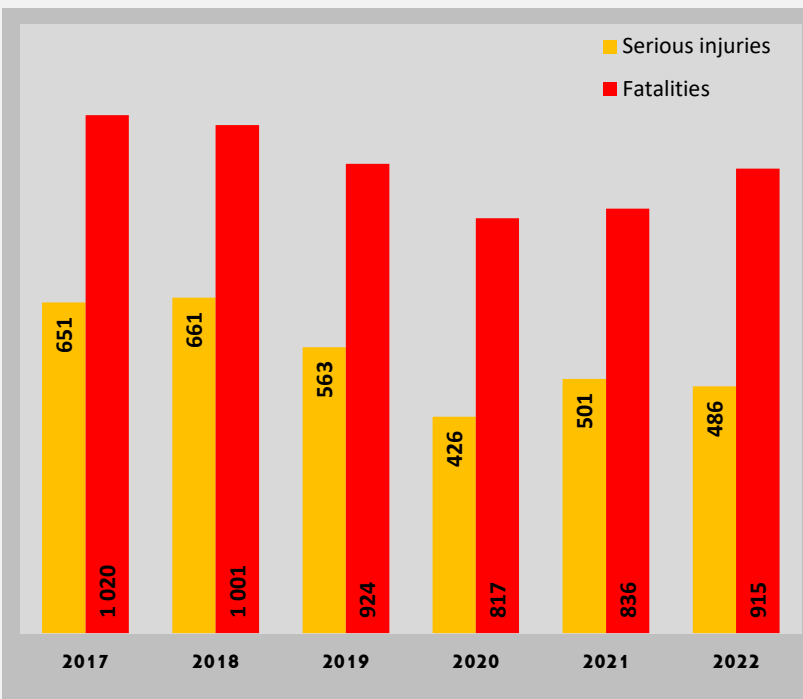
93% of fatal accidents and 83% of serious injury accidents are caused by third parties (year 2022).

Fatal accidents increased 10% comparing to 2021.

Accidents with serious injuries decreased -23% and fatal accidents decreased -10% since 2017.

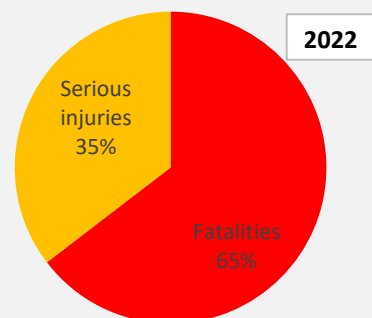


2.05b Victims of accidents caused by third parties



There is a steady grow of indicators in the past 3 years. Compared to 2017, serious injuries decreased by - 25% and fatalities decreased by - 10%.

The part of fatalities among the victims increased from 61% in 2017 to 65% in 2022.

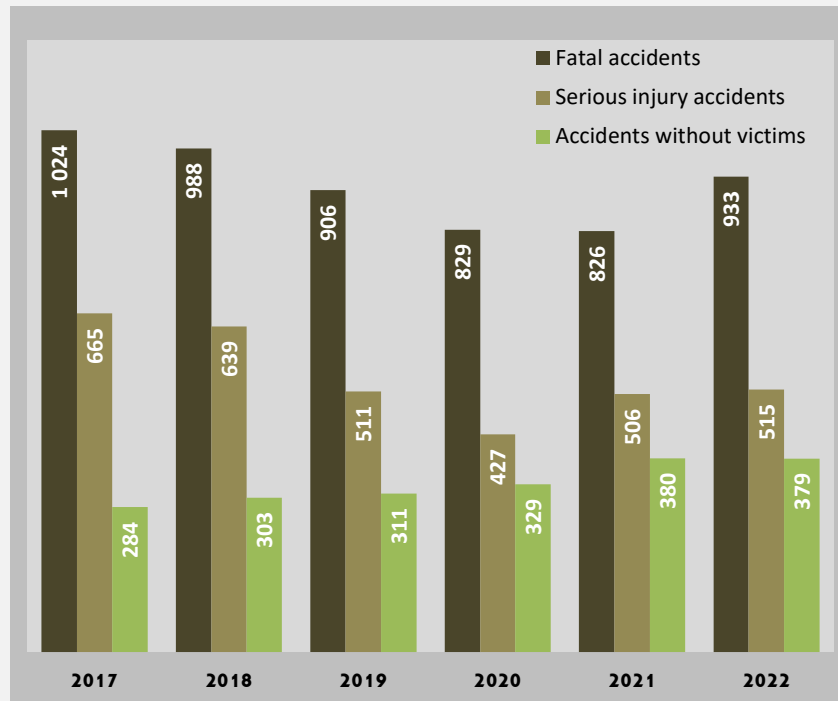


2.06a Accidents per human consequences

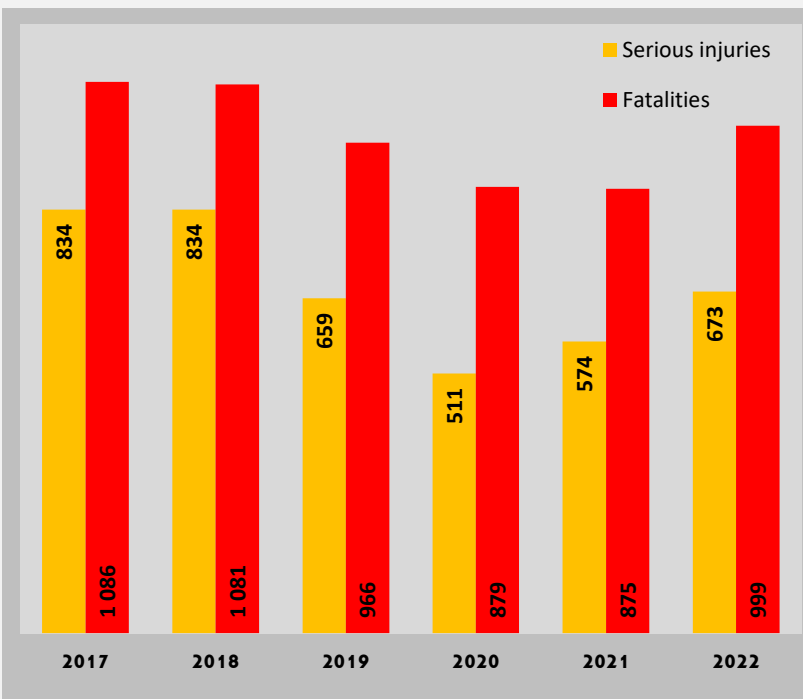
Fatal accidents used to represent slightly more than a half of all significant accidents. In 2022, fatal accidents represent 51% of the total accidents.

Fatal accidents decreased by -9% from 2017 to 2022 while serious injury accidents decreased by -22%.

The number of accidents without victims increases since 2017(33%). This might be linked to more information about accidents with damages or traffic disruption.



2.06b Fatalities and serious injuries



From 2017 to 2022, fatalities decreased -8% while serious injuries decreased -19%.

From 2021 to 2022, serious injuries increased by +17% while fatalities increased by 14%.

This evolution appears quite erratic as it might depend on a small number of severe accidents.

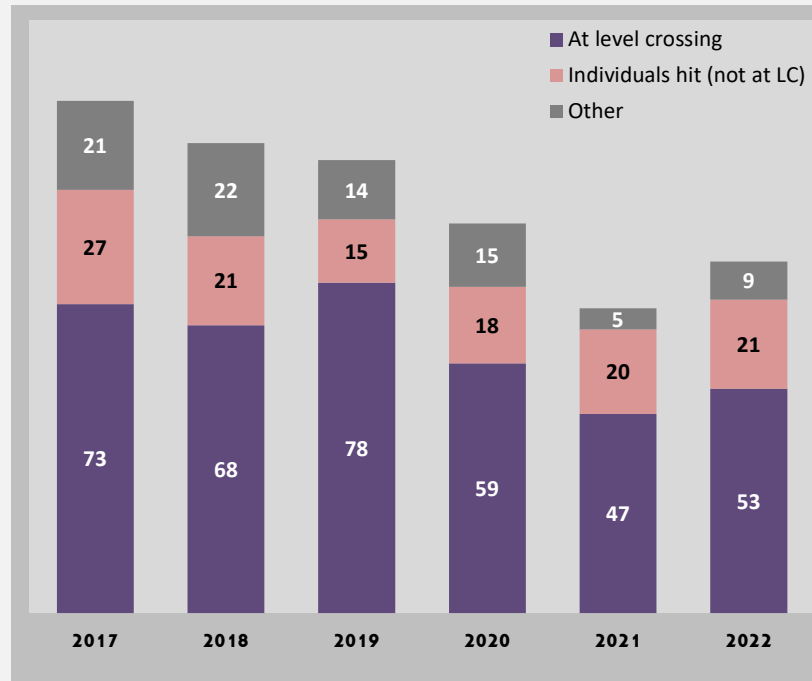
Every year, railway accidents lead to more fatalities than serious injuries, due to the preeminence of "individuals hit by a train" (see graph 2.14).

2.07a Severe accidents (two and more victims)

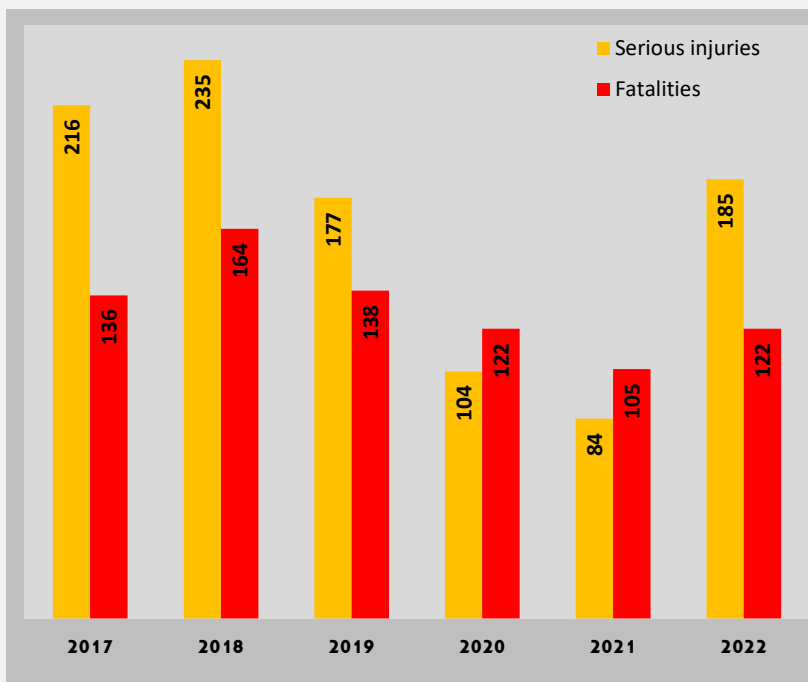
Severe accidents peaked in 2017. Severe accidents decreased -31% between 2017 and 2022. They represent 5% of all accidents in 2022.

The number of collisions with road vehicles at level crossings decreased -27% on the same period.

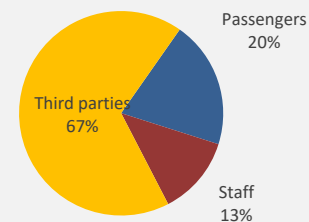
Comparing to 2021, there is a slight increase of all indicators in 2022.



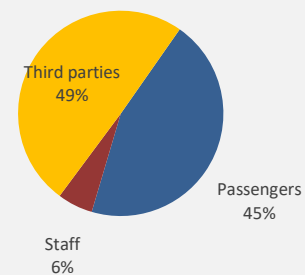
2.07b Victims of severe accidents



Split of victims 2017



Split of victims 2022



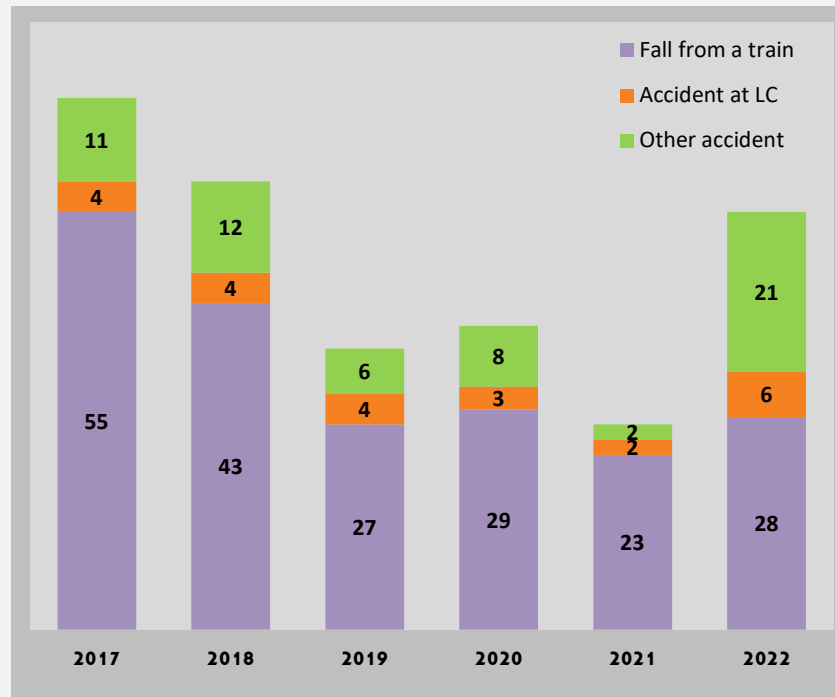
In 2022 there are more serious injuries than fatalities within severe accidents, which inverses the tendency of the two previous years and comes back to pre-COVID trend where serious injuries were dominant.

2.08a Accidents with passenger victims

The number of accidents with passenger victims decreases, since the peak of 2017 (-21%).

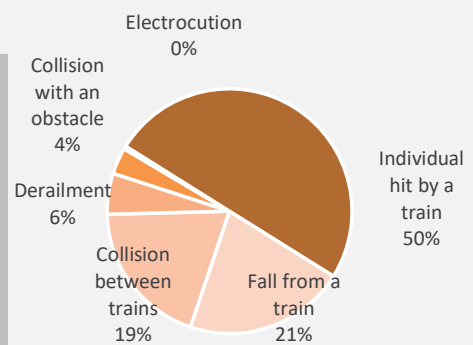
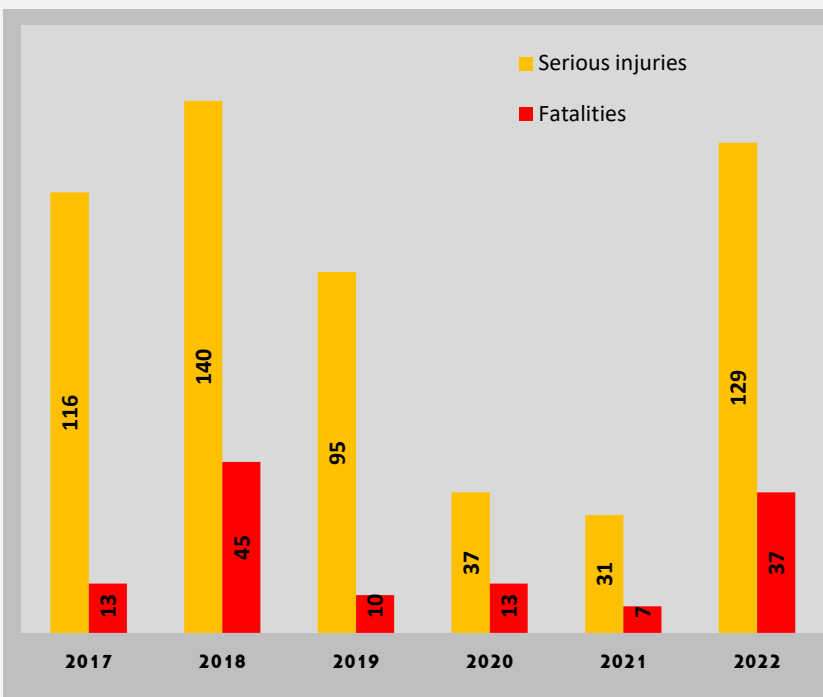
After a significant drop during 2019-2021 years, the passenger victims are on the rise again, close to the 2018 level (55 accidents)

There is a significant rise in Other accidents, among which derailments and collision between trains result in numerous passenger victims.

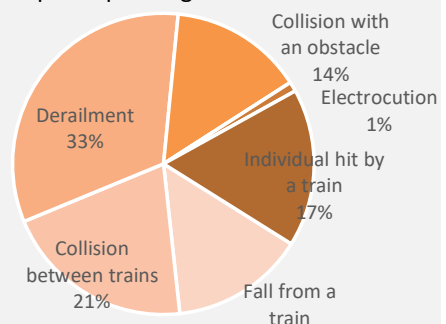


Split of passenger victims in 2017

2.08b Passenger victims



Split of passenger victims in 2022



Two major accidents in 2022 resulted in numerous passenger victims which could partly explain the rise:

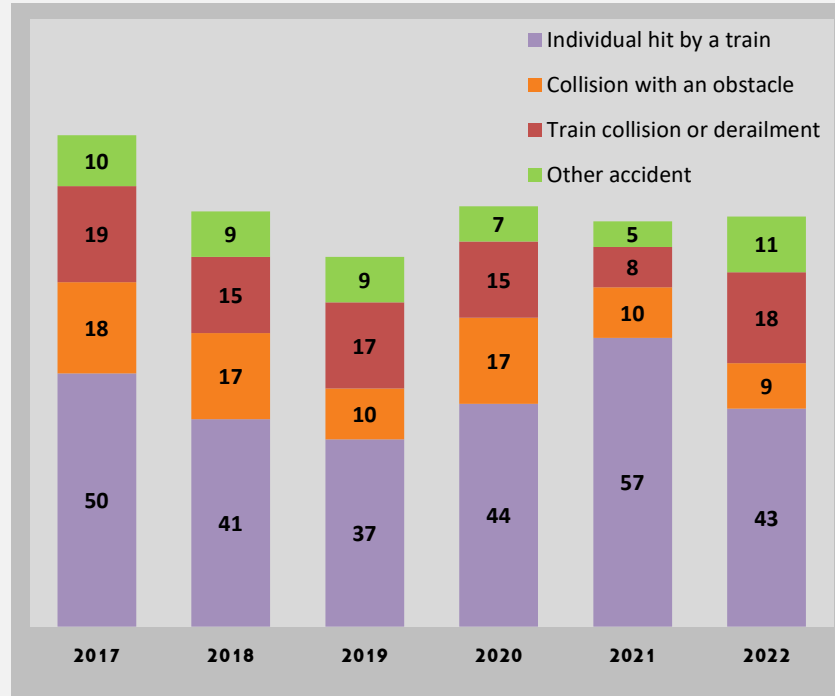
- a derailment causing 39 victims, 25 of which are seriously injured;
- a derailment causing 21 victims, 16 of which are serious injuries.

2.09a Accidents with staff victims

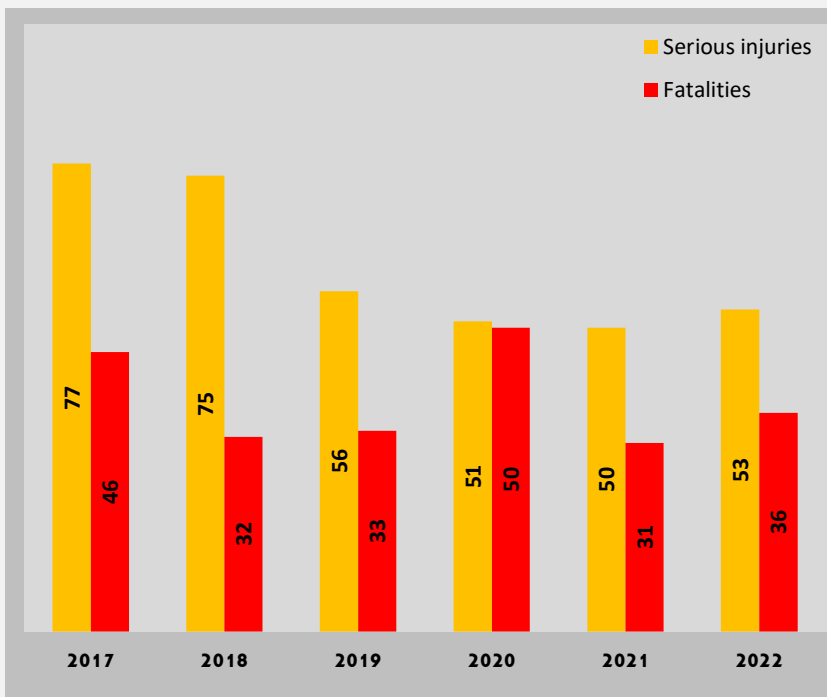
Trends are not obvious on this six-year period, but we should not forget that the number of accidents ten years ago was around 200, which means twice the present number.

Rail infrastructure staff pays the heaviest price (53% of accidents are workers hit by a train).

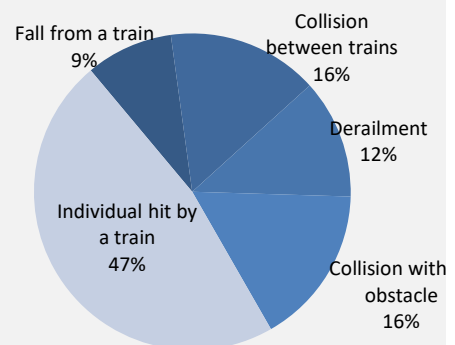
Collisions between trains and derailments are responsible for 22% staff victims.



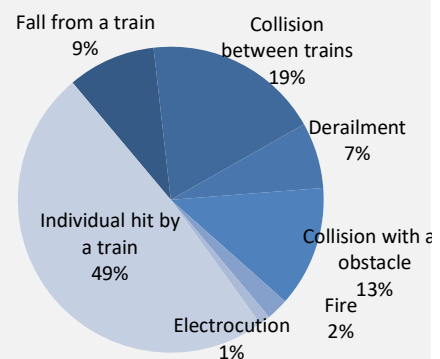
2.09b Staff victims



Split of staff victims in 2017



Split of staff victims in 2022

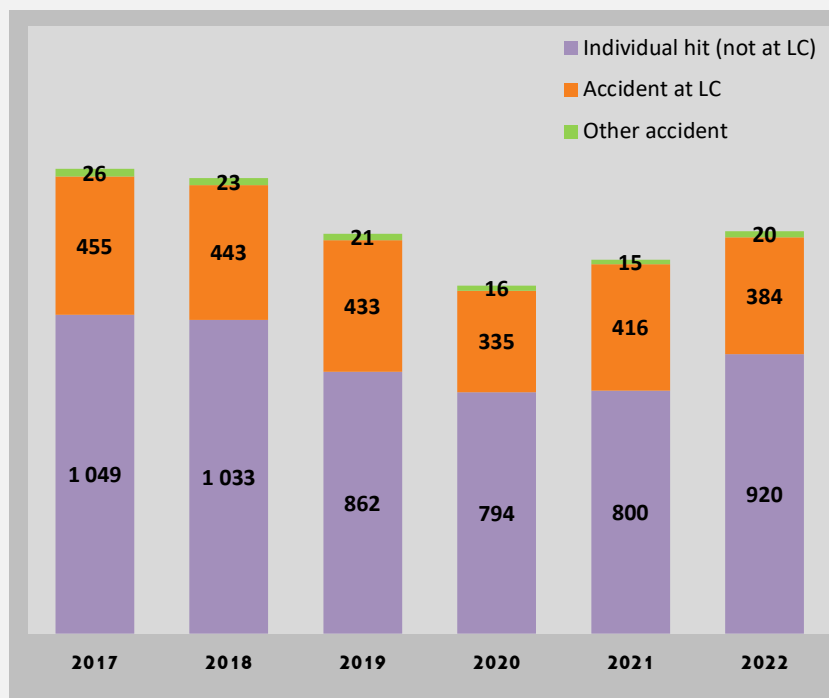


2.10a Accidents with third parties victims

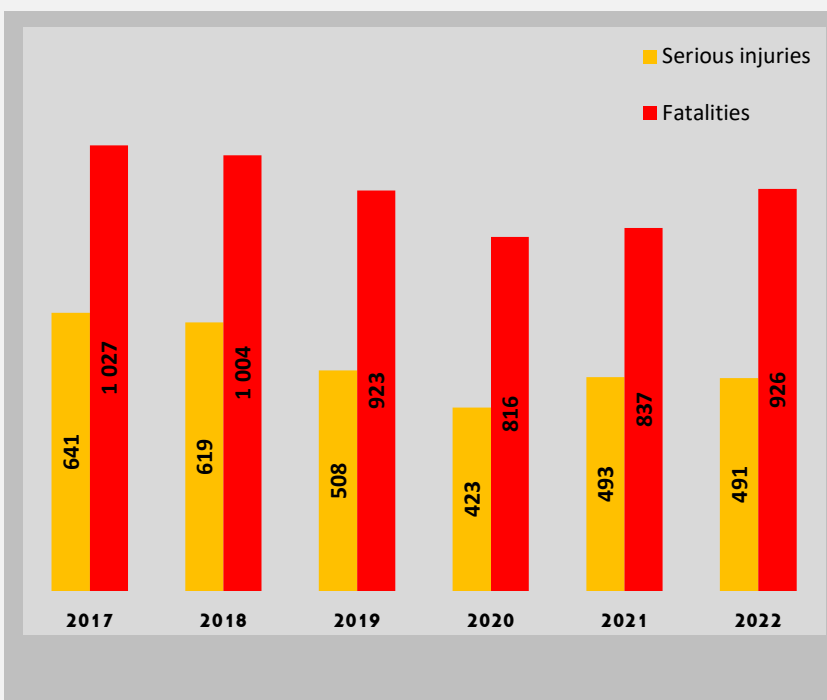
The number of accidents with third parties victims decreased -14% between 2017 and 2022. However, we can observe a steady rise since its lowest level in 2020.

2020 was the year of lockdowns and mobility restrictions. Less people were allowed to go out and less trains were running. 2020 is an exception and doesn't fit with the trends observed on the past years.

The numbers observed in 2022 are close to the year 2019 values .



2.10b Third parties victims



Fatalities decreased -15% from 2017 to 2022, whilst serious injuries decreased -24%.

Fatalities represent around 66% of all victims every year (65% in 2022).

In 2022, most victims were trespassers (64%), followed by LC users (32%) and other third parties (3%), mostly pedestrians on public railway area (platforms).

One sole LC accident led to 5 fatalities and 2 serious injuries.

2.11a Collisions with an obstacle

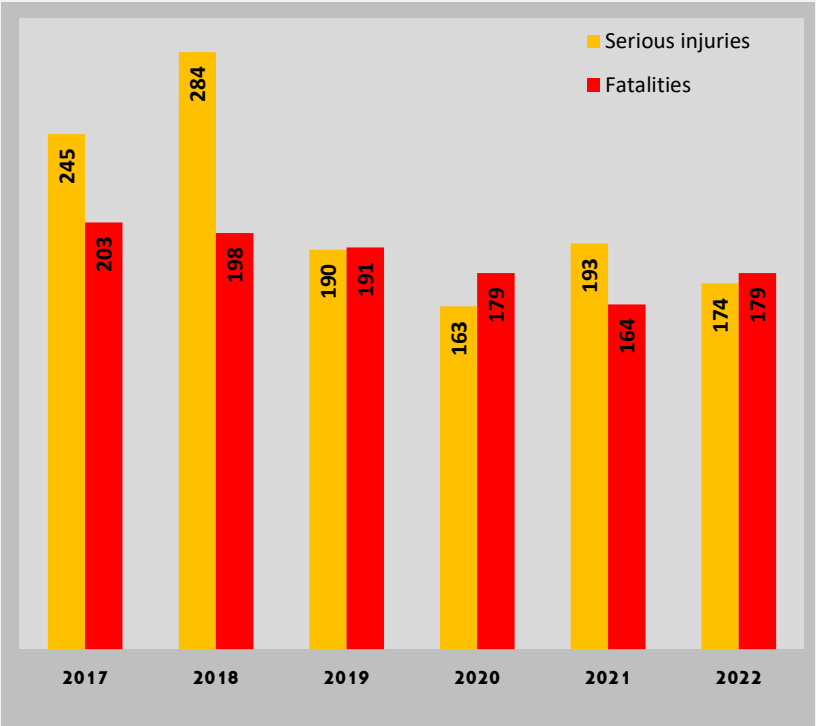
This graph excludes shunting operations.

After its lowest level in 2020, collisions with an obstacle are slightly rising again in 2021. In 2022 the collisions outside the level crossings remain stable, thus the level crossing collisions are on the rise.

72% of collisions with an obstacle occur at level crossings. See graph 2.16.



2.11b Victims of collisions with an obstacle



There is a very small increase in numbers of victims compared to previous years, but decrease in ratio victims per accident:

- ◆ 1.19 victim per event in 2016
- ◆ 1,02 victim per event in 2017
- ◆ 0.85 victim per event in 2021
- ◆ 0.81 victim per event in 2022

The total number of victims decreased -21% since 2017 (fatalities: -12% and serious injuries: -29%).

Accidents at level crossings represent 72% of the total collision with an obstacle accidents in 2022.

The four collisions with the vehicle are standing out in 2022 resulting in more than 5 victims each.

2.12a Collisions between trains

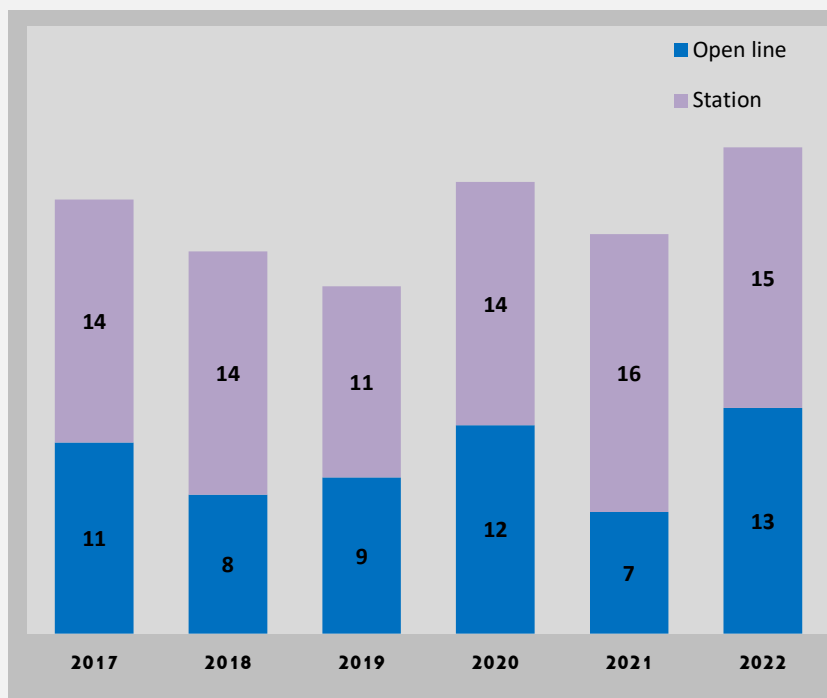
This graph excludes shunting operations.

Numbers are quite low. However, they do not allow to determine trends.

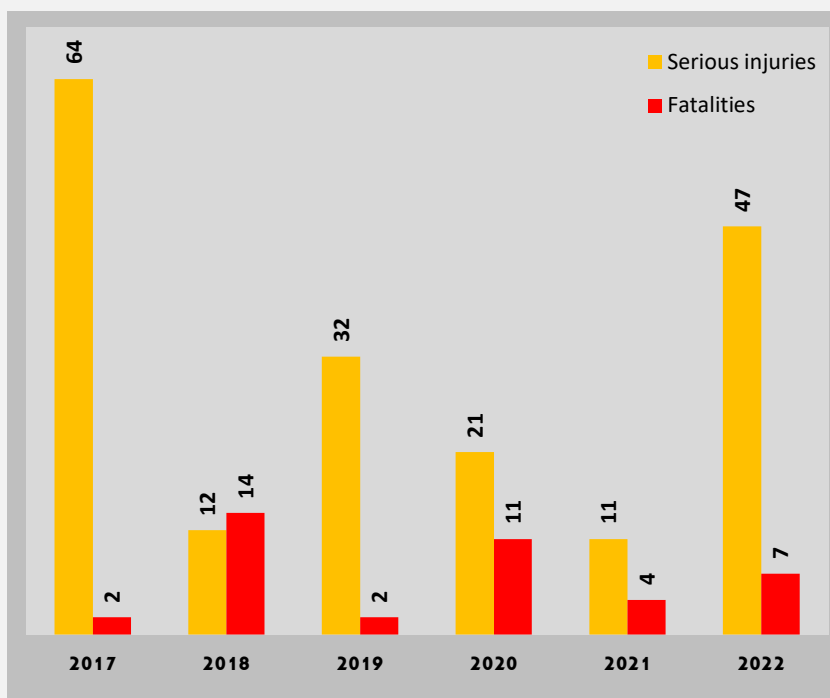
There is no correlation between the number of accidents and the number of victims. Few very severe accidents may lead to a large number of victims.

Proportion of victims caused by the 2 most severe collisions each year:

2017	68%
2018	53%
2019	93%
2020	36%
2021	73%
2022	69%



2.12b Victims of collisions between trains



On the whole period, 10 accidents led to 61% of accounted victims in collisions between trains.

59% of the collisions that occurred during 2022 had no human consequences.

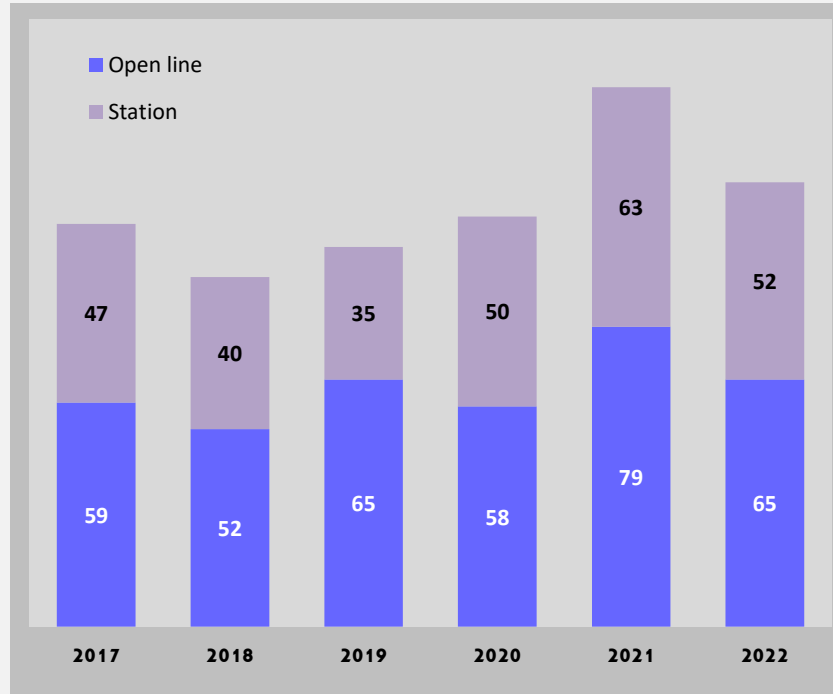
74% of the victims recorded in 2022 were passengers and 22% were staff.

2.13a Derailments

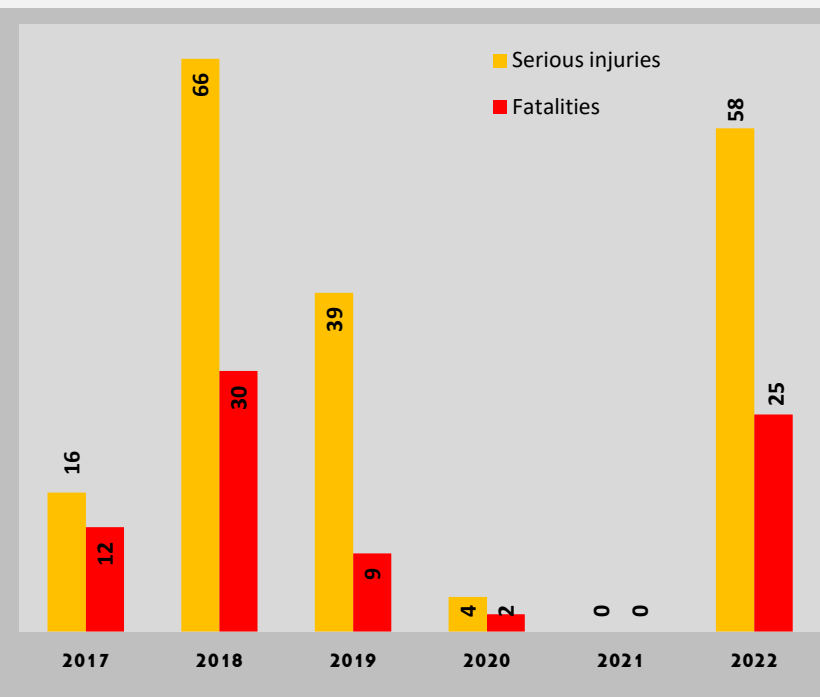
There were 17% less derailments in 2022 comparing to the previous year.

2021 there was a peak of derailments. There is a -14% decrease in derailment in 2022 compared to 2021.

The graph excludes shunting operations (there were 32 derailments during shunting operations).



2.13b Victims of derailments



91% of all derailments in 2022 had no human consequences.

Four accidents generated 92% of all derailment victims in 2022.

Only 11 (9%) derailment accidents resulted in fatalities.

No casualties were recorded in 2021.

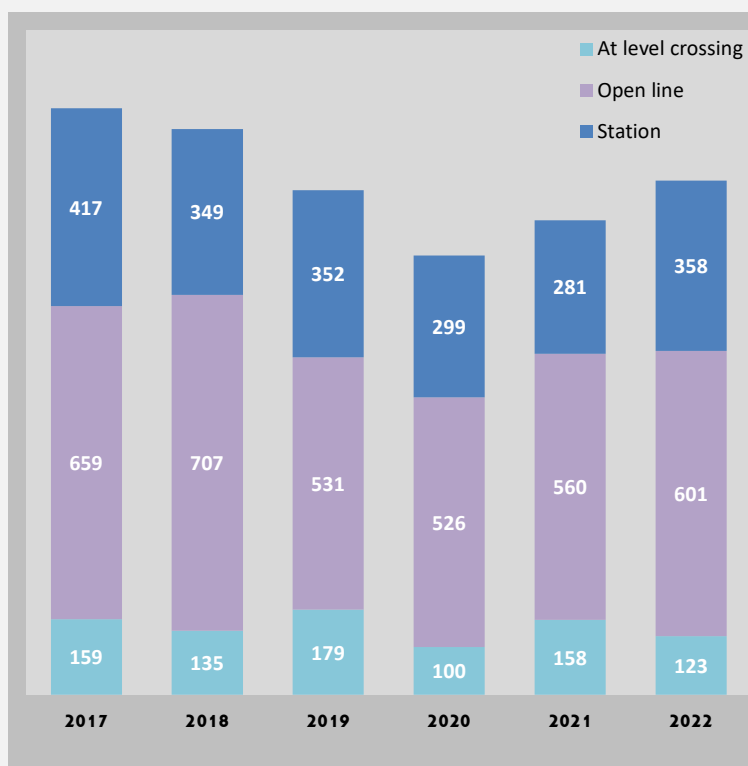
Two derailments in 2022 were responsible for 72% of the total derailment victims.

2.14a Individuals hit by a train: accidents

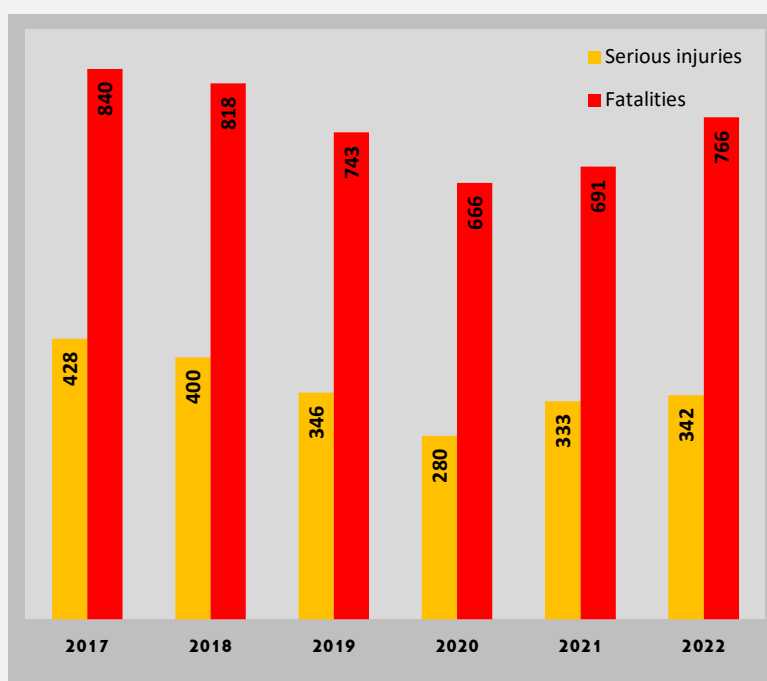
The number of accidents remained stable from 2015 to 2018. It decreased in 2019 (-172 accidents on open line) and again in 2020 (-51 accidents in station and -72 accidents at level crossing).

This may be explained by the exceptional restrictions on mobility: less road traffic led to less accidents at level crossing and less persons on platforms led to less accidents in station.

Figures obtained in 2022 shows a progressive increase and confirm the exceptional situation of 2020. The total number of accidents in 2022 is -12% lower than the number observed in 2017.



2.14b Individuals hit by a train: victims



Individuals being hit by a train result in fatality in two thirds of events. This proportion remains stable along the years.

Split of victims in 2022:

- ⇒ Trespassers 81%
- ⇒ LC users 11%
- ⇒ Persons hit on platform 4%
- ⇒ Staff 3%

Split of accidents per number of victims in 2022:

- ⇒ 1 victim: 1062 events (96%)
- ⇒ 2 victims: 20 events
- ⇒ 3 victims: 2 events

Both graphs exclude shunting operations.

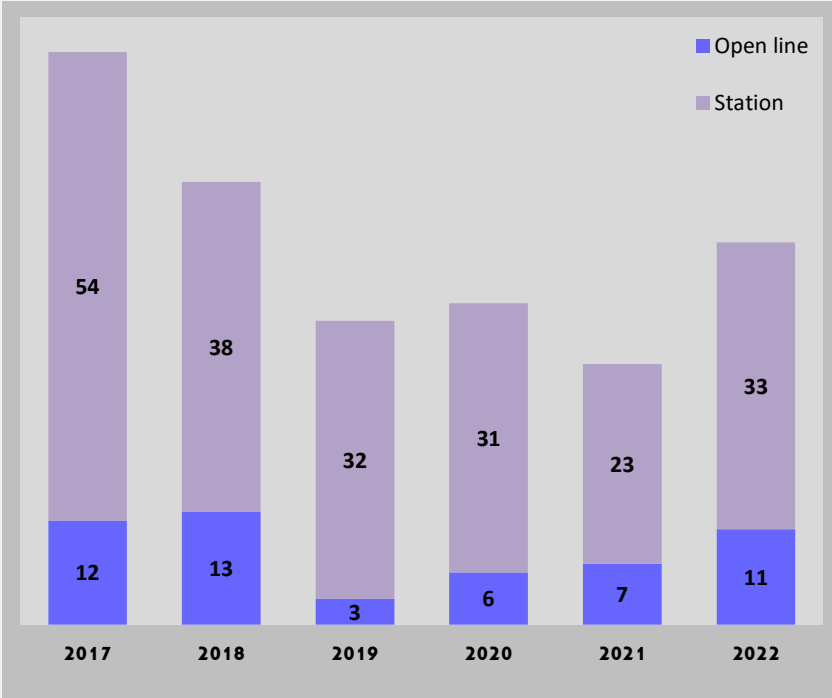
2.15a Individuals falling from a train: accidents

Individuals falling from a train are less and less common. This type of accident now represents 2% of all accidents (7% ten years ago).

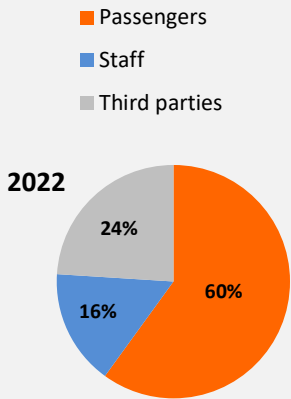
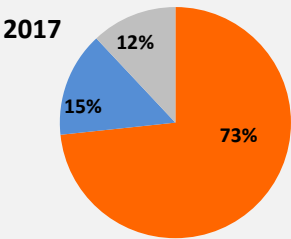
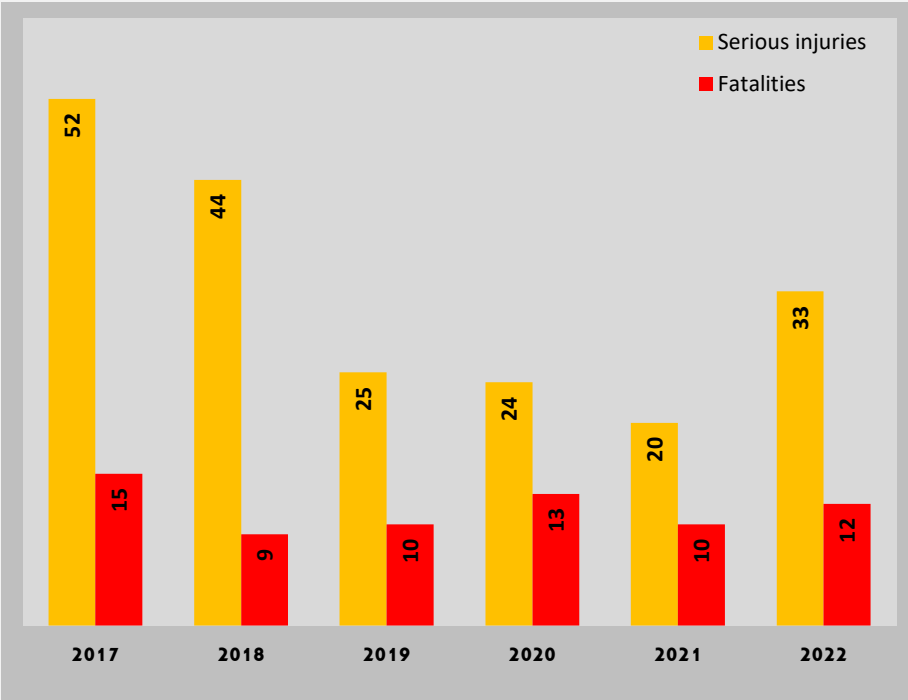
Most events occurred at station.

In 2022, passengers were involved in 28 cases, staff in 5 cases, trespassers in 8 cases, other in 4.

The graph excludes shunting operations.



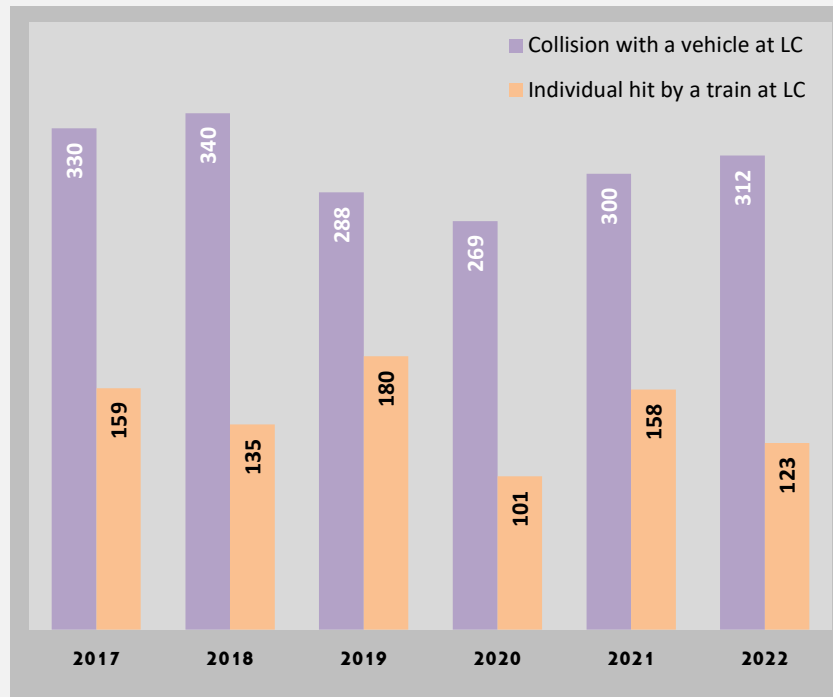
2.15b Individuals falling from a train: victims



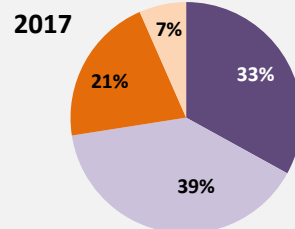
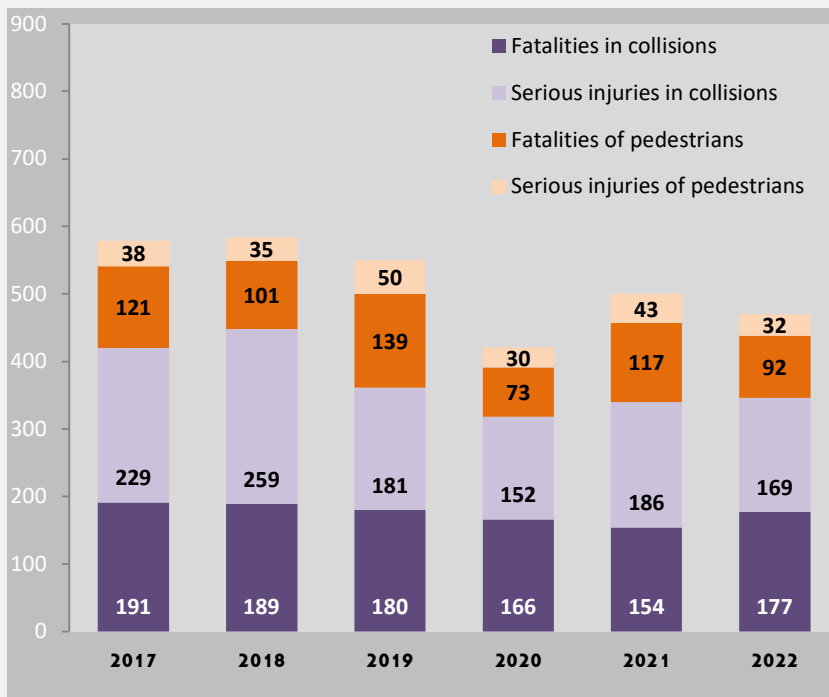
2.16a Accidents at level crossings

Collisions with the vehicle in 2022 are relatively stable compared to the previous year. Individuals hit by a train shows a significant decrease compared to the previous year.

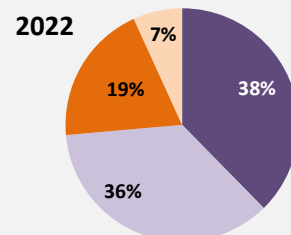
The split of victims shows an increase of fatalities due to collisions with a vehicle and a decrease in pedestrian fatalities (see graph below). Fatalities represent 55% of victims in 2022 which is very close to 2017 levels 54%.



2.16b Victims of accidents at level crossings



■ Fatalities in collisions
 ■ S. injuries in collisions
 ■ Fatalities of pedestrians
 ■ S. injuries of pedestrians



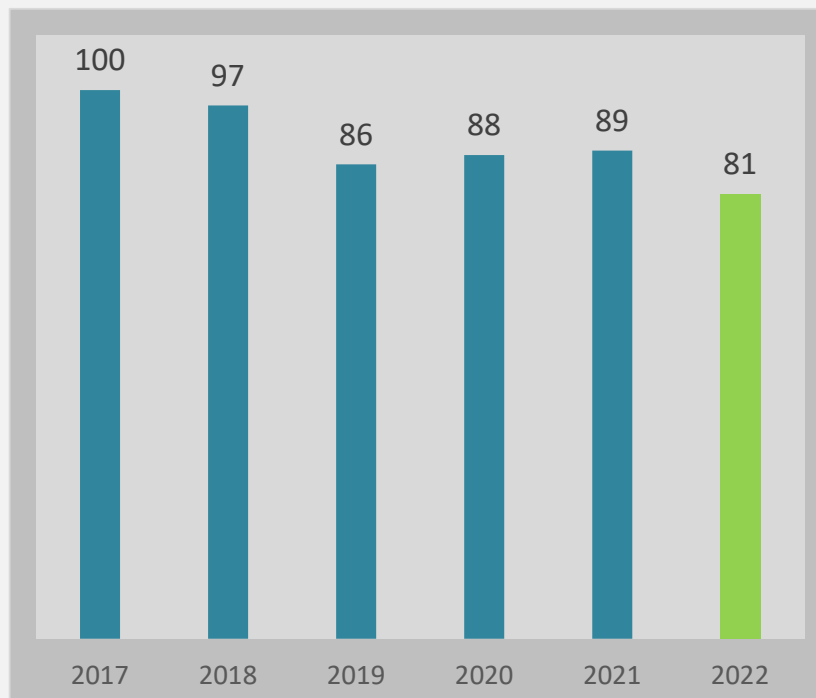
2.17a Significant accidents per million train-km (basis 100 = year 2017)

The number of significant accidents per million train-km regularly decreased between 2017 and 2022.

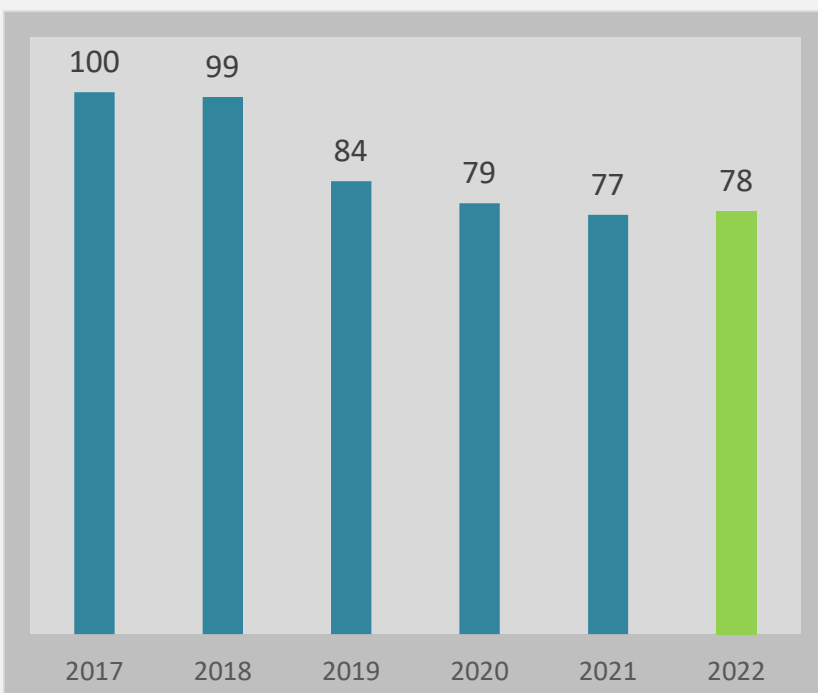
During the year 2020, the traffic dropped -9% but significant accidents only dropped -7%.

Logically, the ratio "significant accidents per million train-km" increased.

During the year 2022, the traffic increased significantly, so the ratio is at its lowest for the whole period.



2.17b Victims per million train-km (basis 100 = year 2017)



The ratio "victims per million train-km" dropped -12% in the year 2017, remained stable in the next year and dropped again -16% in the year 2019.

We observe a slight improvement of the ratio in the year 2020, despite the increase of the ratio "accidents per train-km".

The year 2021 shows a new improvement and the ratio is now 32% lower as the value observed five years earlier.

2022 indicator is close to the previous year with a small increase.

Part 3 - SUICIDES VERSUS TRESPASS EVENTS

3.00 Highlights

3.01 Suicide mortality rate in the world

3.02a Number of Suicides and Trespass events 2012-2022

3.02b Number of Suicides and Trespass events 2012-2022 (train-km)

3.02c Number of Suicides, Suicide Attempts and Trespass events 2019-2022

3.02d Number of Suicides, Suicide Attempts and Trespass events 2019-2022 (train-km)

3.03a Suicides and attempts compared to Unauthorized victims 2012-2022

3.04a Seasonal Trends Suicides and Trespass

3.04b Seasonal Trends Suicides and Trespass (train-km)

3.04c Suicides per month 2019-2022

3.04d Suicides per month 2019-2022 (train-km)

3.05a Light Conditions : suicides, attempts, trespass

3.06 Location details: suicides, attempts, trespass

3.00 Highlights

Often resulting in injury or fatality, disruptive for the traffic, traumatic for the witnesses, trespass events and suicides has always been and remain one of major challenges to the railway safety.

In the current edition of UIC Safety Report, 62% of all significant accidents that made at least one victim (injury or fatality) were declared to be caused by a Trespasser.

Even if suicides on railway infrastructure represent a relatively low percentage compared to national suicide rate, it remains one of the major challenges for the railways: both for the stakeholders and for the users.

As a response to EU rail industry concerns, a European project EU RESTRAIL was carried out in 2011-2013. Coordinated by UIC, the project performed a deep dive into both trespass events and suicides phenomena, producing a toolbox as well as a practical guide on how to prevent suicide and trespass on the railways and mitigate their consequences.

This year, the UIC Safety Report is tackling this topic in the frame of this report focus studying a correlation between the trespass events and suicides based on data from European and non-European countries. This study offers a prospective on suicides and trespass events dynamics on three levels: at year level for the 10 years period and 4 years period, at month level to track the eventual seasonal changes and at daily level exploring the light conditions of the events.

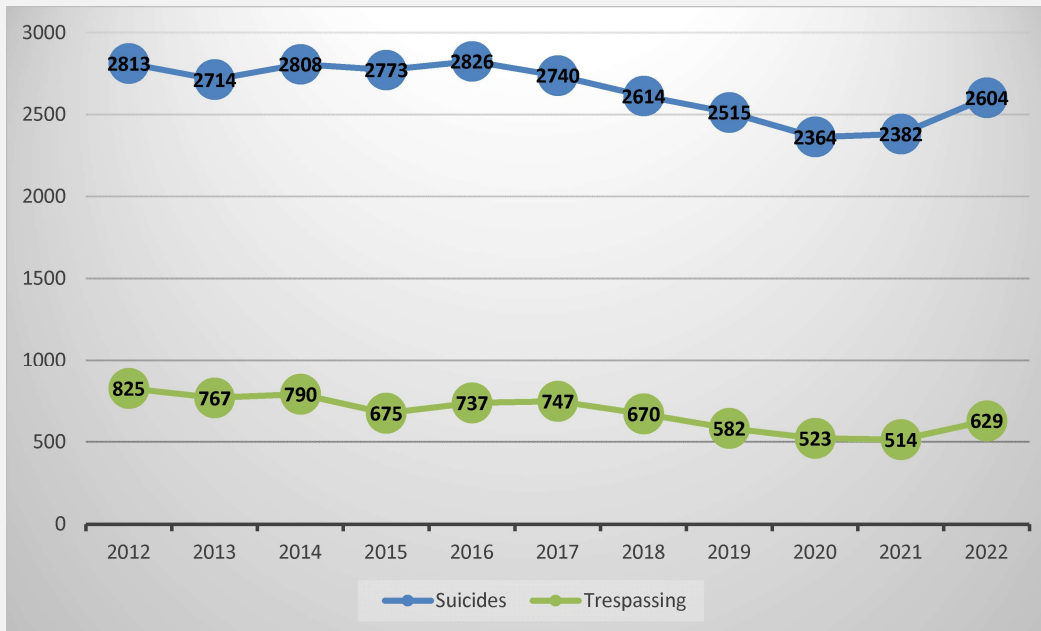
It is important to note that the trespass events analysed in this study are those declared as significant accidents and do not include the totality of the trespass events occurred on the networks.

3.01 Suicide mortality rate in the world

Country	Population ¹	Number of suicides, all ages, 2019 ²	Crude suicide rates, all ages (per 100 000), 2019	Railway suicides, 2019	Crude railway suicide rate	Railway suicides %
AT	9 010 000	1 307	14,6	70	0,78	5%
BE	11 640 000	2 111	18,3	93	0,80	4%
BG	6 950 000	681	9,7	18	0,26	3%
CA	38 070 000	4 417	11,8	NA	NA	NA
CH	8 650 000	1249	14,5	110	1,27	9%
CZ	10 710 000	1302	12,2	236	2,20	18%
DE	84 070 000	10284	12,3	646	0,77	6%
ES	46 770 000	3609	7,7	90	0,19	2%
FI	5 540 000	846	15,3	50	0,90	6%
FR	65 280 000	8961	13,8	264	0,40	3%
GB	68 240 000	5325	7,9	255	0,37	5%
GR	10 420 000	533	5,1	3	0,03	1%
HR	4 110 000	676	16,4	20	0,49	3%
HU	9 660 000	1612	16,6	71	0,73	4%
IE	4 940 000	470	9,6	6	0,12	1%
IR	83 970 000	4334	5,2	0	0,00	0%
IT	60 380 000	4042	6,7	127	0,21	3%
KR	51 470 000	2407	9,4	15,0	0,03	1%
LT	2 750 000	721	26,1	7	0,25	1%
LU	630 000	69	11,3	3	0,48	4%
LV	1 900 000	384	20,1	10	0,53	3%
NL	17 170 000	2025	11,8	219	1,28	11%
NO	5 420 000	633	11,8	8	0,15	1%
PL	37 850 000	4282	11,3	152	0,40	4%
PT	10 200 000	1172	11,5	40	0,39	3%
RO	19 240 000	1886	9,7	41	0,21	2%
SA	34 810 000	2046	6,0	0	0,00	0%
SE	10 160 000	1479	14,7	84	0,83	6%
SI	2 080 000	411	19,8	17	0,82	4%
SK	5 460 000	660	12,1	57	1,04	9%
TR	84 330 000	2003	2,4	14	0,02	1%
XK	1 770 000	NA	NA	NA	NA	NA

¹ <https://data.oecd.org/pop/population.htm>² Source : World Health Association <https://apps.who.int/iris/bitstream/handle/10665/341728/9789240026643-eng.pdf>

3.02a Number of Suicides and Trespass events 2012-2022



Perimeter: 19 countries

The drop in 2019-2021 in absolute numbers is probably influenced by the COVID-pandemic : less trains were run and there were mobility restrictions.

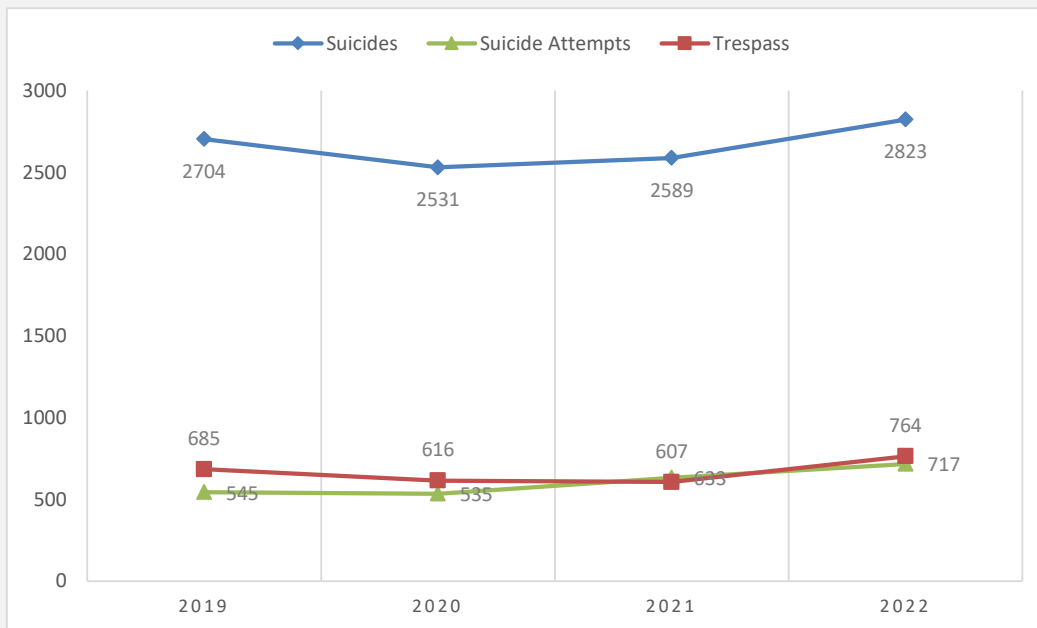
3.02b Number of Suicides and Trespass events 2012-2022 (train-km)



Perimeter: 19 countries

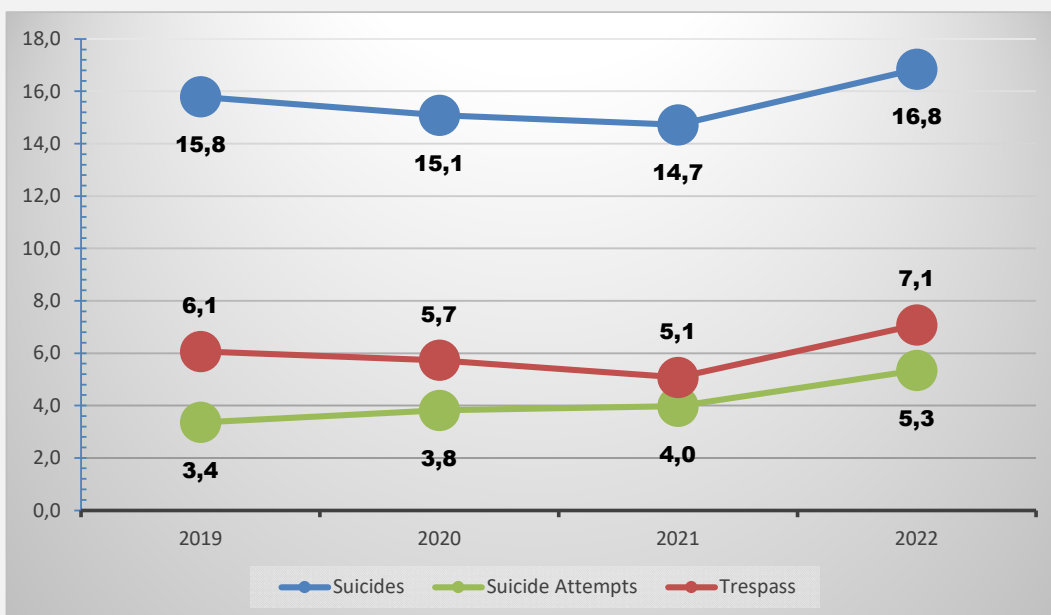
After a decreasing trend since 2014, there is a big increase in 2022, going back to the 2017 level.

3.02c Number of Suicides, Suicide Attempts and Trespass events 2019-2022



Perimeter: 29 companies in 28 countries

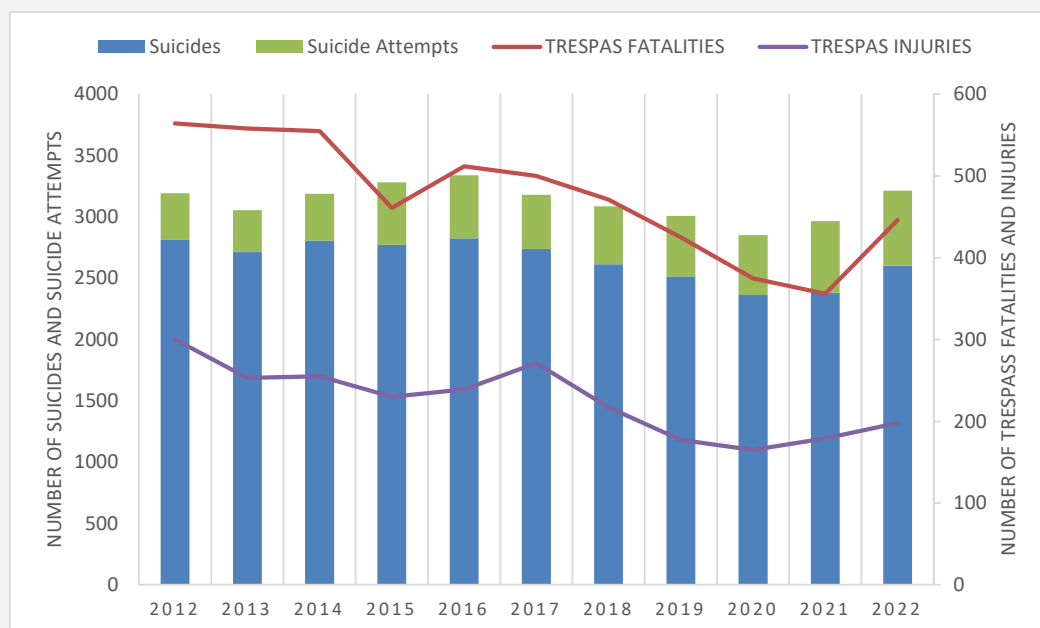
3.02d Number of Suicides, Suicide Attempts and Trespass events 2019-2022 (train-km)



Perimeter: 29 companies in 28 countries

For the larger perimeter of countries, the trend for the last 4 years remain the same: a drop during the COVID years, probably due to the mobility restrictions and a significant increase in 2022.

3.03a Suicides and attempts compared to Unauthorized victims 2012-2022



Perimeter: 19 countries



3.04a Seasonal Trends Suicides and Trespass



Perimeter: 25 countries



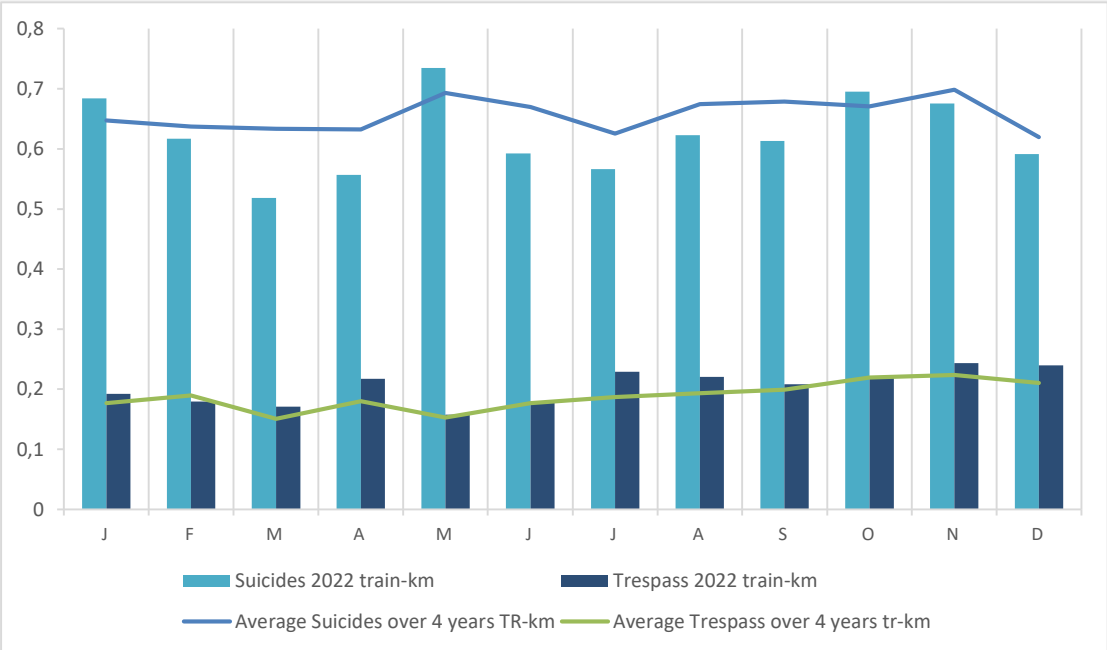
Perimeter: 25 countries

These graphs compare the 2022 suicide and trespass absolute numbers to the 4-years average of each month in the first case and to the 4years average in the second case.

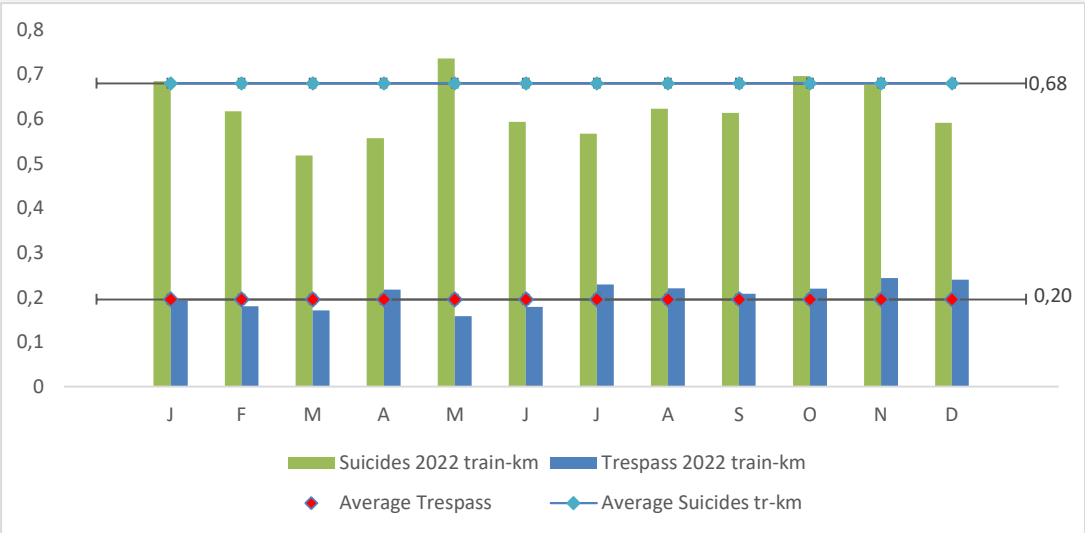
In winter period the suicides are low (with exception of January) and there is a significant peak in May and October.

For the trespassing there seem to be an increase in the second half of the year: July-December) with no particular month standing out.

3.04b Seasonal Trends Suicides and Trespass (train-km)

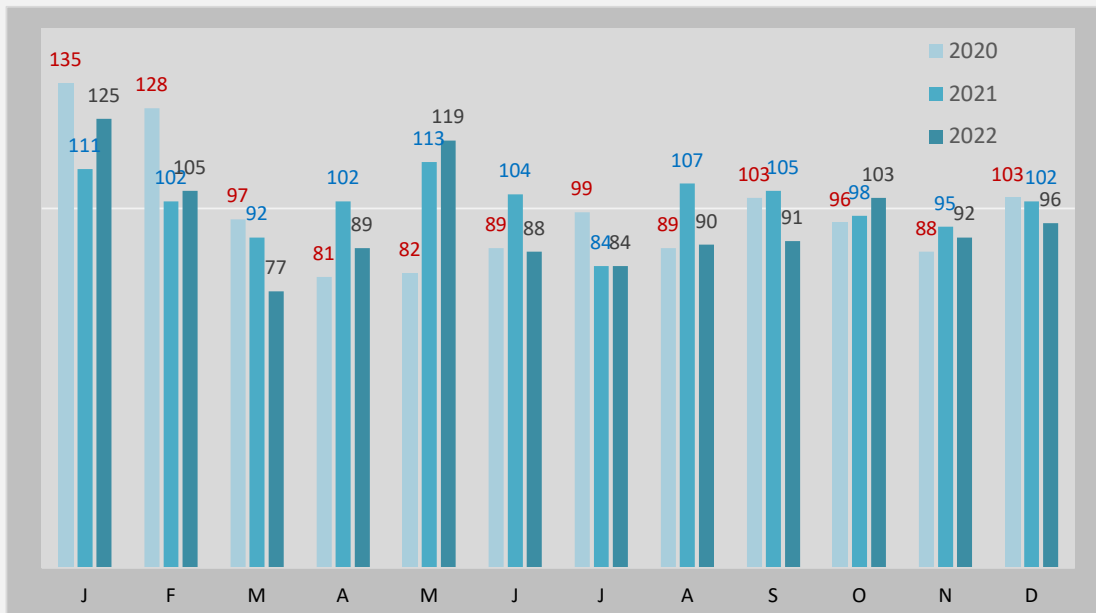


Perimeter: 25 countries



Perimeter: 25 countries

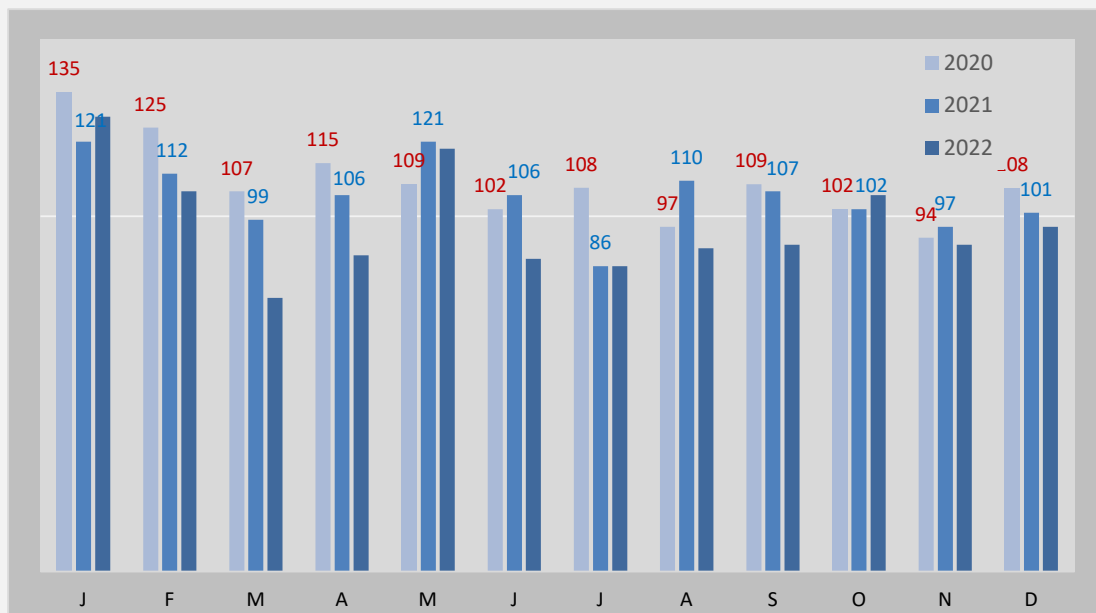
3.04c Suicides per month 2019-2022



Perimeter: 25 countries

base 100 = same month 2019

3.04d Suicides per month 2019-2022 (train-km)

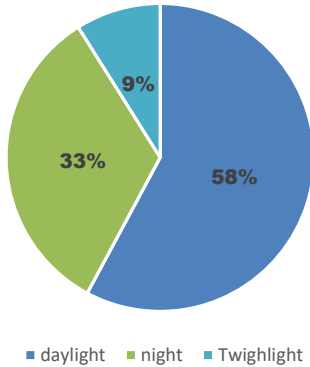


Perimeter: 25 countries

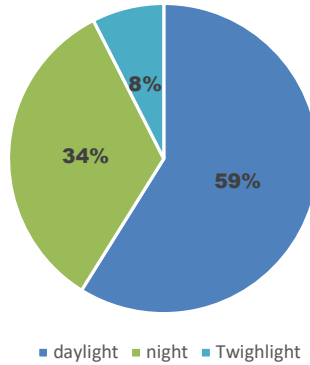
base 100 = same month 2019

3.05a Light Conditions : suicides, attempts, trespass

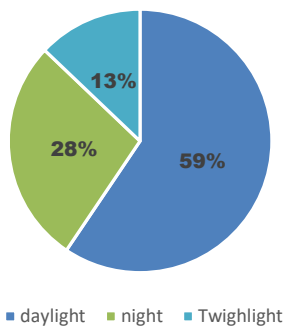
Suicides 10 years average



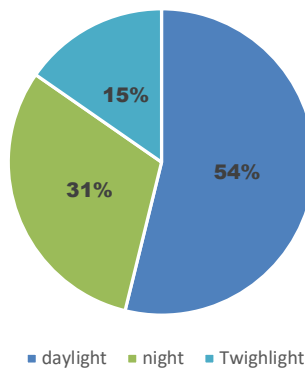
Suicides 2022



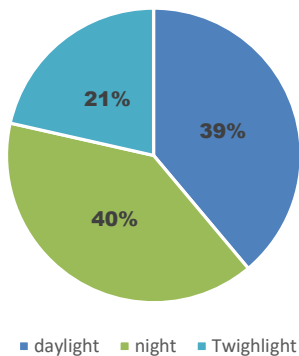
Suicide Attempts 10 years average



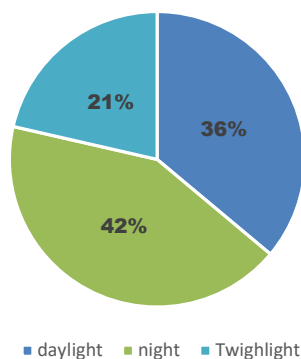
Suicide Attempts 2022



Trespass 10 years average



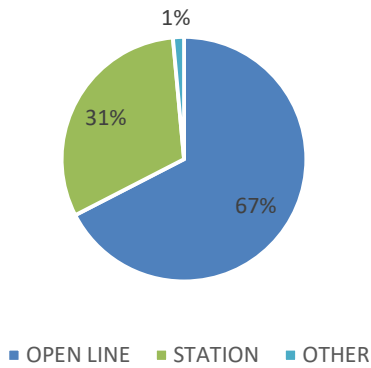
Trespass 2022



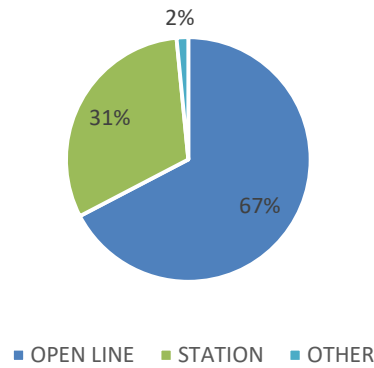
There are considerable differences in light conditions of the trespass events and the suicides. Suicides as well as the attempts are mostly committed during the day. However, for the trespass events both daylight and night stand out with a slight predominance of the latter. The twilight part is much larger for trespass, less for the suicide attempts and marginal for the suicides.

3.06 Location details: suicides, attempts, trespass

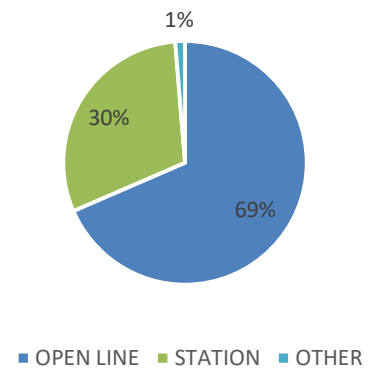
Suicides 2012-2022



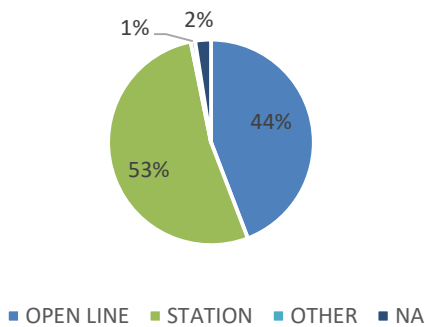
Suicides 2019-2022



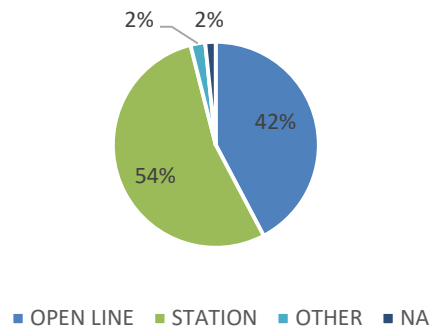
Suicides 2022



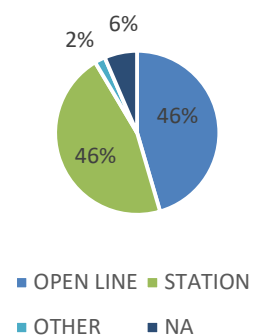
Suicide attempts 2012-2022



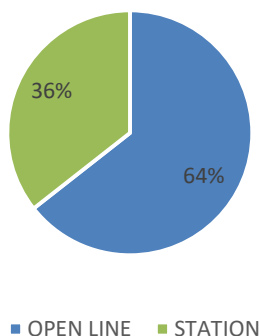
Suicide attempts 2019-2022



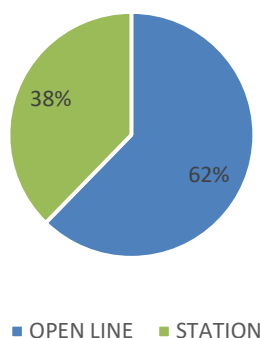
Suicide attempts 2022



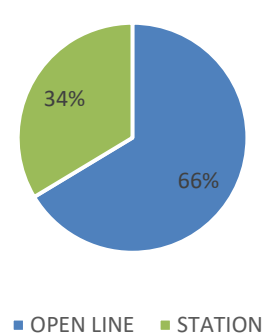
Trespass 2012-2022



Trespass 2019-2022



Trespass 2022



There are relatively more Attempts in Stations compared to Open line. So in Stations there are more suicide attempts ending in injuries compared to fatalities.

Definitions from the Commission Directive 2016/798/EC ("Safety Directive")

"**Significant accident**" means any accident involving at least one rail vehicle in motion, resulting in at least one killed or seriously injured person, or in significant damage to stock, track, other installations or environment, or extensive disruptions to traffic, excluding accidents in workshops, warehouses and depots.

"**Significant damage to stock, track, other installations or environment**" means damage that is equivalent to EUR 150 000 or more.

"**Extensive disruptions to traffic**" means that train services on a main railway line are suspended for six hours or more.

UIC Safety Database

Report 2023

Significant Accidents 2022

Public report available on the UIC website

<http://safetydb.uic.org>



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