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Research report

Deliveries of packages - mapping challenges related to the impact on road safety and mobility in Belgium.

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Content

Executive summary

This study aims at investigating the impact of package delivery on mobility and road safety in Belgium. We focus on delivery of packages only – instant food deliveries are not covered in this study. The objective is to qualify the impact of package deliveries and to provide a comprehensive, holistic view on the situation, based on the perspective of all relevant stakeholders: service providers, delivery workers, communes, police, related organizations and general public. A synthesis of challenges and risks as well as possible actions to mitigate these is provided, taking into account the perspectives of all stakeholders.

The results are based on review of the recent literature concerning the topic, analyses of available data sets concerning accidentology in Belgium and Europe and of specific quantitative and qualitative data collected for the purpose of this study. We analyze the fleet evolution with DIV data (vehicle registrations) and estimate the impact on road safety by crossing this data set with available crash statistics.

Two representative samples of 1000 adult Belgian citizens were asked two different sets of questions: a first one regarding their acceptability of certain van drivers behaviors and the frequency of their observation, and a second about the attitudes towards behavior of cargo bikers and their willingness to pay for different standards of deliveries. Additionally, we collected 100 responses of package delivery workers concerning their experience, their behavior on the road, their attitudes towards their own behavior and that of their colleagues, the risks and problems they perceived in their daily tasks and their perception on possible ways to improve their safety and comfort at work. Due to low representation of cargo cyclists in the sample, the analyses focuses on the van drivers.

Additionally, following a common protocol, 14 qualitative interviews were conducted with service providers, relevant associations, communes and police, concerning the challenges, opportunities, knowledge gaps and specificities of the sector. The proposed set of recommendations takes into account the suggestions of all interviewees as well as best practices from abroad, the principles of road safety and existing legislative constraints.

We found that there is not enough specific data available to fully estimate the scope of the challenges and impact on road safety. No major differences were observed between urban and rural areas, however more of discussed challenges are typical in urban environment. Many risks have been acknowledged by numerous independent actors, which indicate a structural and multidimensional nature of the challenge. Among the most frequent, time pressure on drivers, working conditions, importance of training, difficulties with parking and traffic intensity have been mentioned.

Despite the growth in the total vehicle fleet, the number of road crashes involving company-owned vans and their severity has decreased significantly between 2017 and 2020. However, there is still a lot of room for improvement as the percentage of road crashes between company-owned vans and vulnerable road users has increased and keeps growing. We urge that road safety cannot be used as a competitive advantage, which we have observed as a practice among some of the providers. The company-owned fleet itself is growing at a slower pace than the private one. The growth in the size of the vehicle fleet cannot be explained by the increase of e-commerce only; it is driven by other factors that require further investigation.

Belgian adults have only a limited willingness to pay an extra cost to improve delivery standards – however, ensuring fair working conditions for the delivery workers is strongly supported, even if this implies an additional cost. Home deliveries remain the preferred delivery option, although self-collection points are an interesting alternative to many. Public opinion is also highly biased in terms of image it has regarding the deliveries. It should be noted that the acceptability of certain risky or illegal behaviors

is very low, even though these behaviors do not occur a lot. Education and awareness campaigns are needed to facilitate wider application of the self-collection of packages, to increase cohabitation between road users and the understanding of what can be expected from a delivery worker on the road.

Many van drivers admit that they often do not respect the highway code – the most common behaviors are speeding violations and using space for cyclists and pedestrians to load or unload packages. They have also indicated that the behavior of other road users and shortage of parking to load/unload lead to difficulties in their daily work and are reasons for (near) crashes. Strong correlations were observed between the experience, the behavior and the attitude of the drivers.

The sector is undertaking efforts to tackle the challenges and risks related to the deliveries. These include on the side of the providers: intense training programs, deployment of telematic solutions and fleet innovation, optimization of operations with the objective to attract employees and provide them with the tools to safely execute their tasks. However, although many challenges can and should be addressed by the providers, certain risks cannot be mitigated without involvement of different stakeholders. The providers referred to access to data, traffic intensity, infrastructure availability, connectivity, and a coherent strategy as areas which were beyond their responsibility.

The volume of package deliveries is likely to further increase in the future, and cities should account for it in the planning. Structural changes are needed to improve delivery patterns such as adjustment in infrastructure and adaptations of urban planning. This would help to change the modal split and facilitate more cargo bike deliveries and on-foot last mile. It is also needed to work on public awareness as well as to create a road map for all actors in the sector to understand the objectives and align expectations.

Although strategic changes are required to achieve significant progress, many improvement can be achieved in the short and medium term. Increased enforcement, training for drivers and physical separation of the infrastructure dedicated to cyclists and other vulnerable road users are quick wins. Also, better and more specific data collection is required to fully understand the performance and the impact that deliveries have on road safety and mobility in Belgium.

1 Impact of e-commerce

1.1 Evolution of e-commerce in Belgium

Some key facts from the recent literature:

- Belgium is **28th largest market** for e-commerce in the world.[1]
- **6%** of Belgians buy products online at least once a week and **30%** at least once a month.[2]
- Distribution of parcels in 2020 accounted for **62%** of postal services (**+42%** in comparison 2010).[2]
- Outbreak of the COVID19, led to a **44.5%** increase in the number of packages handled.[3]
- The volume of parcels handled in Belgium (table 1) has more than **quadrupled** between 2010 and 2020.[2]
- In 2019, e-commerce in Belgium accounted for **a third of general business turnover** – higher than in the neighboring countries as well as EU28 average - **18%**.[4]

According to a study carried out by the SPF Mobility, **80% of Belgians regularly make purchases online**, which is higher than the current European average of 70% (UNCTAD, 2021). This is a **12% increase** compared to the period before the pandemic (2019 vs. 2020).[5] According to BEMOB survey, following the outbreak of COVID19, a **5% shift** is observed among people who did online shopping less regularly in the year before towards purchasing online at least once a month in 2020.

Table 1 Evolution of the volume of parcel and express services in Belgium

Year	[mln]	Per capita
2010	72	6.64
2011	82	7.48
2012	83	7.53
2013	90	8.11
2014	103	9.27
2015	136	12.11
2016	155	13.71
2017	180	15.86
2018	208	18.33
2019	232	20.33
2020	336	29.22

Source: *Belgisch Instituut voor postdiensten en telecommunicatie*

[1] E-commerce barometer: annual report on the state of e-commerce in Belgium (2020)
[2] BEMOB (2021)
[3] Belgisch Instituut voor postdiensten en telecommunicatie (2021)
[4] SPF Economie (2019)
[5] Estimations of SPF Economie (2019) & SPF Mobilité (2021)

1.2 Impact on mobility

Some key facts based on the most recent available literature:

Patterns:

- **56%** of deliveries in Belgium occur in urban areas.[6]
- Roland Berger (2020) estimated that in Europe, for every 1.000 urban inhabitants, **300 to 400 freight trips** are carried out. In the case of Brussels and its surrounding area, given its population of above 2mln inhabitants, that means that **more than 800,000 trips** are happening daily. Other sources suggest, that in urban areas specifically, number of deliveries amounts to 0.1 per person per day which in case of Brussels Capital Region translates to **more than 200,000 direct deliveries** to customers.
- Brussels Mobility estimated in 2018 that approximately **30.000 vans** operated in the region of Brussels**,** which accounted for **9% of the morning traffic in Brussels**.[7] However, when considered the entire market (B2B + B2C) and the return processes, that size of the problem might be underestimated.
- **60%** of professional drivers, is impacted by congestion at least weekly, while 33% experience difficulties resulting from heavy traffic on a daily basis.[8]

	Average population density (habitant/sq.-km)	**Average delivery density per day** (deliveries-day/sq.- km)	**Average daily deliveries per capita** (deliveries-day/ thousand habitants)
Urban densely populated mixed-use areas: residential, retail, etc., fairly heavy traffic with different road users (pedestrians, cyclists, etc.)	1299.17	0.43	0.33
Suburban less densely populated area, less traffic, mainly residential area	345.19	0.25	0.72
Rural sparsely populated, residential areas further away from high traffic areas	219.59	0.20	0.91

Table 2 Densities of population and deliveries per square kilometer in Belgium, source: Cárdenas et al. (2017)

External cost:

- Deliveries in urban areas, although accounting for more than a half of all deliveries in Belgium, result in **50.07% of the total external costs** (congestion, accidents, noise, air pollution, climate change) of e-commerce in the scale of the country.[6]
- According to research from before the outbreak of the pandemic, **the share of VKTs per package** (vehicle kilometers travelled) in case of Belgium is almost equally shared between urban and rural deliveries (the distribution of the external delivery costs in the scale of the country is presented in figure 1).[6]
- E-commerce **consumption per capita is higher in rural areas** (people living outside cities order more online). This contrasts with the typical assumption that deliveries to rural areas would account for considerably more kilometers driven per package due to their peripheral location (table 3).

[6] Cárdenas et al. (2017)

[7] Data from Sustainable Urban Mobility Plan (SUMP) / GoodMove

[8] Research concerning the use of navigation and camera warning systems (extracted sample of professional drivers, N=26), funded by SPF Mobilité, 2021 *(ongoing project).*

- According to recent research from VUB (2021) **in rural areas, home deliveries are clearly more sustainable than deliveries to collection points** and associated consumer collection trips. For the urban area, collection point deliveries via store supply are to be preferred in sustainability terms.

Consumer attitude:

- According to PWC's Global Consumer Insights Survey (2018), **55%** of the population expects their purchases to arrive no later than within 2 business days, and a large proportion is also willing to pay extra for the express delivery (same day and shorter).
- Although **42%** of consumers use different types of collection points, **84%** prefer home deliveries.[9] This has not change since 2015.[10]
- Already back in 2015, consumers expected to know with 95% certainty when their parcel will arrive – this has probably further increased ever since the study was carried out.[10]
- In the study carried out in Brussels, less than one third - **27.9%** - of consumers selected collection point delivery as default delivery method.[11]

Modal split:

- **64%** of Belgians find themselves carrying less journeys ever since they started doing online shopping.[12]
- **42%** of Belgians chose active transport modes for package collection (**14%** cycling, **28%** walking). **5%** uses public transport.[12]
- Although **52%** of trips to the collection point are carried by a car, modal split of parcel collection is better than compared to the regular shopping in physical stores, where car is used for **76%** of the trips and only **13%** by active transport modes. [12]

[9] SPF Mobilité (2021)
[10] BIPT (2015)
[11] Buldeo R. et al. (2020)
[12] BEMOB (2021)

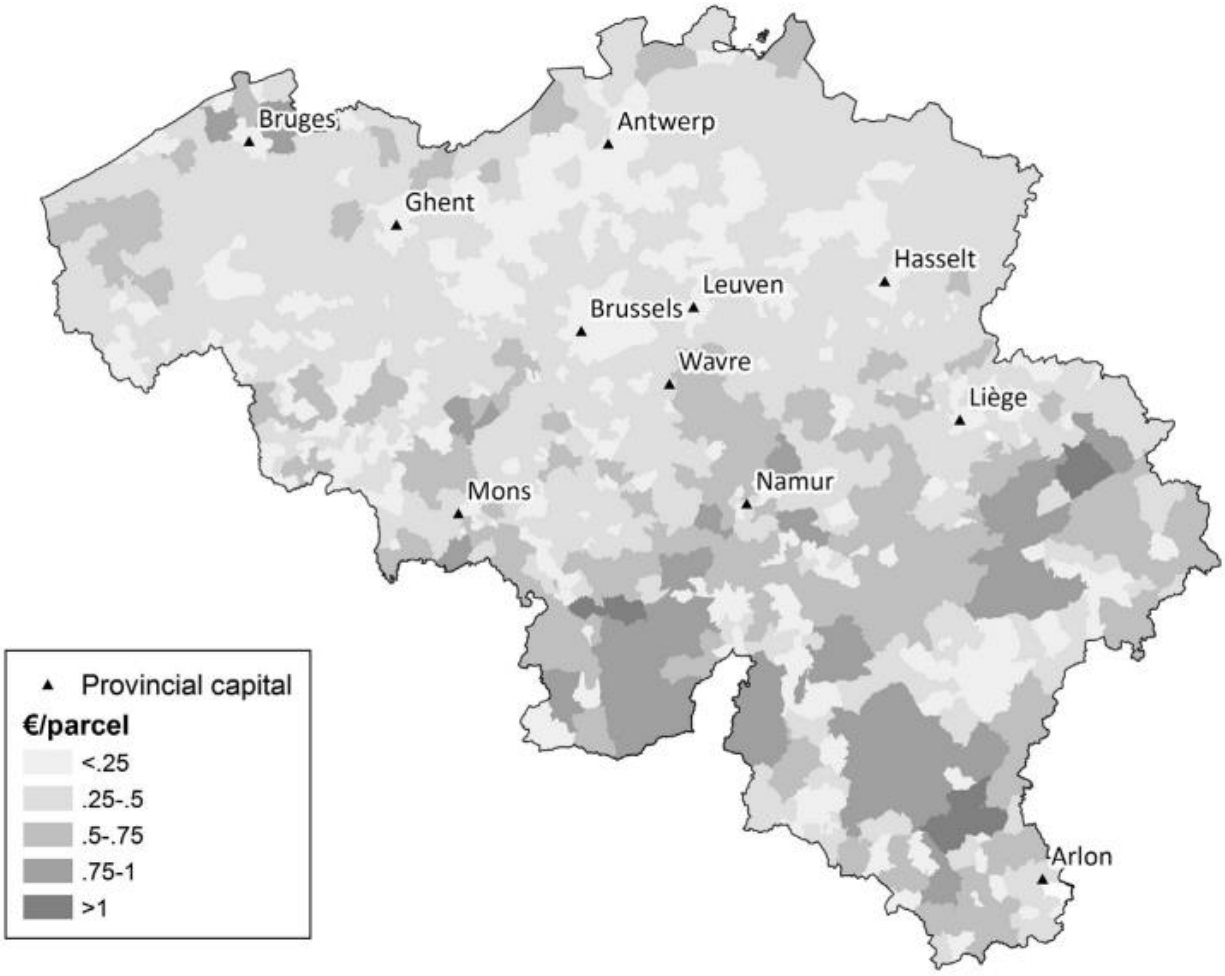


Figure 1 Total external costs of e-commerce per parcel delivered, *source: Cárdenas et al., 2017*

1.3 Impact on road safety

The data available in regards to accidentology of vans has certain limitations. It is important to recall that only figures are given on injury crashes - these are only 1/10 of all crashes and concern incidents with injuries, while property-damage-only crashes are not available. It is not to be excluded that the property-damage-only crashes have been increasing. It is also not possible to provide an accurate number of accidents related only to deliveries – neither at the level of packages delivery nor at the distribution of goods in general. More data is needed to objectivize the discussion.

In order to bridge that gap, Vias crossed the accidents statistics from Statbel with DIV data base concerning ownership of the vehicle (table 3). Comparing the data for privately owned vans with those owned by companies would allow us to provide a proxy that can describe the trends in the sector. The ownership of the vehicle as belonging to a company is determined based on the possession of VAT number of the owning organization. The statistics of accidents in Belgium differentiate the ownership of the vehicle from 2017 onwards. No information related to the economic sector of the company is available.

In case of 14% of all accidents, ownership of the van was not determined (company-owned or private-owned). Additionally, in one and the same crash both a company owned van and a privately owned one can be involved (30% of all accidents). In the statistics, this crash is included both in the statistics referring to crashes involving company owned vans and the statistics referring to privately owned vans. Hence the overall number might differ from general statistics for accidents involving vans.

	PRIVATE FLEET		COMPANY FLEET		
	Total number	% of total fleet	Total number	% of total fleet	TOTAL
2013	317.206	**49,75%**	320.445	**50,25%**	637.651
2014	323.936	**49,70%**	327.875	**50,30%**	651.811
2015	334.442	**49,85%**	336.514	**50,15%**	670.956
2016	351.919	**50,32%**	347.479	**49,68%**	699.398
2017	371.241	**50,84%**	358.986	**49,16%**	730.227
2018	390.921	**51,42%**	369.370	**48,58%**	760.291
2019	409.550	**51,84%**	380.513	**48,16%**	790.063
2020	425.050	**52,08%**	391.041	**47,92%**	816.091
2021	446.883	**52,40%**	405.952	**47,60%**	852.835

Table 3 Fleet composition of vans in Belgium – evolution
Source: DIV data 2013-2021

Although the number of registered vans in general in Belgium is increasing (+34% since 2013), the company-owned fleet has been growing slower compared to the private one (+27% vs. 41%). Currently, the size of the private fleet exceeds slightly the number of company-owned vehicles, although the difference is not significant. We would need to investigate data more in depth to be able to interpret this difference, as this could be linked to multiple factors (financial, practical etc.)

RAC Foundation concluded that the **increase in van parks is driven by something else than e-commerce**. Although the growth in vans is indeed a burgeoning problem for traffic, especially in cities, e-commerce and package delivery growth is merely one factor, and not the determinant. Even if controlled by possible substitution effect of shifting from heavy goods vehicles to vans, it has been concluded that any shift from lorries to vans is heavily masked by other factors affecting van use, that are not possible to determine with the currently available data.

The same study found that delivery segment accounts for up to 10% of all van traffic. This suggests that one van in ten experienced by the public in the streets is associated with all parcel and grocery delivery.

1.3.1 Road crashes with company-owned vans

Current situation:

- In 2020, company-owned vans accounted for **48%** of all fleet and has been involved in **56.6%** of all accidents involving vans.
- The share of **injury accidents** with company-owned vans involved has been stable on the same level in the last years.
- The severity of accidents involving company vans is **30%** lower compared to the private fleet; this factor has been decreasing systematically.

Evolution:

- The number of total fatal accidents with company-owned vans has decreased by **37%** over the last 4 years.
- Both severity and fatality of the accidents involving company cars is decreasing faster than average (figure 2).
- The share of **fatal accidents** involving a company-owned van has been relatively stable around **48%** of all accidents involving vans.

Table 4 Comparison of accidents and their severity between company and privately-owned vans in Belgium, source: STATBEL (2017-2020)

	2017		2018		2019		2020	
	company	private	company	private	company	private	company	private
Crashes	1942	1216	1966	1204	1866	1148	1679	964
Fatal crashes	32	23	25	24	25	21	20	17
Victims (in all parties involved)	2757	1758	2756	1706	2541	1639	2223	1290
Fatalities (in all parties involved)	33	23	29	26	26	22	22	18
Crash severity (fatalities / crashes * 1000)	**17,0**	**18,9**	**14,8**	**21,6**	**13,9**	**19,2**	**13,1**	**18,7**

Time & location:

- In 2020, **35%** of accidents involving company vans occurred outside vs. **51%** inside built up areas. This proportion is **5.5% higher** than for the private fleet.
- The share of accidents occurring on the motorways is also slightly higher in case of company-owned vans: **13%** vs. **9%**.
- **55%** of injury accidents involving a company van occurred on the road with a speed limit of 50 km/h or less (**+5%** in comparison with private fleet).
- The vast majority of accidents (**82%**) with the involvement of company-owned vans occur during the day time (**+11%** compared to the private fleet) and less during weekends (**-8%** compared to the private fleet).

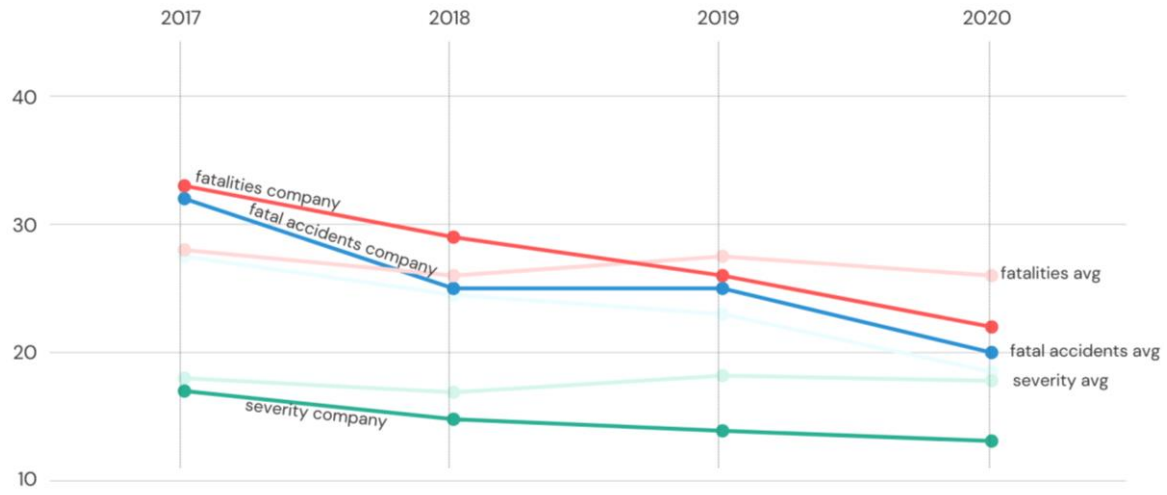


Figure 2 Severity of accidents: trends for company-owned vans (2017-2020)

Other road users:

- Company-owned vans typically cause accidents involving **vulnerable road users**. This is particularly noticeable in case of **cyclists, moped and motorbike users** who are specifically affected by accidents involving company vans.
- This value keeps increasing over the last years as well as the share of involvement of company vans (table 5, figure 3).
- Company-owned vans are also **slightly more likely to collide with other vans** whereas less likely to collide with heavy vehicles.

	2017	2018	2019	2020
Pedestrian	56,3%	60,2%	53,0%	54,0%
Bike	58,1%	56,8%	52,8%	**57,5%**
Moped	54,3%	50,3%	58,3%	**63,8%**
Motorbike	55,9%	54,8%	53,8%	**61,1%**
Car	56,9%	56,5%	54,4%	54,7%
Van	54,2%	55,5%	52,8%	56,6%
Autobus / autocar	65,1%	33,8%	41,9%	45,0%
Heavy goods vehicle	55,3%	51,1%	47,7%	54,1%
TOTAL	**55,9%**	**55,7%**	**53,7%**	**56,6%**

Table Share of victims (fatalities + injured) in accidents involving company vans (compared to total van fleet) by road user type, source: STABEL (2017-2020)

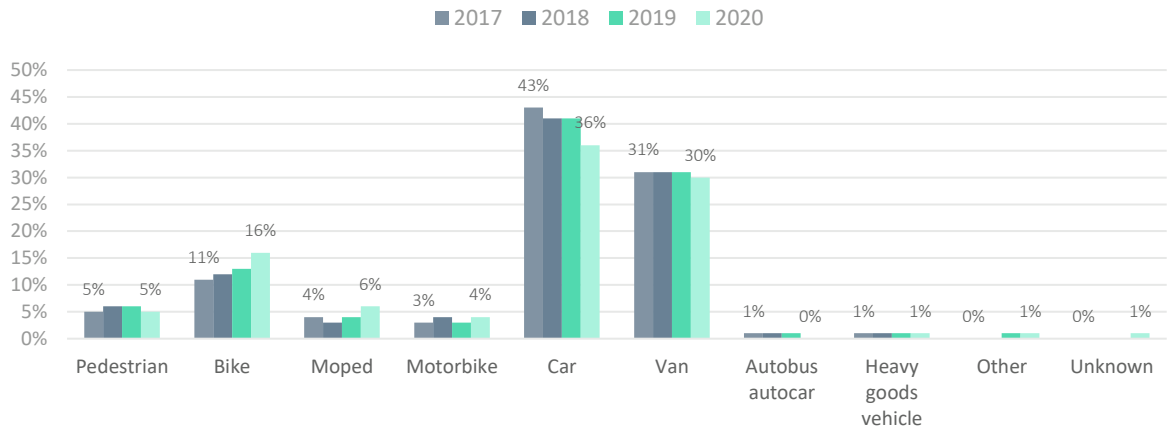


Figure 3 Shared of victims in crashes involving company-owned vans by road user type, source: STATBEL (2017-2020)
victims = fatalities + injured

ATTENTION:

- Data including ownership of the vehicle is available up to 2020 only.
- **In 2021 the trends in accidents statistics started increasing compared to 2020** - although no specific data concerning company vans, we can assume it follows the general trend.[13]
- Overall, **14.4%** more injury accidents has been recorded in 2021 compared to 2020 (**+15.6%** in case of camionettes with **46.5%** increase in related fatalities).
- The increase in mortality of camionettes accidents was specifically significant in Flanders (**75%** of all deaths), whereas no deaths were recorded in Brussels Capital Region.
- In the first trimester of 2022 there has been **22.5%** increase in total injury accidents compared to 2021 (**+19%** in case of camionette with **18%** increase in the number of victims, no increase in fatalities).

1.3.2 European context

- Although it is below the European average**, the share of fatalities resulting from crashes involving vans in the population in Belgium** is similar to the EU average - 5,4 / 1mln inhabitants (figure 5).
- The proportion of fatal accidents involving vans in the total number of fatal accidents in Belgium is slightly below European average. The fatalities resulting from accidents involving a van account for **1/10 of all fatalities** in the country (figure 4).

[13] Road Safety Barometer (2021)

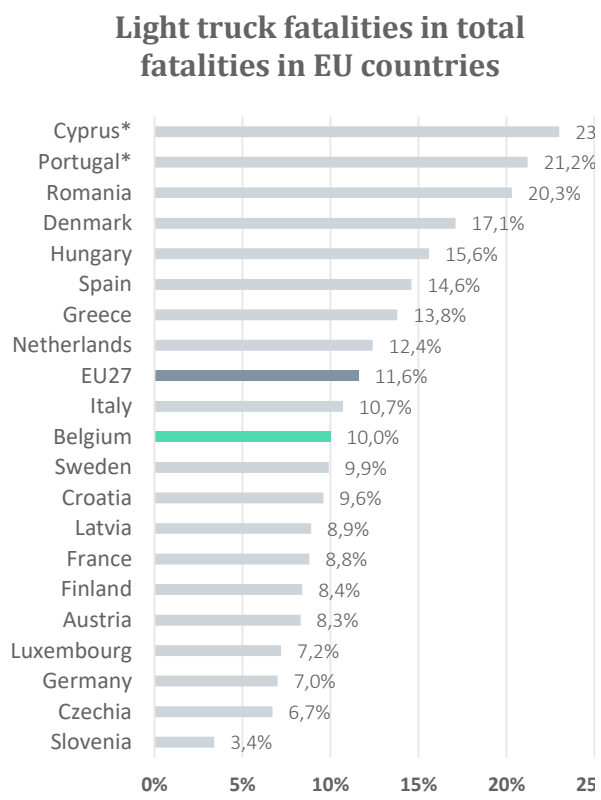


Figure 4 Number of fatalities in crashes involving a light truck in the total number of fatalities, per country in the EU27, source: CARE (2019), *2016-2018

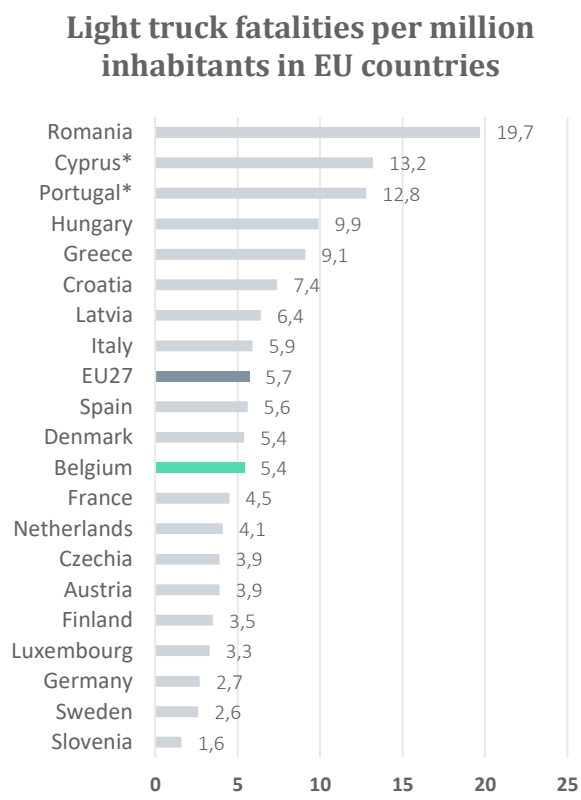


Figure 5 Fatalities in crashes involving a light truck per million inhabitants per country, source: CARE, EUROSTAT (2017-2019), *2016-2018

1.3.3 Infractions related to handling goods

- Although the number of injury accidents has decreased over last years, we observe a **growing number of traffic offences related to inappropriate loading of goods**, specifically in Flanders (figure 6).
- Data concerns all vehicles and not vans specifically – no information related to deliveries or vans itself is available.
- In 2020, **30% more fines were issued** compared to the year before.
- In the first 9 months of 2021 (latest available data period), 33% more fines were issued compared to 2019.

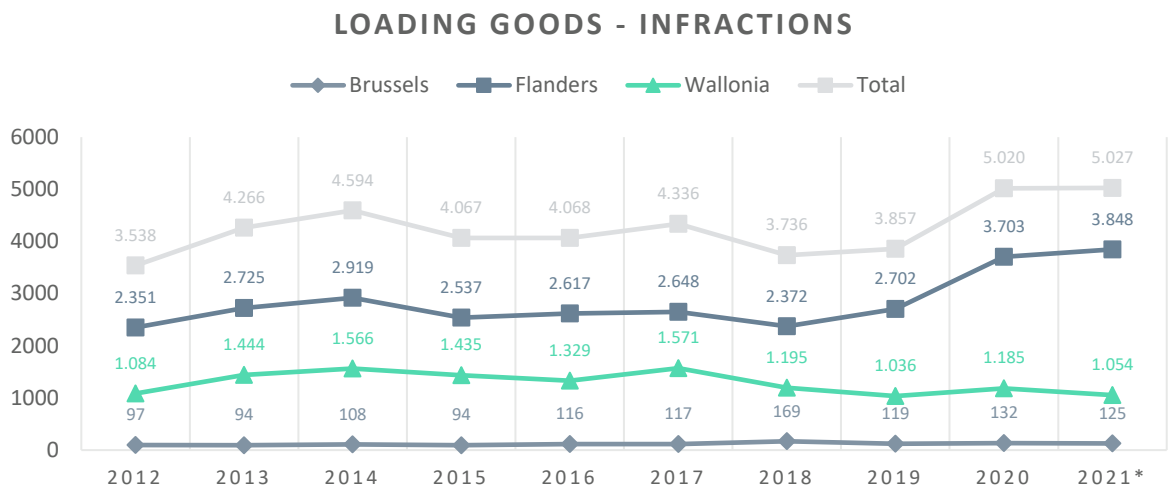


Figure 6 Number of highway code infractions related to loading of goods in Belgium, source: Police (2021) *data until 30.09.2021

1.3.4 Conclusions

- Data concerning deliveries and their impact on road safety has **significant limitations** and require further improvement in methodology of collecting such data – currently it is not possible to fully estimate the impact that deliveries of packages have on road safety.
- Although more than half of deliveries in Belgium occur in urban areas, **the share of VKT per package is almost even between rural and urban environment** – more packages delivered per person, but less people in rural areas whereas less packages delivered per person, but more people in urban areas.
- **Home deliveries remain preferred delivery option** of Belgians. In rural areas, these has been found as an option more sustainable than self-collection points.
- The growth in the park size of vans is slower in case of company-owned vehicles compared to the private ones. **The increase is not driven only by the rise of e-commerce**, but also by other external factors that require further investigation to be determined.
- Company-owned vans account for **48% of the total park size and are involved in almost 57% of all accidents** with vans.
- The severity of accidents involving company-owned vans is **30% lower compared to the private vans**.
- Company-owned vans typically cause accidents involving **vulnerable road users**, especially cyclists, moped and motorbike users.
- In the European context, fatalities resulting from accidents involving vans and light tracks account for **10% of all fatalities** in Belgium (below average).
- The recent data indicates that the decreasing over last years number of accidents, has started increasing in 2021 compared to the year before.

2 Perspective of Belgian stakeholders

To bridge the existing gap in the available data, Vias conducted additional collection of qualitative and quantitative insights among different groups of Belgian stakeholders. We have interviewed relevant stakeholders related to the deliveries ecosystem, investigated the attitudes of road users as well analyzed the perception of the delivery workers themselves.

2.1 Survey among road users

Two rounds of consultations with the general public have been organized via two online surveys on a representative sample of 1000 Belgians. We investigated the attitudes related to deliveries by vans, deliveries by cargo bike and the possible changes in the consumption of delivery services.

2.1.1 Attitudes towards behavior of van drivers

In a first survey, 20 variables related to the behavior of van drivers (stopping, driving style, use of mobile phone, speeding etc.) have been analyzed in regards to the acceptability of these behaviors and the frequency of their occurrence. The list of all analyzed behavior is available in table 5 and 6. Results were controlled by the transport mode used in the period of data collection by the respondent, region and the environment they spend most of their time in (urban, sub-urban, rural) – detailed analyses are available in appendix.

Table 5 Acceptability of behavior of van drivers - in bold behaviors legally allowed, N=1000

Acceptability of different behaviors of van drivers who are delivering packages				
		Low	Average	High
1	Does not respect safety distances of the car in front	78%	14%	8%
2	Distracted (busy with something else like calling, setting the radio...)	79%	15%	7%
3	Get out of the van and open the doors without scanning the environment/surroundings	80%	14%	6%
4	Abruptly changes direction	75%	18%	7%
5	Stops abruptly	76%	16%	8%
6	Adopts an aggressive driving style	82%	11%	7%
7	Drives faster than the speed limit in force in urban areas	77%	16%	6%
8	Drive faster than the speed limit in suburban areas	75%	16%	9%
9	Drives faster than the speed limit in rural areas	73%	17%	10%
10	Drive faster than the speed limit in force around a school	82%	11%	8%
11	**Phone while driving with hands-free kit**	**40%**	**23%**	**38%**
12	Uses a mobile phone in hand while driving	83%	10%	7%
13	Crosses a traffic light that has just turned red	82%	12%	6%
14	**Unloading/loading packages by stopping in the middle of the road**	**63%**	**24%**	**13%**
15	Unloading/loading packages by stopping on the bike path	70%	19%	11%
16	Unloading/loading packages by stopping at the pedestrian crossing or sidewalk	71%	18%	11%
17	Unloading/loading packages by stopping at parking spaces reserved for other road users (people with disabilities, kiss + ride school, bus stop etc.)	68%	20%	12%
18	**Drives very slowly, looking for an address**	**31%**	**35%**	**34%**
19	**Does not use the turn signals to show a change of direction**	81%	13%	5%
20	Not paying enough attention due to fatigue, mobile phone use*	78%	14%	8%

*item asked only in regards to acceptability

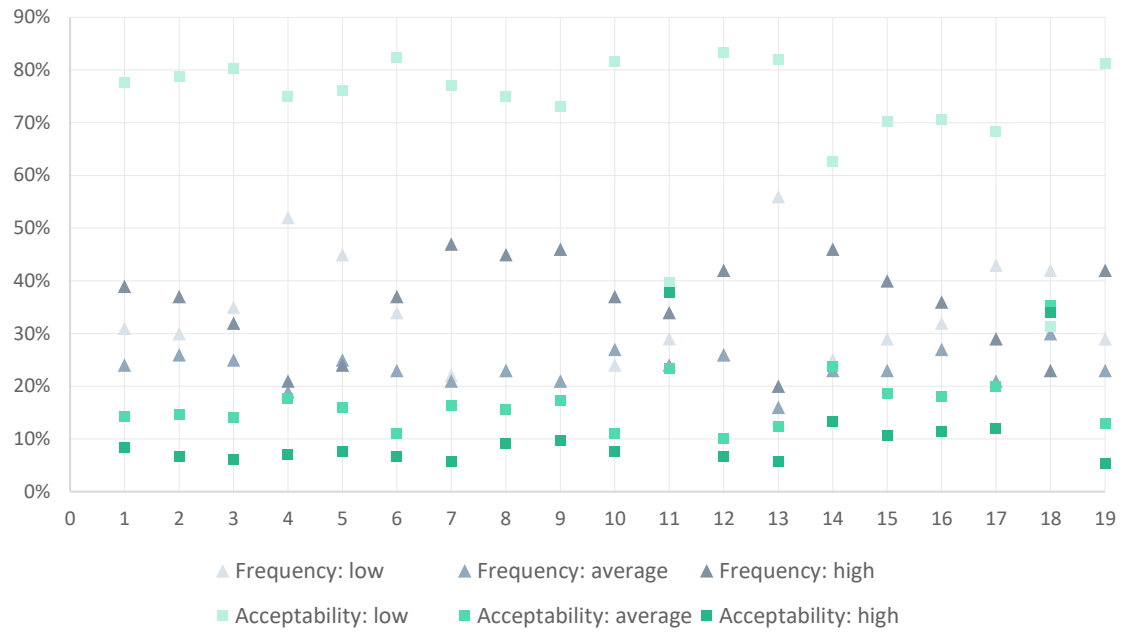
Table 6 Frequency of observed behavior of van drivers - in bold behaviors legally allowed, N=1000

Frequency of different behaviors of van drivers who are delivering packages				
		Low	Average	High
1	Does not respect safety distances of the car in front	31%	24%	39%
2	Distracted (busy with something else like calling, setting the radio...)	30%	26%	37%
3	Get out of the van and open the doors without scanning the environment/surroundings	35%	25%	32%
4	Abruptly changes direction	52%	19%	21%
5	Stops abruptly	45%	25%	24%
6	Adopts an aggressive driving style	34%	23%	37%
7	Drives faster than the speed limit in force in urban areas	22%	21%	47%
8	Drive faster than the speed limit in suburban areas	23%	23%	45%
9	Drives faster than the speed limit in rural areas	21%	21%	46%
10	Drive faster than the speed limit in force around a school	24%	27%	37%
11	**Phone while driving with hands-free kit**	**29%**	**24%**	**34%**
12	Uses a mobile phone in hand while driving	26%	26%	42%
13	Crosses a traffic light that has just turned red	56%	16%	20%
14	**Unloading/loading packages by stopping in the middle of the road**	**25%**	**23%**	**46%**
15	Unloading/loading packages by stopping on the bike path	29%	23%	40%
16	Unloading/loading packages by stopping at the pedestrian crossing or sidewalk	32%	27%	36%
17	Unloading/loading packages by stopping at parking spaces reserved for other road users (people with disabilities, kiss + ride school, bus stop etc.)	43%	21%	29%
18	**Drives very slowly, looking for an address**	**42%**	**30%**	**23%**
19	Does not use the turn signals to show a change of direction	29%	23%	42%

The main observations are:

- On average, **33%** of respondents never or almost never observe any of the listed behaviors, while **72%** have a very strong, negative opinion in regards to their acceptability in general.
- **The least acceptable behaviors are**: mobile phone use (1.43/5), aggressive driving (1.46/5), speeding around a school (1.53/5) – these are related to the driving style itself rather than carrying out the operations.
- **The most acceptable behaviors are**: stopping in the middle of the road (2.34/5), using hands-free kit mobile phone (2.9/5), slow driving - looking for address (3.15/5) – even though none of these are prohibited by law, the acceptance is still limited.
- Explicitly forbidden **parking on the cycling path** is tolerated on the level of average and above by **30%** of the population (table 5)

Figure 7 Acceptability of van driver behaviors crossed with the frequency of observation



- Even for the behaviors that are legally permitted in the highway code, the acceptability among population is very low: **63%** found it unacceptable to stop in the middle of the road to load / unload and **40%** found it unacceptable to use a mobile phone with a hand-free kit.
- The most frequently observed behaviors are related to **speeding**.
- Only in two cases (driving slowly - looking for the address & using a mobile phone with a hands-free kit) there is a **correlation between acceptability and the frequency** of observation (figure 7) – other than that, there is no link between exposure and attitude.
- Regarding **parking behavior**, the acceptability is only slightly lower for prohibited than for legally allowed parking.
- All types of behaviors are rather **evenly distributed** in terms of frequency in relation to level of urbanization (urban – suburban – rural) – however speeding is more often observed in rural and suburban areas while parking violations are more typical in urban areas.
- The acceptance in rural areas is generally lower than in urban environment.

Table 7 Acceptability of parking behavior on a scale from 1 (=not acceptable) to 5 (=acceptable) - comparison of perception of cargo bikers and van drivers by different road users – in green parking legally allowed, in red parking legally prohibited.

	IN THE MIDDLE OF THE ROAD		ON THE CYCLING PATH		ON THE SIDEWALK		IN RESERVED PARKING SPOTS	
	cargo-bike	van	cargo-bike	van	cargo-bike	van	cargo-bike	van
PEDESTRIAN	2,15	2,31	2,25	1,95	2,05	1,93	2,08	1,92
CYCLIST	2,35	2,52	2,07	1,78	1,96	1,87	2,16	2,00
CAR DRIVER	2,09	2,26	2,18	1,81	1,99	1,83	2,00	1,91
AVERAGE	**2,20**	**2,34**	**2,17**	**1,90**	**2,00**	**1,91**	**2,08**	**1,99**

- Acceptability of stopping in the middle of the cycle lane or on the sidewalk is low even in case of cargo cyclists, who are legally allowed to do so.
- We observe no difference between transport modes of the road user regarding their perception on parking behavior.
- Belgian road users prefer a van to park on the road, followed by reserved spots for other users, while side walk and cycling lane are perceived as the least acceptable.

2.1.2 Attitudes towards behavior of cargo cyclists

In a second survey, 17 variables related to the behavior of cargo cyclists have been analyzed in regards to the acceptability of these behaviors (table 8). A question on the frequency of occurrence was not included due to the limited exposure. Results were controlled by the transport mode used in the period of data collection by the respondent and the region – detailed analyses are available in appendix.

Table 8 List of items referring to cargo cyclists behavior - in bold behaviors legally allowed, N=1000

Acceptability of different behaviors of cargo cyclists				
		Low	Average	High
1	Does not respect the safety distances with other users	83%	13%	4%
2	Distracted on the bike	86%	10%	4%
3	Sudden change of direction	84%	13%	3%
4	Sudden stops	72%	22%	7%
5	Uses a mobile phone in hand on his bike	89%	8%	4%
6	**Crosses a traffic light that has just turned red***	88%	8%	4%
7	Loading or unloading by stopping in the middle of the road	66%	22%	13%
8	**Loading or unloading by stopping on the cycle path**	62%	23%	15%
9	**Loading or unloading when stopping on the crosswalk or sidewalk**	67%	22%	11%
10	Loading or unloading by stopping in places reserved for other road users (people with reduced mobility, school kiss & ride, etc.)	66%	22%	13%
11	Does not indicate the direction changes when turning	83%	13%	4%
12	Rides on the road rather than on the available cycle path	65%	23%	13%
13	Rides on the sidewalk instead of the bike path	85%	10%	5%
14	**Does not wear safety equipment (e.g. helmet)**	71%	21%	8%
15	Rides without appropriate lightning	88%	8%	3%
16	Does not respect the right-hand priority of other users (pedestrians, motorists, etc.)	91%	7%	2%
17	Obstructs the passage of public transport (e.g. stopping at a bus stop, blocking bus lanes, etc.)	84%	12%	4%

*allowed if a sign B22 or B23 is present

The main observations are:

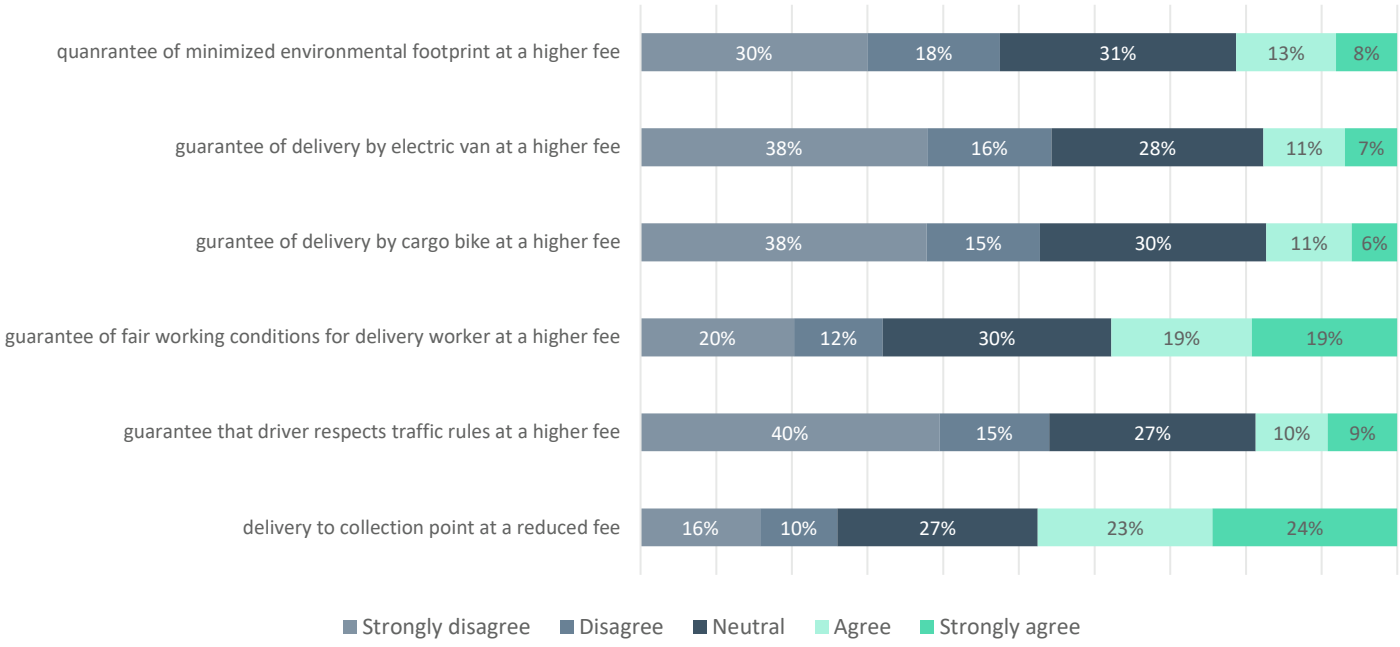
- Attitudes toward cargo bikes are even stronger than towards vans – on average, **78%** of respondents find listed behavior unacceptable.
- Although the attitudes toward behavior of cargo cyclists **are uniformly distributed in all regions**, respondents from Flanders tend to consider more of the behaviors as unacceptable.

- The least tolerated behaviors related to the **visibility** of the cyclists on the road (lighting), **the respect of traffic rules** (priority of other traffic participants, red light) and **riding on the sidewalk**.
- Similarly as in case of vans, even behaviors that are **legally allowed** are not tolerated by Belgians.

2.1.3 Attitudes towards changes in consumption behavior related to deliveries

The attitude towards changing the consumption behavior related to deliveries was measured as a function of respondent's willingness to reduce the cost or pay an additional fee for a service that ensures certain quality standards (table 9). **47%** of the respondents were positive towards at least one of the proposed items.

Figure 8 Attitudes towards changes in delivery standards, Omnibus May, N=1000



- **Almost half** of consumers is willing to use collection points to have their packages delivered if that entails reduced cost of shipment.
- Ensuring fair working conditions for the delivery workers is second most acceptable item at the cost of a higher fee (**38%**).
- **19%** of respondents is willing to pay extra cost for providing driver's compliance with traffic rules and road safety principles.
- Additional costs for an alternative to a traditional van delivery mode have the lowest acceptability (by electric van - **18%** or cargo bike - **17%**). This is in line with a study of SPF Mobilité that found that although cargo bikes would be chosen as a delivery method for **52%** Belgians, only **13%** is willing to incur additional cost and longer delivery time. Furthermore, **16%** of Belgians find their residence **unsuitable for cargo bike deliveries**. The perceived barrier is the highest in Wallonia (21%), followed by Flanders (14%) while being relatively low

in Brussels (6%). Recent estimates in UK suggest e-cargo bikes deliver about **60% faster** than diesel vans and cut carbon emissions by 90%.

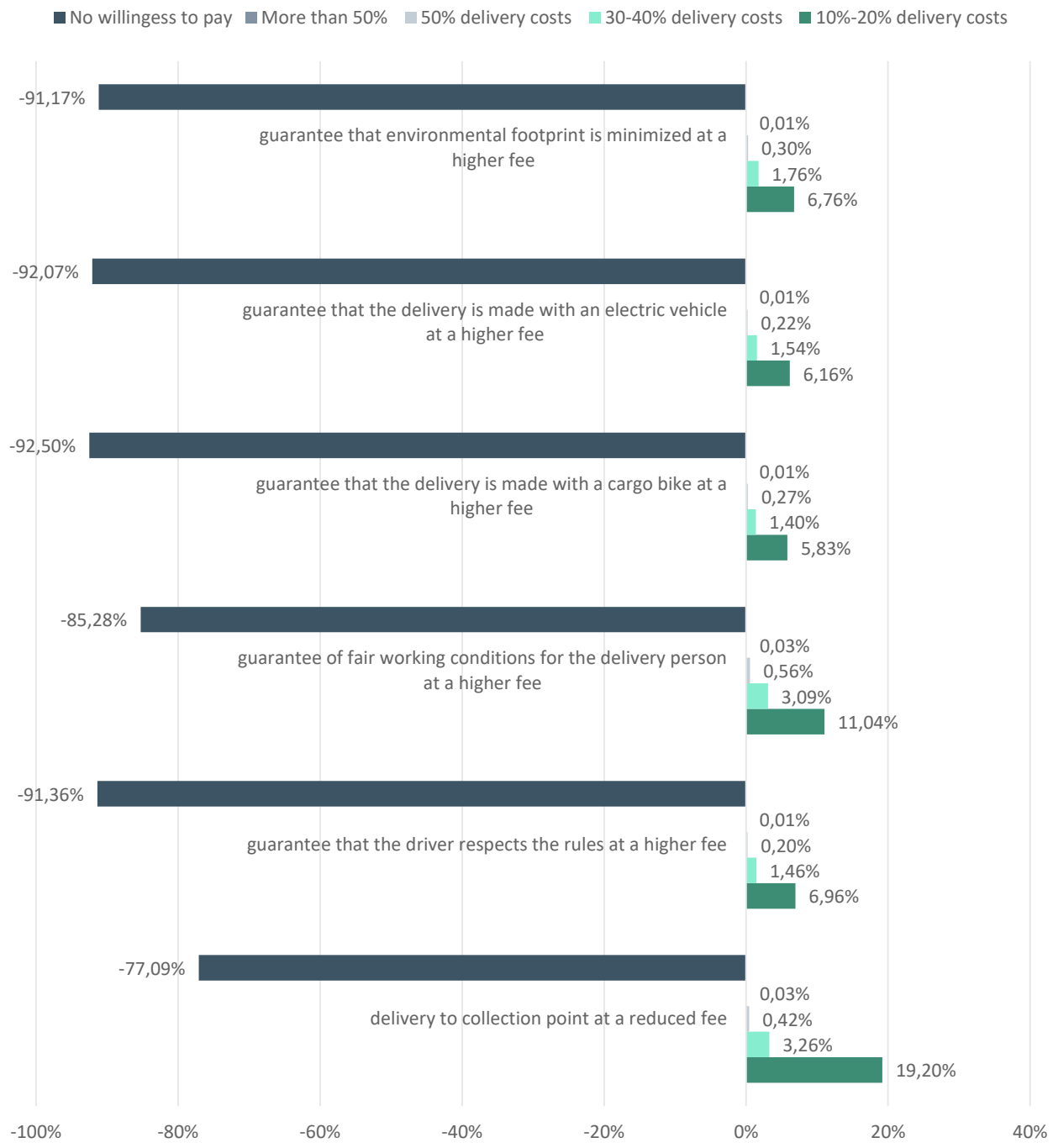
- Minimizing and the transparency of environmental footprint has also a limited likelihood of being accepted by the consumer at the cost of a higher delivery fee - **21%** – this is in line with the results of BEMOB survey (2021) which showed that although **60%** of Belgians indicate favoring environmental-friendly delivery options, only **26%** is willing to accept related additional cost. A study from VUB found that non-financial incentives can encourage a more sustainable delivery choice and that positive environmental information is key in encouraging sustainable delivery.

Table 9 Interest distribution and willingness to pay referring to changes in delivery standards, N=470

			Accepted reduction / increase of delivery fee			
	Behavior	**Interest**	**10%-20%**	**30-40%**	**50%**	**>50%**
1	I am ready to have my package delivered in a collection point if the delivery costs are reduced	**30%**	64%	17%	13%	6%
2	I am willing to pay additional delivery costs if I have the guarantee that the driver respects the rules of the road and the principles of road safety	**12%**	58%	21%	14%	6%
3	I am willing to pay additional delivery costs if I have the guarantee of a fixed minimum salary and fair working conditions for the delivery person	**23%**	48%	28%	18%	6%
4	I am willing to pay additional delivery charges if I have the guarantee that the delivery is made with a cargo bike instead of a van	**11%**	53%	24%	19%	3%
5	I am willing to pay additional delivery charges if I have the guarantee that the delivery is made with an electric vehicle instead of a traditional van on (diesel / petrol)	**11%**	56%	25%	14%	5%
6	I am willing to pay additional delivery costs if the environmental footprint of the delivery is minimized and completely transparent	**13%**	52%	26%	17%	5%

- An additional fee for any of proposed services would be accepted by the majority at the level of 10-20%. Interestingly, approximately **one-fourth of the consumers who declared the willingness to pay**, is willing to pay up to 40% more.
- Among people interested in changing their behavior, the most popular was using the collection points. The majority of consumers who expressed their interests in it – **64%** - would chose a collection point if the delivery fee was reduced by 10-20%.
- In the entire population, almost **a fourth of respondents** declares the interests in using collection point at a reduced delivery fee (figure 9).
- Among respondents who are willing to pay more to **ensure good working conditions for the delivery workers**, 42% is willing to pay 30% on top of the initial delivery fee.
- Ensuring fair working conditions achieved the highest score for willingness to pay among all proposed standards –**11%** in the entire population.

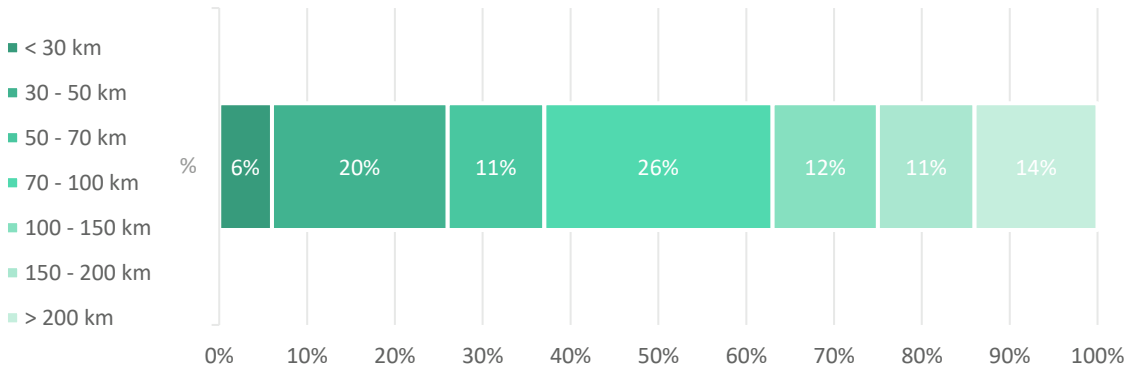
Figure 9 Willingness to pay for additional delivery standard controlled over entire sample, N = 1000



2.2 Packages delivery drivers by van and cargo bike

A survey to understand the perspective of the delivery workers themselves has been prepared in consultations with companies providing the service. Out of 100 responses, 5 respondents deliver food (Deliveroo, Uber Eats, etc.) and has been excluded from the sample. After cleaning the data**, 93 responses** of delivery workers have been analyzed: 4 using cargo bikes and 89 using a delivery van. Due to limited number of cargo cyclists in the sample which constrains the statistical significance of the responses, we provide the answers concerning the acceptability of the behaviour by the respondent and perceived acceptability by the cargo cyclists in general in appendixes.

Figure 10 Distribution of daily milage covered by the delivery workers



- Almost all respondent work with the **employment contract** (only 2% are subcontractors).
- **82%** of the respondents work in full-time work regime.
- Majority of the drivers (**73%**) deliver between **30 and 70 packages per day**.
- More than **70%** of the time drivers spend **in urban and suburban roads**, 20% in rural and less than 10% on highways.
- **84%** of drivers share the vehicle with other colleagues. Vast majority of them – **92%** - adapt the features of the vehicle to their needs before starting the work.
- **77%** of respondents have more than 2 years' experience in delivering packages, whereas **12%** has experience of less than 1 years.

2.2.1.1 Perceived difficulties and challenges

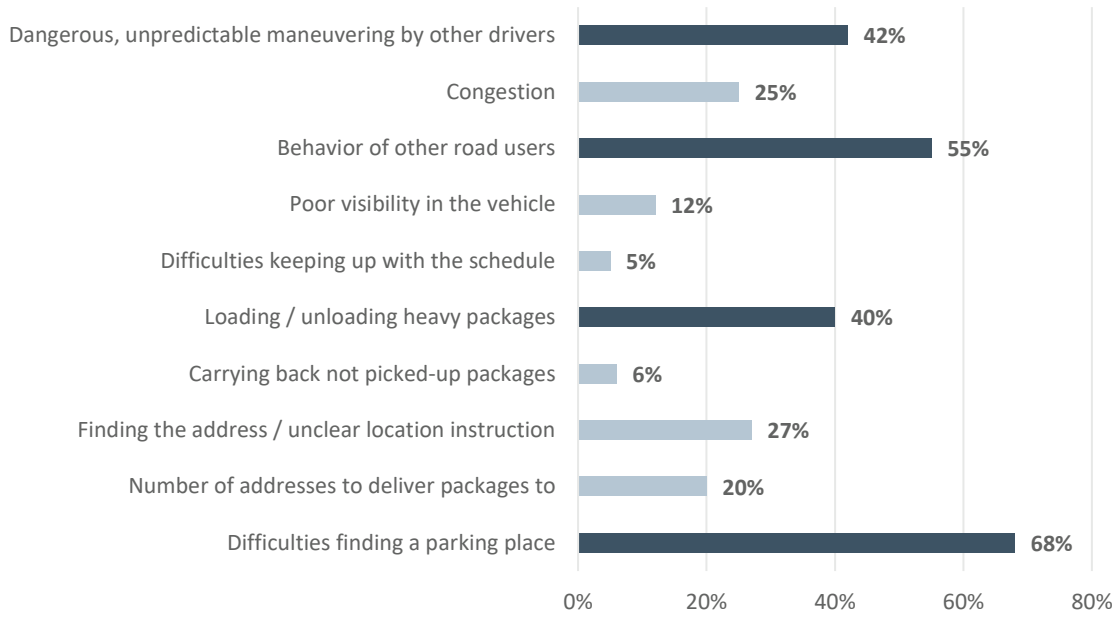
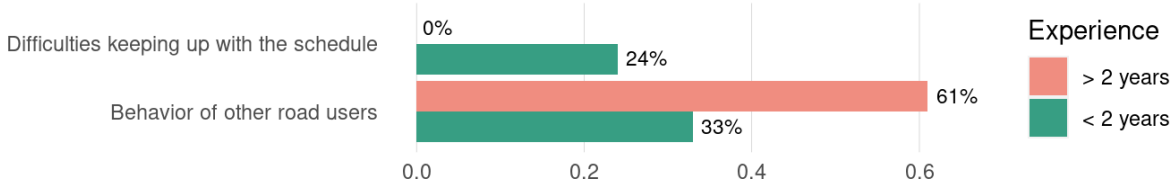


Figure 11 Aspects of the job that delivery workers struggle the most with

Among the most difficult aspects of the work, **difficulties with parking place** has been indicated by the most of the respondents, followed by **interactions with other road users** and physically demanding handling of heavy goods. Time pressure and resulting difficulties with keeping up with the schedule have been found among the least problematic aspects.

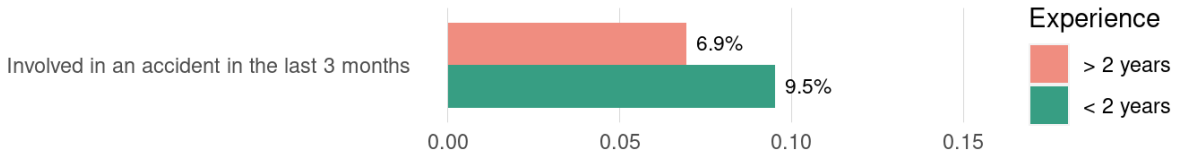
There are statistically relevant differences between experience of the driver and difficulties with keeping up with the schedule (significant on the 0.01% level) as well as struggling with the behavior of other road users (significant on the 5% level). More experience drivers are twice more likely to perceive the behavior of other road users are problematic, whereas less experience drivers are struggling with keeping up with the schedule (figure 12).

Figure 12 Correlation between driver experience and perceived difficulties in the job



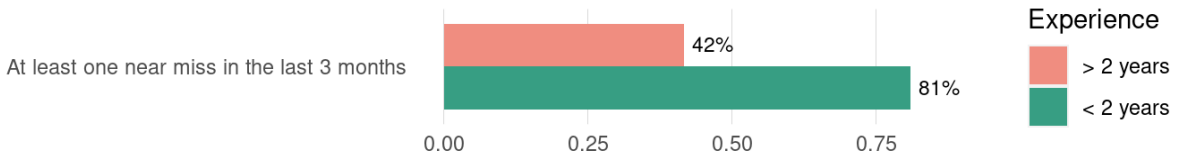
2.2.1.2 Accidents and conflicts with other road users

Figure 13 Correlation between driver experience and being involved in the accident in the last 3 months



In the entire sample, **8%** of respondents had an accident in the 3 months prior the study. Majority (86%) resulted in **material damages only** (which are not captured in the accidents statistics). Although there is no significance in the occurrence of accidents, near-misses are clearly related to insufficient experience. It is an important argument to prevent retention of drivers (figure 14). Overall, **half of the respondents have experienced at least one near miss** in the last 3 months. There exists a strong correlation between the driver experience and having a being involved in a dangerous traffic situation (difference statistically significant at 1% level).

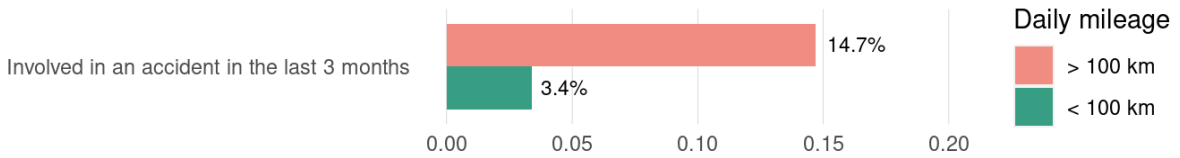
Figure 14 Correlation between experienced accident / near miss and the experience of the van driver.



Each of respondent who declared having (near) accidents, admit to commit **frequently behaviors related to speeding and not respecting safety distance.** Although the sample is small, results are significant (some on the 10% level, some 5%).

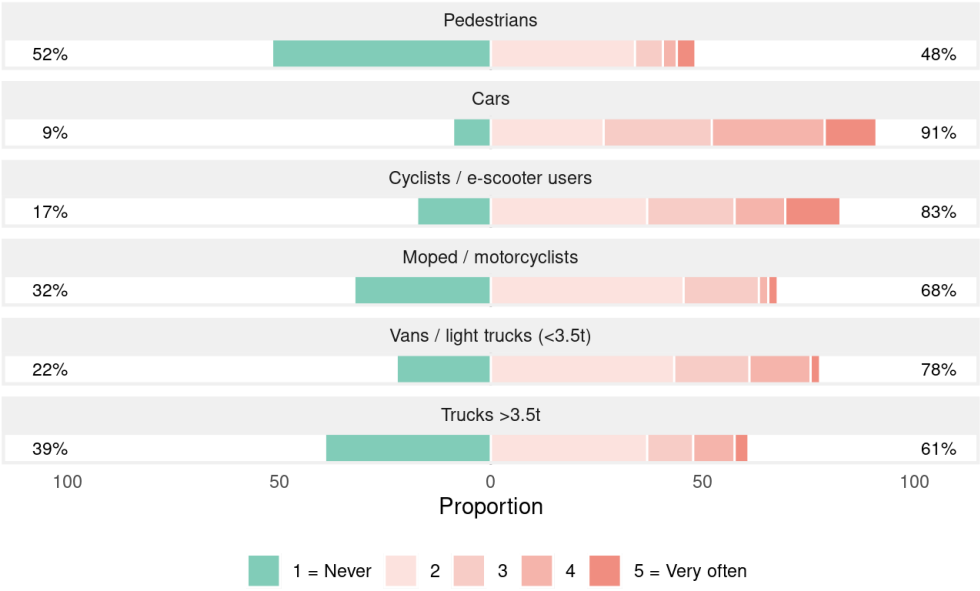
Furthermore, there is a significant correlation between the occurrence of the accident and the daily milage covered by the drivers (the difference is statistically significant on the 5% level). The drivers who cover milage above 100km daily are **4 times more likely to have an accident**. This suggest that fatigue can be an important factor playing a role in the delivery-related accidents. When controlled for the number of km (since driving more logically results in more accidents) we found the risk of having an accident per km is **56% higher** for the group driving milage above 100km than the group driving less.

Figure 15 Correlation between the daily milage and the accidents occurrence



The frequency of conflicts with other road users is aligned with the statistics on victims resulting from accidents involving company-owned vans (figure 3). **The most frequently occurring are conflicts with cars, followed by cyclists / e-scooters users and other vans**. The least conflicts occur with pedestrian – half of respondent declared never experiencing conflicts with this road users group (figure 16).

Figure 16 Frequency of experiencing conflicts with other road users



Behavior of other road users has been indicated not only as a common struggle for delivery workers, but also as one of the main causes of accidents and near misses (figure 17). Together with high time pressure on the drivers, it has been indicated as the most important reason for accidents, followed by the aggressive driving style in Belgium in general and a lack of proper infrastructure dedicated to carrying out loading and unloading.

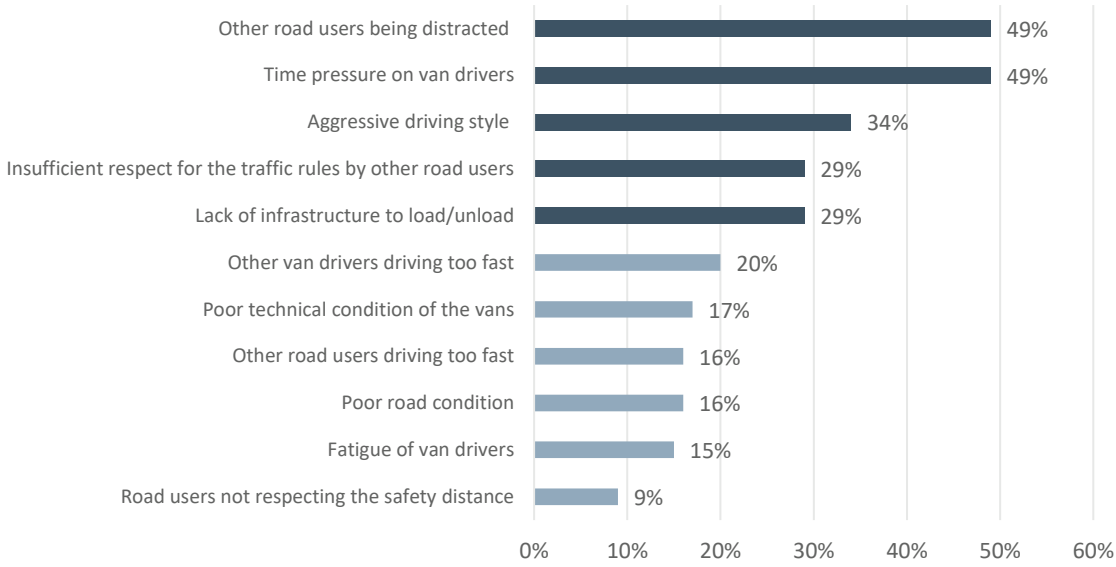
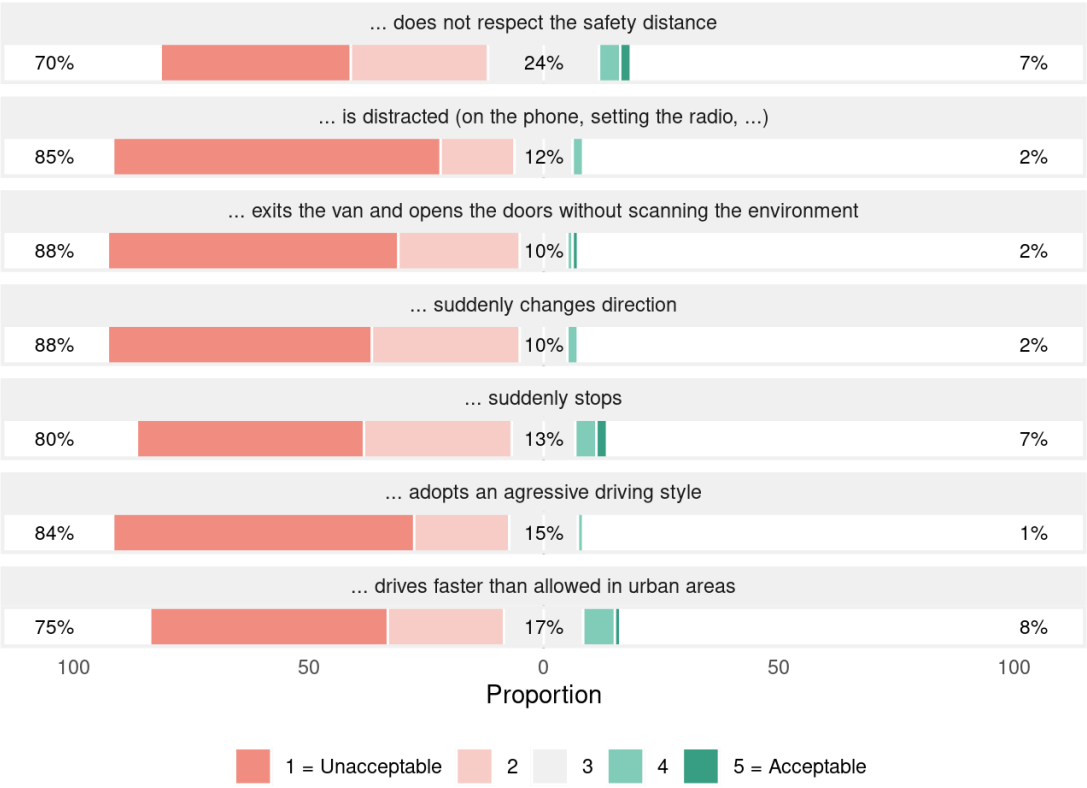


Figure 17 Causes of (near) accidents in the opinion of delivery workers

2.2.1.3 Self-reported behavior and perceived acceptability

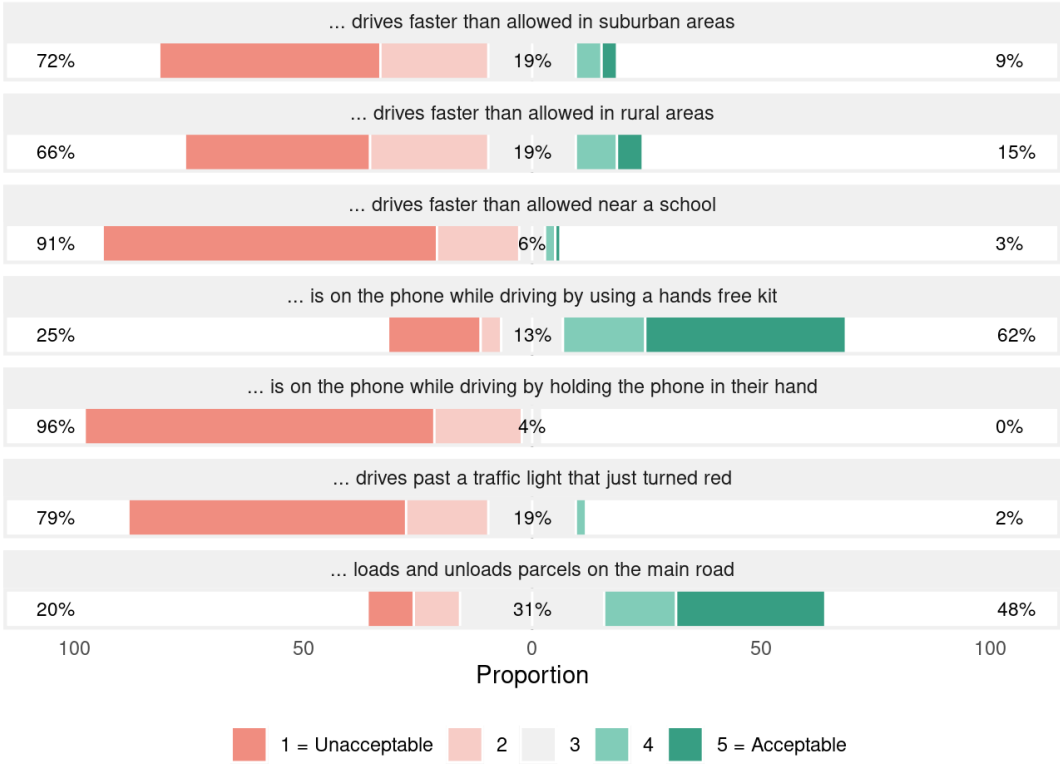
We observed drivers to lean towards unacceptability for all listed behaviors. Not respecting safety distance as well as speeding in urban areas, however, are acceptable for 7-8% of respondents. Speeding in the rural areas is seen as acceptable for 15% of van drivers, whereas 10% finds it acceptable to driver faster than the speed limit in suburban areas.

Figure 18 Perceived acceptability of the behavior of a van driver (1/3)



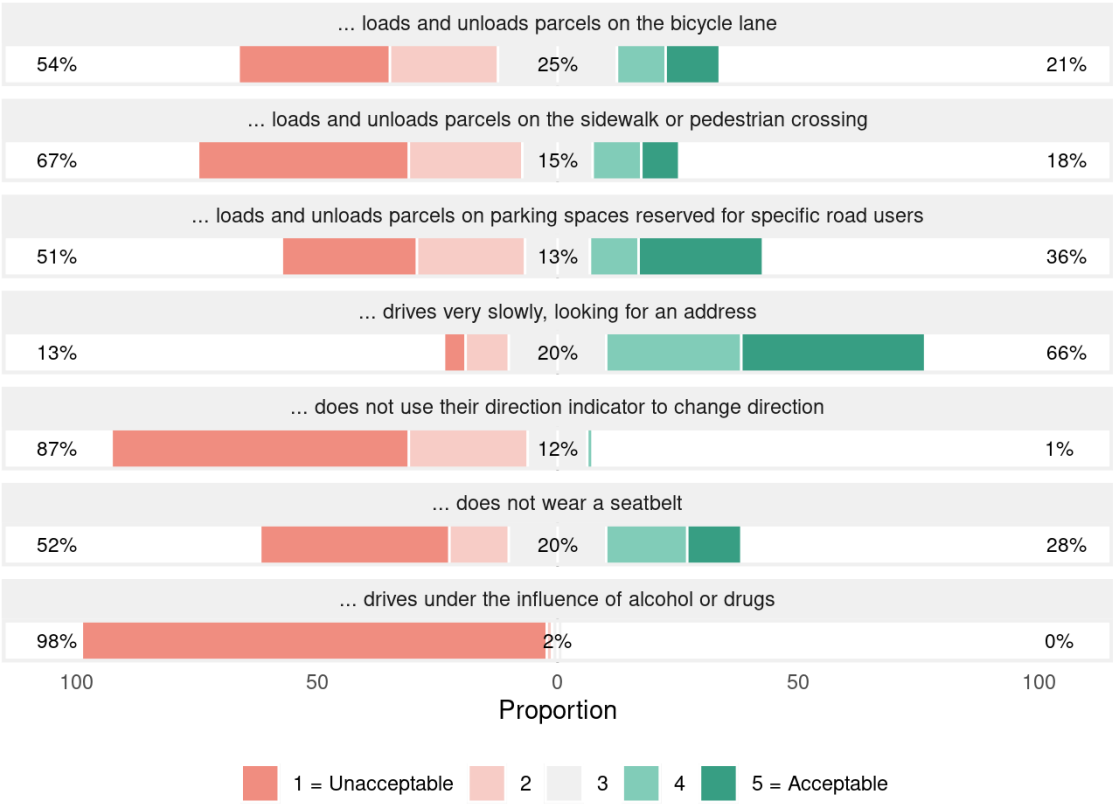
Around 20% of the sample finds it acceptable to use a sidewalk or a cycling lane as a space to load / unload packages. Contrary to the general public opinion, van drivers are significantly more tolerable towards using a phone with a hands-free kit as well as loading / unloading on the road. However, **around a fifth of the sample perceived these behaviors as unacceptable**, suggesting a need for sensibilization about the traffic rules for the drivers themselves. Using a mobile phone without appropriate hands-free kit is seen as of the most unacceptable behaviors.

Figure 19 Perceived acceptability of the behavior of a van driver (2/3)



When asked about the perception of the van drivers in general, **respondents believe that other drivers find listed behavior about 10% less unacceptable than they do themselves**. In case of speeding in the area of a school and using a phone without a hands-free kit, respondents believe it is 20% less unacceptable in the opinion of the van drivers in general. That suggests that the drivers perceive themselves more obedient with the traffic rules, than they believe their environment does.

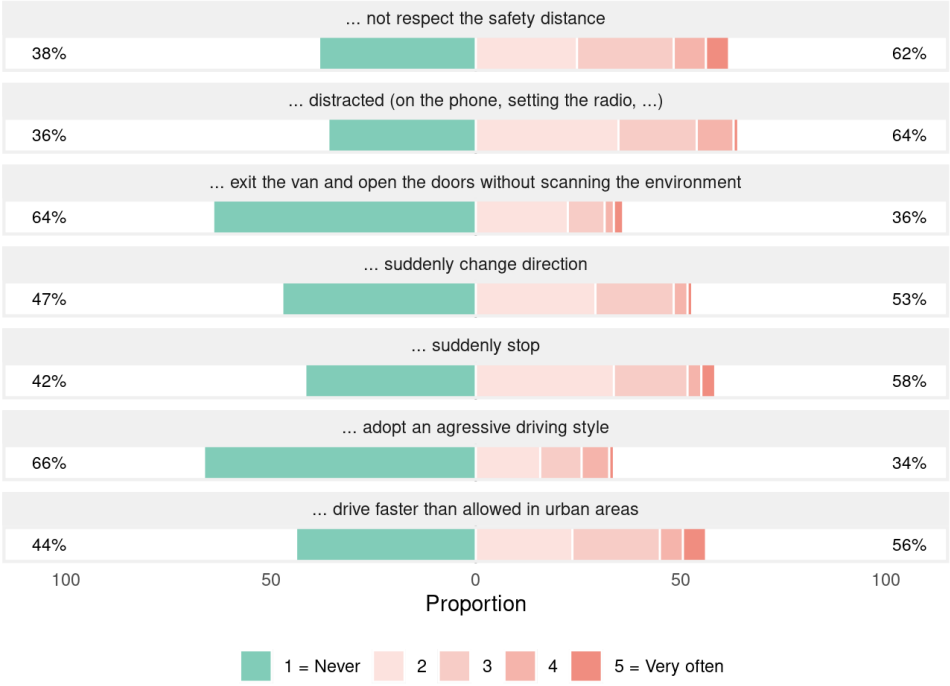
Figure 20 Perceived acceptability of the behavior of a van driver (3/3)



While drivers find most behaviors unacceptable, a large proportion admit to adopting these behaviors at least from time to time **The largest disproportions are observed among following behaviors**:

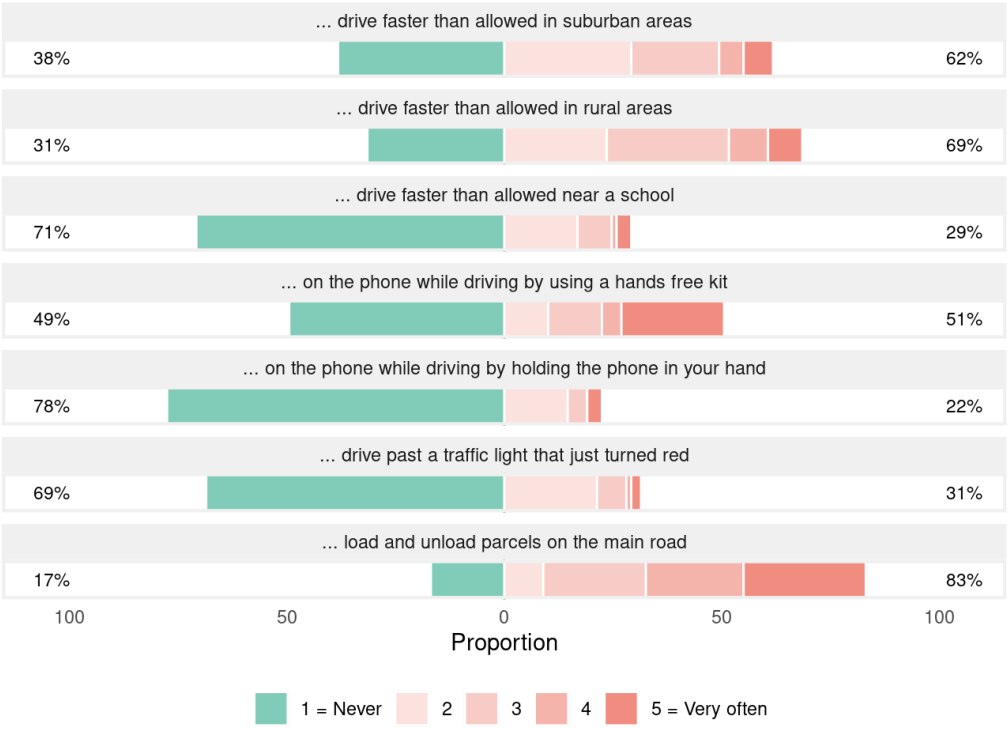
- **Not respecting safety distance**: 70% find it personally unacceptable but 62% do it sometimes.
- **Being distracted** (e.g. by using the phone): 85% find it personally unacceptable but 64% are distracted sometimes.
- **Suddenly changing direction and abruptly stopping**: 88% and 80% respectively find it personally unacceptable vs. 53% and 58% do it sometimes.
- **Driving faster than the speed limit:** 66-75% find it personally unacceptable, whereas 56-69% do it sometimes.

Figure 21 Frequency of self-reported behaviors of van drivers (1/3)



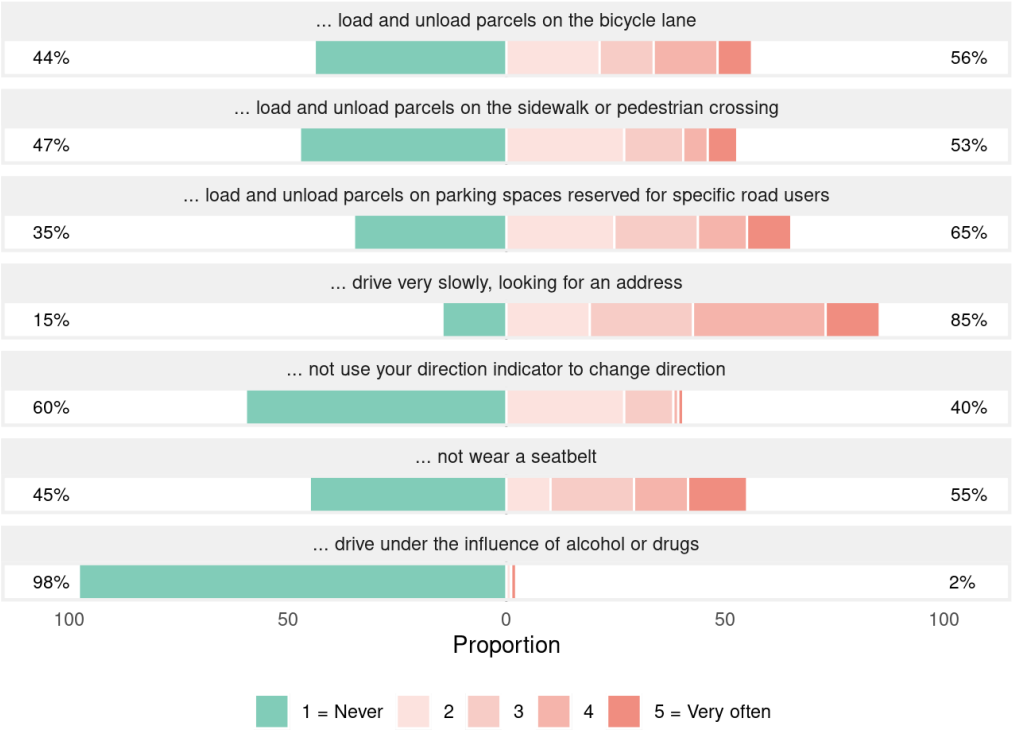
56% of drivers often use cycling infrastructure to load / unload packages. **53%** often do so on the sidewalk or pedestrian crossing, whereas **65%** use parking spaces reserved to specific road users. Speeding is done often by **over half of respondents**, the most typically in the **rural areas - 69%** drivers often drive faster than speed limit. Even around schools, almost third of respondents often break the speed limits.

Figure 22 Frequency of self-reported behaviors of van drivers (2/3)



Around **third of the sample** often do not pay enough attention while opening the doors, similar share often adopt aggressive driving style. Over **60%** often do not respect the safety distance to other road users. More than **20%** drivers often use a mobile phone without a hand-free kit. **98%** of the respondents never drive under influence of alcohol or drugs.

Figure 23 Frequency of self-reported behaviors of van drivers (3/3)



Interestingly, the **inexperienced drivers more often adopt the unacceptable behaviors**, such as driving faster than the speed limit and being on the phone while driving, than the experienced drivers (figures 24-26). Noteworthy, experienced drivers may think highly of their own driving skills and consequently do not admit to adopting these behaviors. Differences of 24% or more between the two groups are significant on the 5% level.

Figure 24 Correlation between driver experience and frequency of behavior (1/3)

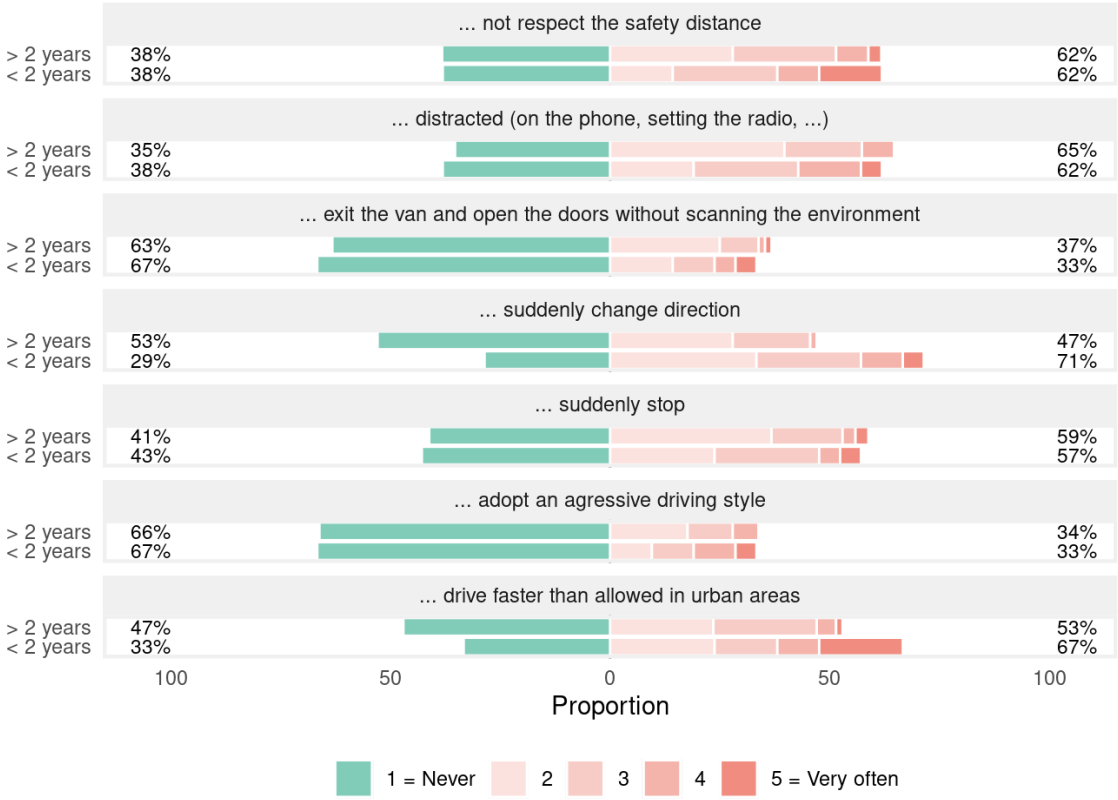


Figure 25 Correlation between driver experience and frequency of behavior (2/3)

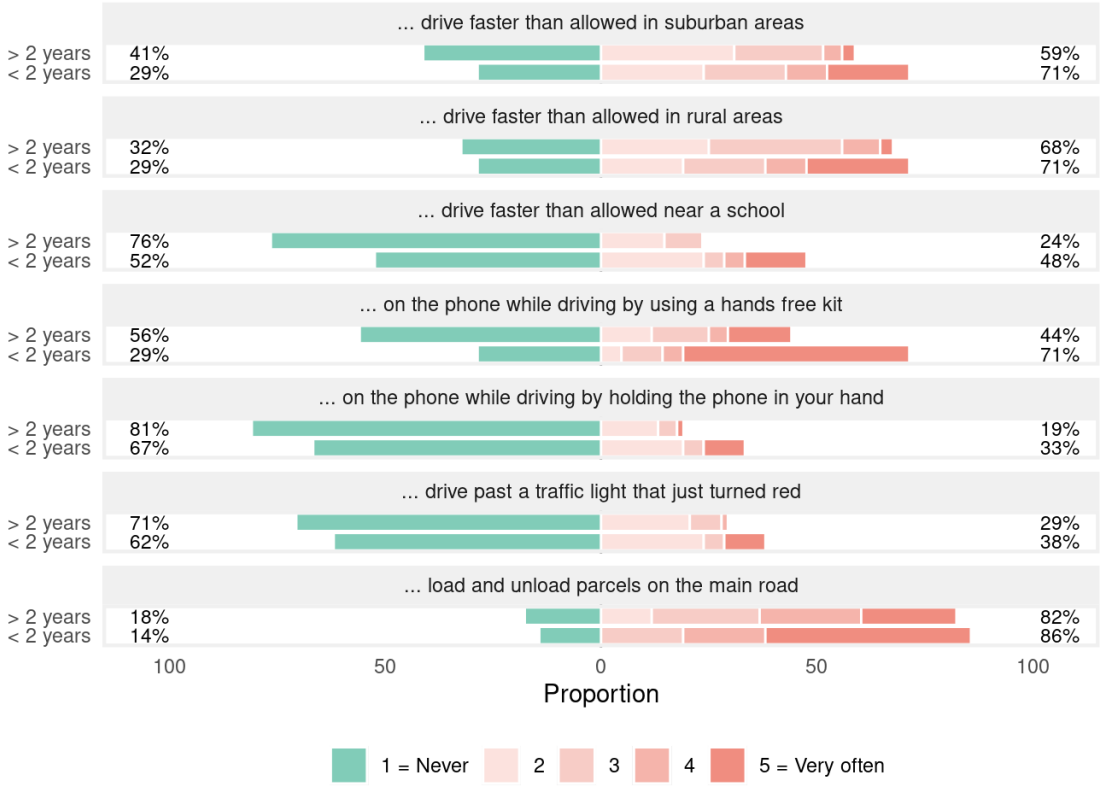
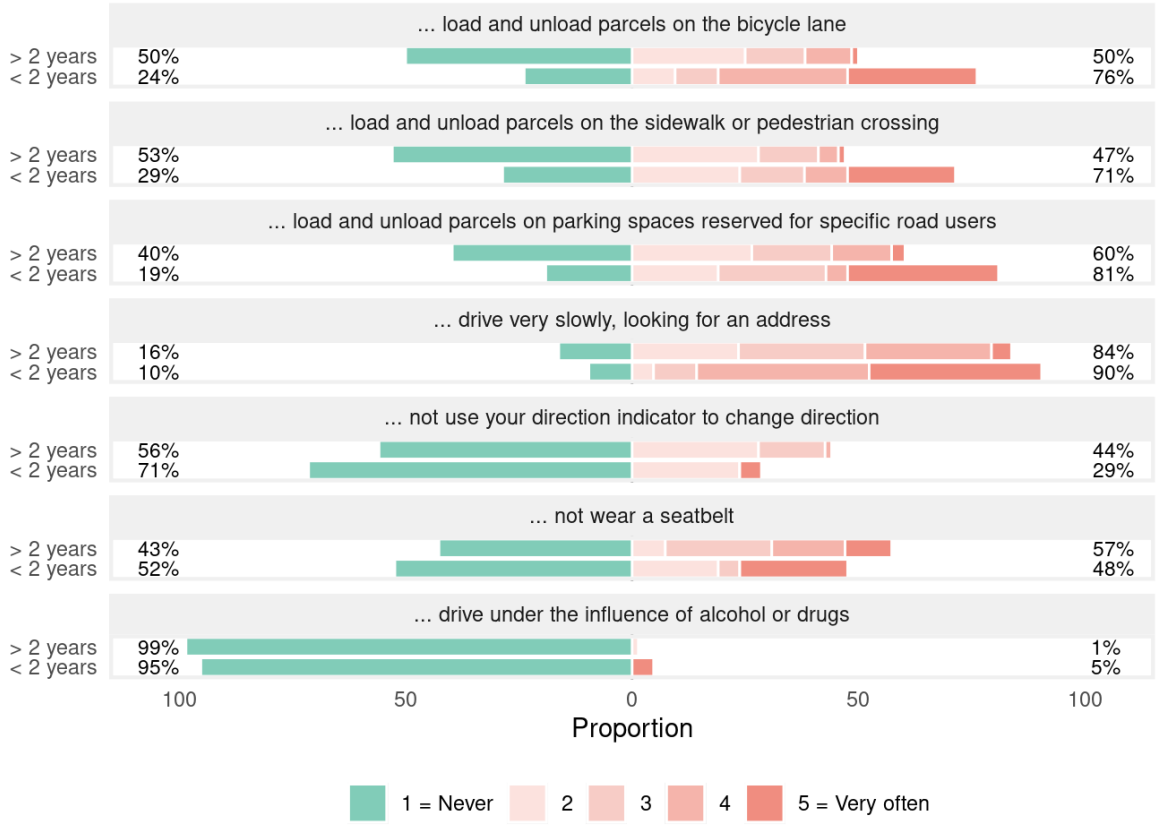
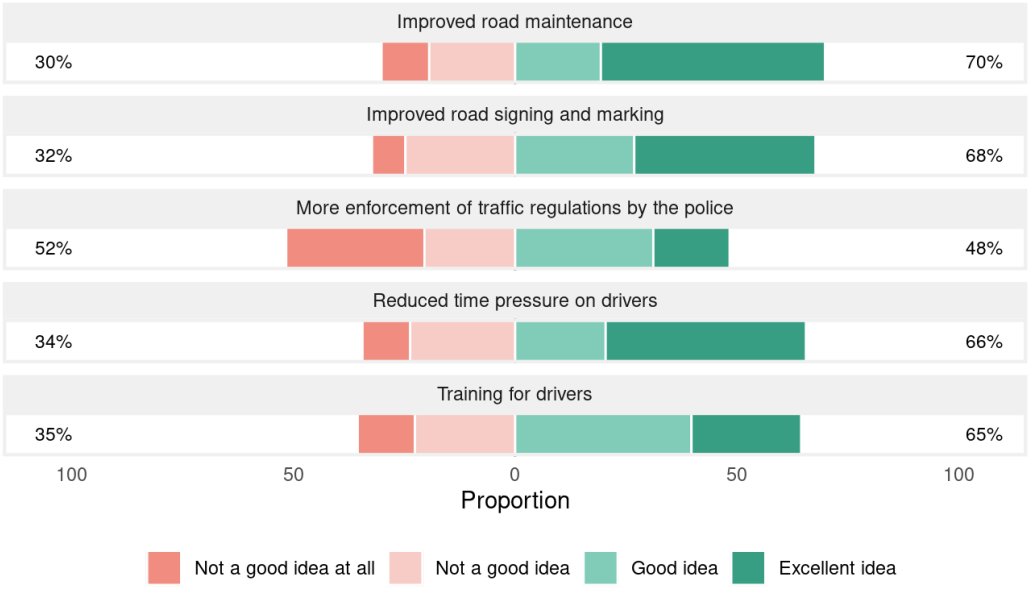


Figure 26 Correlation between driver experience and frequency of behavior (3/3)



2.2.1.4 Ideas to improve comfort and safety of delivery workers

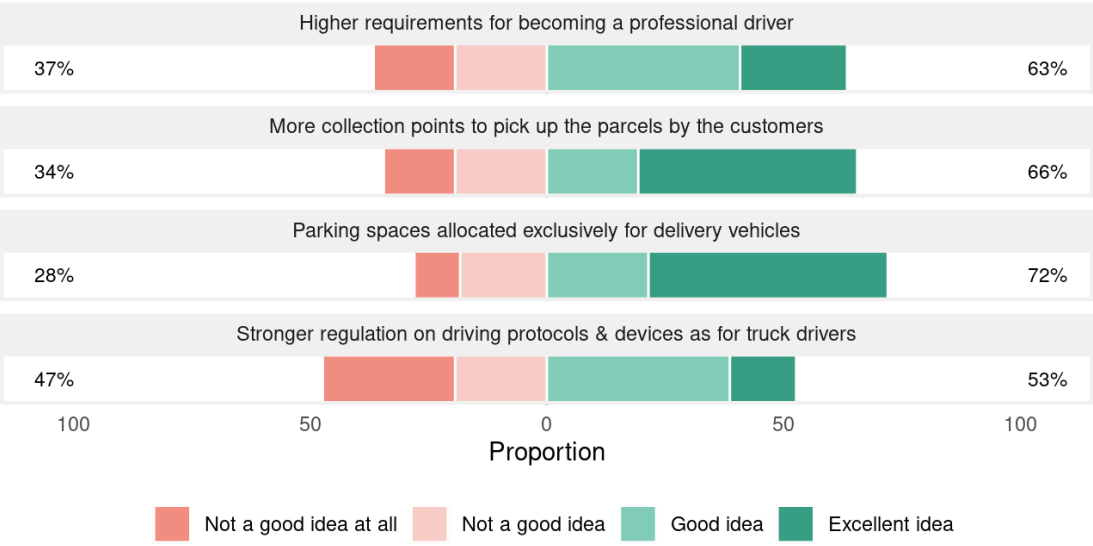
Figure 27 Attitude towards actions to improve the work comfort and safety of delivery workers (1/2)



Most of the proposed actions to improve the safety and comfort of the work has been seen positively by the respondents. Delivery workers are the most divided in terms of adaptations of traffic regulations (50/50). Most support is observed for creation of **parking spaces** exclusively for delivery drivers, improved road maintenance, signing and marking. Increased **enforcement,** largely discussed among

stakeholders as a mean to improve the situation, has been seen positively by almost half of respondents.

Figure 28 Attitude towards actions to improve the work comfort and safety of delivery workers (2/2)



2.3 Interviews with stakeholders

2.3.1 Approach used

Following discussions with several actors, a protocol for interviews with stakeholders involved in the ecosystem of deliveries has been developed and implemented. The invitation to participate in a meeting of one and a half hour was sent to parties indicated by the cabinet, complemented by additional suggestions from Vias. In total, 14 actors (85% of invited parties) have been interviewed from 4 different categories of stakeholders (associations, service providers, police, communes & regions).

The main part of the protocol consists of 10 questions. Participants were asked to indicate – items (challenges, opportunities, perceived risks etc.) related to 7 topics:

- problems resulting from deliveries,
- best practices, promising solutions,
- risks for the delivery workers,
- the use of data,
- opportunities in the future,
- threats in the future.

Three open questions were intended for the end of the interview:

- Who should work with businesses to improve the safety of riders?
- What should be done to improve the efficiency and safety of delivery operations?
- Is there something that general public should know about deliveries but is not aware of?

The results of the interviews and the most common topics for both challenges and best practices are summarized in **figures 32 and 33** respectively.

2.3.2 Communes

RISK FACTORS & CHALLENGES	KEY WORDS
'venstertijden' - specific hours within which vans are allowed in the city resulting in the high concentration of road users between these hours. Overlapping schedule between cities increase the number of vehicles in the network (e.g. a van that would normally be able to deliver in two cities, can only serve one area at the time)	• Entry restrictions
Lack of data to capture the in- and outflow of goods. It is impossible to grasp the loading parameter and establish a minimum load value. Service providers are very protective on this kind of data.	• Data • Collaboration
Lack of clear central vision for the sector- there are no clear guidelines to adjust the mobility policy of a city/region. It is problematic not only for the cities but also the service provider, who have no clarity on where to invest and how to adapt.	• Vision • Clarity
Little awareness of merchants themselves.	• Awareness • Communication

TRACKS FOR IMPROVEMENT	KEY WORDS
Tackling first mile and focusing on merchants who send packages via their web shop which require it being picked up by package operators. Some projects test a bicycle courier who picks up all these kind of packages and bring it to a central distribution center or micro hubs for further processing.	• First mile • Bicycle
Eco zones, where parcel lockers are accessible within short distance (e.g. 400m) from any citizen.	• Parcel lockers • Self-pickup • Accessibility
Nudging citizens to pick up their package by bike or foot (e.g. no parking space provided at these lockers)	• Parking
Data exchange with the providers.	• Data • Collaboration
Clear legislation, coordinated at a central level.	• Legislation
Knowledge exchange: collaboration with research institutions, universities for methodology for pilot projects; international and national cities, for expertise sharing; learning networks for knowledge sharing; interest groups for innovative ideas.	• Knowledge exchange • Collaboration

2.3.3 Police

RISK FACTORS & CHALLENGES	KEY WORDS
Time pressure (either to finish early the day or because they are remunerated according the number of parcel delivered) resulting in van-driver stopping the closest as possible to the delivery place.	• Parking • Working conditions • Driver behavior
Parking on cycling lanes or sidewalks. And continuing to drive on the cycle lane instead of reintegrating the road	• Parking • Obstructing
Recidivism: most of the drivers stop the violating behavior after 3 or 4 fines, but sometimes it takes up to 9-10 fines. Concentrated and coordinated actions from police/municipalities are needed in terms of areas and penalized behaviors.	• Recidivism • Driver behavior
Driving on cycling lanes (especially in more remote locations)	• Driver behavior

Knowledge of traffic rules by drivers themselves, not uniform among providers	• Driver education

TRACKS FOR IMPROVEMENT	KEY WORDS
Training, awareness, information, e.g.: - police organized a live session in the street of Brussels with drivers/responsible from a company to show where drivers can park and what is not allowed. - drivers do not feel comfortable to stop in the middle of the road but after police confirmed it was legal, they followed his voice.	• Training • Awareness
Critical role of enforcement and inevitability of receiving a fine for violations.	• Enforcement
Analyzing the data and statistics on number of issued fines to reorient the focus. Each month statistics per topic are being analyzed to be able to reorient the right teams to the right places. Essential to have focus topics & places, to be able to make a difference and progressively extend the zone (oil-spill effect). Since the beginning in 2005, there is a reduction of 50% of number of violations of riding & parking on bicycle lanes (all vehicles).	• Data • Centralization
Implementation of smart circulation plans with delivery zones (e.g. via tactical urbanism).	• Smart circulation zones • Delivery zones
Physical separation of infrastructure for vulnerable road users (e.g. with concrete obstacles).	• Infrastructure
Deployment of cargo bikes and maximum reduction of van trips for last mile.	• Modal shift
Set up clear priorities and coordinate with neighboring regions/communes – for example 1) Protect active transport users; 2) accessibility of public transport; 3) delivery zones to be kept free for delivery providers; 4) other: alcohol, speeding etc. First two categories account for 60% of all violations.	• Priorities and enforcement strategy

2.3.4 Associations

RISK FACTORS & CHALLENGES	KEY WORDS
Freelance drivers are exposed to higher risk as the technical condition of the vehicle as well as security equipment lies in their responsibility and is not properly validated.	• Gig workers • Working conditions
High turnover of workers does not allow time to gain experience and get properly trained.	• Employment • Training • Experience
Lack of visual associations with any of the delivery brands encourages to risky behaviors (they do not face any consequences from the employers).	• Gig workers • Branding
The increasing number of deliveries as well as actors involved in the distribution.	• Volumes
The rush of drivers due to high volumes of packages as well as the working conditions (payment per package, working hours until completing all deliveries instead of fix schedules), results in limited compliance with traffic rules and distraction.	• Volumes • Driver behavior • Working conditions
Problem with finding a parking spot forces drivers to violate parking rules and use cycling paths, sidewalks and other prohibited areas – it cause danger and frustration to all road users.	• Parking • Driver behavior • Infrastructure
Development and increase of the type of volume of operations (more deliveries, express deliveries, bulk deliveries)	• Volumes • Feasibility

Limited enforcement of rules by the police puts other traffic participants in danger. When this is tackled (e.g. ZP Bruxelles-Ixelles), the situation improves significantly.	• Enforcement
Disproportion between regulations in transport sector in general and delivery sector – lack of driving and resting time regulation, medical attest proving fit to drive professionally.	• Regulation • Legislation
Difficulties with obtaining licensing for parcel lockers as well limited available surfaces in the urban areas force the operators outside the cities, making it less feasible to shift towards cargo bikes.	• Feasibility • Licensing • Regulation
Competitive struggle between providers: race to the bottom due to holding the delivery costs low. Environment of the industry does not encourage collaboration.	• Competition • Cost • Collaboration

TRACKS FOR IMPROVEMENT	KEY WORDS
Allocate parking spaces for delivery operations.	• Parking
Replacing vans with (cargo) bicycles whereas applicable.	• Modal shift • Cargo bike
Establishing urban distribution hubs – centralizing the operations to make more areas operational with (cargo bikes), to allow smarter consolidation of packages.	• Modal shift • Cargo bike • Delivery pattern
Creating easily accessible self-location points – to reduce unsuccessful deliveries (resulting with unnecessary trips).	• Parcel lockers • Self-pickup
Additional nudging to encourage to walk / cycle to parcel lockers (e.g. by not providing parking in the proximity of parcel locker).	• Modal shift • Self-pickup • Parcel lockers • Failed deliveries
Smart circulation plans to encourage shift to bikes and reduce traffic in dense areas.	• Modal shift • Smart circulation plans
Simulating the effect of changes in circulation etc. by using digital twins – it requires collaborative approach to data sharing but would allow better adaptations of new rules and spatial planning to account for delivery operations.	• Simulation • Innovation • Data
Training, coaching and sensibilization for drivers based on their performance (telematics solutions) – using the data for the evaluation as well as in real-time to correct behavior.	• Training • Telematics
Facilitation of data collection and sharing among all involved parties – stimulation for collaborative approach (e.g. development of common KPIs for providers).	• Data • Collaboration
Improvement of working conditions for delivery workers - introducing driving times and resting periods, access to paid holidays.	• Employment
Enforcement of parking rules, especially towards parking on cycling lanes	• Enforcement

2.3.5 Discussion with service providers

Additionally, a set of 10 questions was prepared for the service providers. These concern the specifics of the delivery worker job, the onboarding process, bottlenecks contribution to the problem, the impact of road safety / mobility issues on the efficiency, cooperation with stakeholders, and facilitators that could improve the situation (with distinction between employed and gig workers). Two open questions were asked about methods of data collection and evaluation of the drivers.

RISK FACTORS & CHALLENGES	KEY WORDS
Difficulties with finding available parking spot or a safe space to leave the vehicle for the delivery.	• Parking
Traffic volume in the cities causing delays.	• Congestion • Traffic volume
Inaccurate information regarding constructions, deviations and real traffic condition in real time.	• Data • Routing
Low connectivity with 4G and 5G network	• Connectivity
Low quality of available addresses data-base, lack of details, inaccurate information.	• Data
Licensing difficulties to access traffic-restricted areas, lack of centralized platform to make the requests, low accessibility for fleet manager not residing in Belgium.	• Licensing
High pressure and stress on delivery workers (due to traffic conditions, low clarity of address etc.)	• Stress • Fatigue • Working conditions
Low feasibility of transition towards electric fleet for bulky deliveries.	• Feasibility • EVs
Dynamic and random routing patterns.	• Routing
Retention of the workers.	• Employment • Experience
Not sufficient supply of qualified workers to carry deliveries (experience, physical condition etc.).	• Employment
High customer expectations for 'day-after-delivery' resulting in unsuccessful deliveries due to too short notice.	• Expectations • Failed deliveries
Ensuring certain quality level by the delivery (gig) workers.	• Supervision • Compliance • Employment • Gig workers
Strict admissible loading limits (500kg) for light delivery vehicles.	• Regulation
Difficulties with executing the company rules and standards from the employees.	• Compliance • Supervision
Difficulties with compliance with traffic regulations (parking and speeding) resulting in fines for drives.	• Compliance
Working schedule oriented on deliveries instead of fixed hours – leading to risky behaviors from drivers trying to finish their day early.	• Employment • Working conditions
Damages to the fleet (correlated with weather conditions, peak in January-February)	• Fleet
Drivers exposed to (verbal) aggression from other road users.	• Aggression • Working conditions
Range of products to be delivered (bulky, time-sensitive, refrigerated).	• Feasibility

TRACKS FOR IMPROVEMENT	KEY WORDS
Tracking behavior of the driver and vehicle performance with telematics solutions.	• Driver behavior • Telematics
Allocating parking space for delivery operations in dense areas.	• Parking
Internal development programs for drivers.	• Training • Development
Re-occurring driver training (e.g. via e-learning platforms)	• Training
Preparatory training with initiation period before taking full duty as a driver.	• Training
Equipping vehicle with tech-innovations (360° cameras, smoke detectors to prevent smoking etc.) and ergonomic solutions.	• Fleet • Innovation • Ergonomics • Working conditions
Associating hubs with certain areas and training with the specification of the area in mind.	• Training • Centralization
Accounting for parking and maneuvering while planning the routing.	• Routing
App to communicate in real time with the delivery worker.	• Communication • Innovation
Evaluation and coaching of the drivers based on their performance via collected empirical data on their behavior.	• Coaching • Data
Parcel lockers facilitating self-pickups and decreasing ratio of failed deliveries.	• Failed deliveries • Parcel lockers • Self-pickup
Deployment of cargo bikes whereas possible.	• Modal shift
Avoiding subcontracting to ensure expected service quality.	• Employment • Gig workers
Periodical hours clearance to avoid incentivizing to rush to finish the day (e.g. balancing over and under time every 6 months).	• Working conditions
Feedback culture – in real-time (e.g. via the app) and/or on regular reoccurring basis.	• Communication • Feedback
Open communication with the workers and good socio-economic condition to maintain skilled employees in the company.	• Communication • Employment • Working conditions
Feedback & 'warning' culture among drivers themselves (exchange of knowledge, experience, particular information referring to certain locations etc.).	• Communication
Regular maintenance and technical checkups of the vehicles.	• Fleet
Loading the vehicle accounting for the routing order.	• Loading • Routing

3 Highway code rules concerning parking and handling of goods

3.1 Parking and standing still

The highway code in Belgium makes a clear distinction between **parking** and **standing still**:

Article 2.22 defines "standing still" as stopping the vehicle for no longer than needed for letting people in and out of the vehicle or loading goods in and out of the vehicle. It does not consider if the engine of the vehicle is running or not. In principle, standing still is allowed in more places than parking and the rules related to this type of stopping of the vehicle will be applicable to the delivery workers in most cases.

Article 2.23 defines "parking" as stopping for longer than a necessary operation of the loading or unloading or letting people in and out of the vehicle.

Article 23 describes how to place a vehicle that is parked or standing still: always at the right side (in one way streets parking is allowed on both sides). It is a good practice especially for deliveries: sliding door is on the right side of the vehicle, hence parking on the left side of the road makes it unpractical to unload.

In case of absence of dedicated parking spots, a vehicle must park or stand still outside of the driving space. If there is a shoulder, it should be used to stand still. In principle, the vehicle should be placed in a way that obstruct the traffic the least. There exists a hierarchy of shoulders, raised shoulder and level shoulder: within built up areas only level shoulder should be used, but outside both are allowed.

If pedestrians need to use that shoulder as well, at least 1.5m passage must be left next to the vehicle (however, in built-up areas there are often sidewalks and no shoulders). If the whole surface of the vehicle is stopped on the shoulder, the orientation of the vehicle is not important. If part of the vehicle exceeds the shoulder and is on the carriageway, it should take the least space possible and be placed as far as possible from the middle of the road.

If placed on the road, vehicle should be stopped in parallel to the carriageway in <u>one single line</u> (if there is a road marking indicating the parking spots on the side of the road, that is not the part of the driving path – hence delivery worker is allowed to stand still next to already parked car, as it would be considered as one line on the carriageway). Only if there is no shoulder or dedicated parking spots, one can stop the vehicle on the carriageway.[14]

Article 24 regulates spaces where stand still and parking are prohibited. In principle, a vehicle should stop in a way that does not endanger other road users. The article specifies ten circumstances (but the list is not exhaustive):

1. **On the sidewalk** and in built-up areas on raised shoulders, with 2 wheels only; the sidewalk should be considered as untouchable unless the road administrator has indicated otherwise.
2. **On the cycle path** – it is never allowed to park or stand still on the cycling path and the road administrator CANNOT allow parking on the cycling lane – and **in less 5m before and after from the places where cyclists need to merge with the regular traffic** (where cycling lane finishes).

[14] Please note: the parking and stand still rules are subjected to the general hierarchy of traffic instructions. If there is a sign regulating the parking / standing still, it is the sign that is binding and not the general rules.

3. **On level (train) crossings** (this is the only 4th degree parking violation in the highway code).
4. **On pedestrian crossing and cycling crossing** - regardless which part of the road they are. If vehicles need to stop on the roadway, it **should not be closer than 5m from these crossings.**
5. **In tunnels and on bridges.**
6. If on the roadway, **not close the top of the hill**, and if obstructing the way, **on the curves.**
7. **On an intersection and within 5m from an intersection** - unless road administrator allow and mark the parking closer than that.
8. **20m before traffic lights placed at an intersection** (not only on the roadway but also on the shoulder) – however, a road administrator can allow parking on the intersection.
9. **20m before traffic lights placed outside an intersection** (this does not apply to vehicles of which the height, including the load, does not exceed 1.65 m, when the lower edge of these signals is at least 2 meters above the roadway). It is not allowed for a road administrator to allow parking within 20m before traffic lights outside of the intersection.
10. **20m from the road signs** (does not apply to vehicles of which the height, including the load, does not exceed 1.65 m, when the lower edge of these signals is at least 2 meters above the roadway).

Article 25 specifies 14 cases where parking is prohibited but standstill is allowed – however, none of it is not applicable to the deliveries.

Article 28 regulates opening the doors of the vehicle – it is only allowed after you make sure that it will not endanger other road users (specifically cyclist and pedestrians), leaving it open is also considered.

Article 35.2.1 specifies the exemption applicable exclusively to Bpost employees, who are allowed not to wear seatbelts if their work requires to stop consecutively (no other operators are exempt).

Article 45 clarifies that goods loaded onto a vehicle cannot hinder the visibility or obstruct the view of the driver. The way goods are loaded should not constitute a danger to the driver or other vehicles (hence, packages cannot be loaded on the passenger seat of the van if these are not properly fixed).

3.2 Rules concerning cargo bikes

Articles 24 and 25 (and most of the regulation concerning parking and stand still) do not apply to (cargo) bicycles according to the rule that **if a bicycle (of any kind) is not ridden (in motion), then it is not considered as a vehicle.** The main principle, however, assumes that cycling path as well as a sidewalk should not be obstructed by parked bicycles. Article 23.3 currently forbids bicycles (2 wheels) to use parking spots.

Figure 31

D7: Compulsory cyclepath

Figure 30

D9: Part of the road reserved for pedestrians, cyclists and mopeds class A

Figure 29

D10: Part of the road reserved for pedestrians and cyclists

Although different rules applies for bicycles with more than 2 wheels, if the width of the bicycle is not larger than 1m it will always be considered as a regular bike. Exceptions granted in highway code for cyclists (e.g. going against traffic on the way street etc.) only apply to bikes of the width of max. 1m.[15] Loading of the bike cannot exceed 80km unless trailer has a breaking system.

Parts of the public roads indicated by signs D7, D9 and D10 are compulsory to use for cyclists. However, if the width of the cargo bike is larger than 1m, they are not allowed to use these parts of the road.

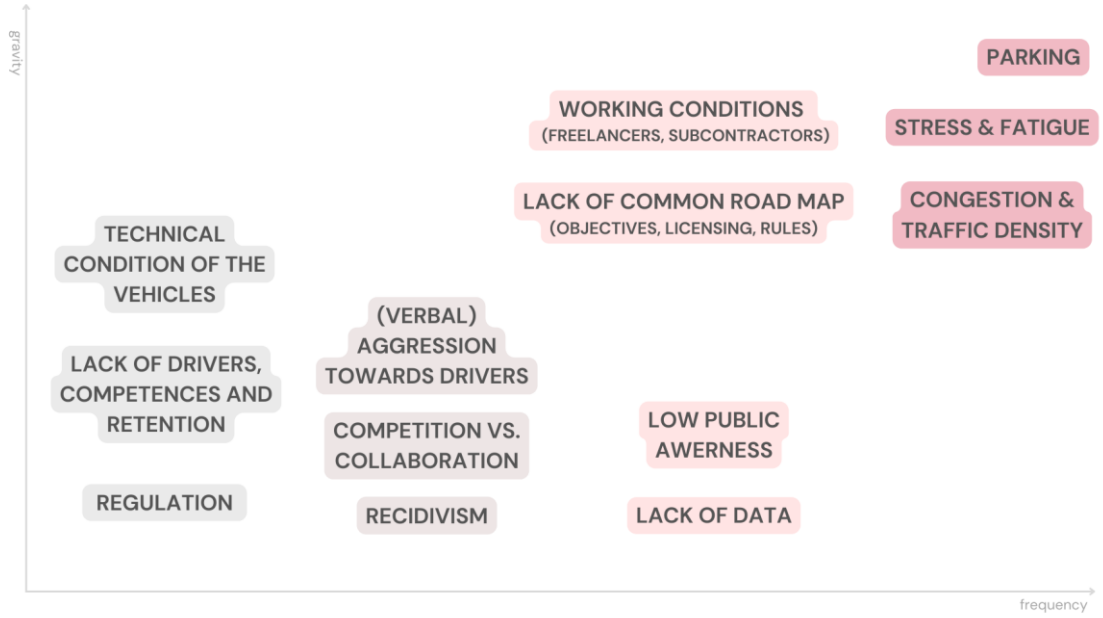
[15] The width of the regular bicycle is standardized (max 75cm for 2 wheels bike).

4 Conclusions and recommendations

4.1 Key messages emerging from the study

- Many challenges are acknowledged by numerous independent actors, indicating a structural and multidimensional nature of their impact (figure 32).
- No major differences were observed between urban and rural areas, although the challenges referred to by the stakeholders are most often presented within the context of an urban environment. Self-declared behavior of drivers indicate speeding to be more frequent in rural areas.
- Although **structural changes are needed**, many improvement can be achieved in the short and medium term.

Figure 32 Mapping the challenges related to deliveries

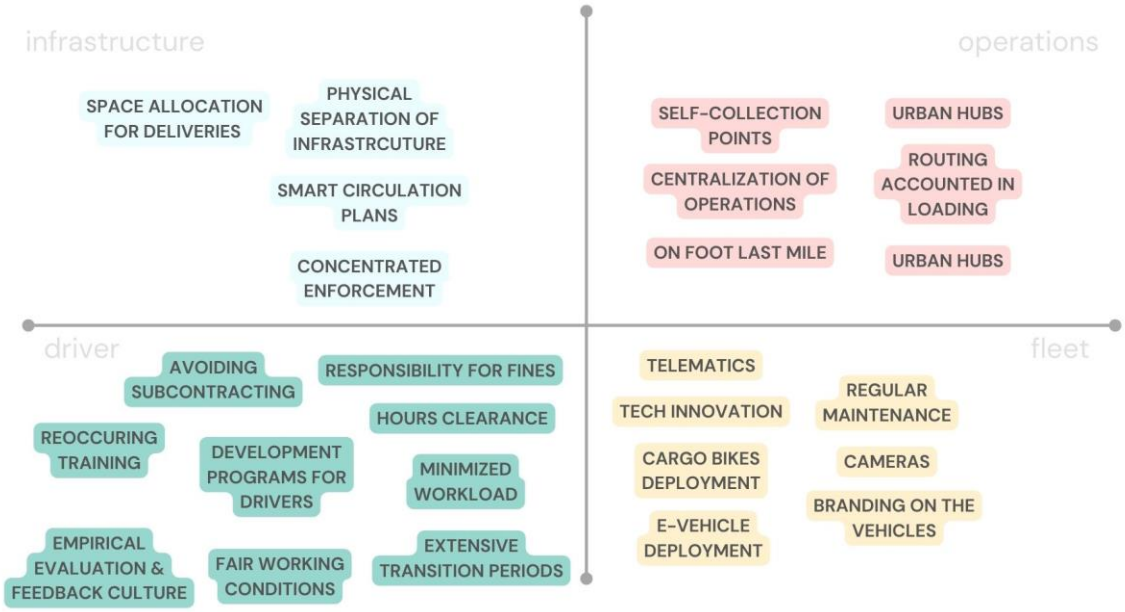


- There is a **limited willingness to pay a higher price** among the Belgian population to improve delivery standards. However, ensuring fair working conditions for the delivery workers is strongly supported, even when it comes as an additional cost. These results are in line with other studies.
- There is **not enough specific data available** to fully grasp the scope of the challenges and impact on road safety and mobility – new data collection methods resulting in KPIs, a framework that allow comparison among different providers and a more systematic approach to data evaluation are needed for an evidence-based discussion and better understanding of the situation.
- Road safety is perceived by some providers as a **competitive advantage** – yet it should be considered as a basic principle of operations without having a marketing connotation.
- Great effort is being made in the industry – specifically on the side of the providers themselves: intense training programs, deployment of telematic solutions and fleet innovation, optimization

of operations with the objective to attract employees and provide them with tools to safely execute their tasks (figure 33).

- Many drivers admit to often violate the highway code – the most common behaviors are violations related to **speeding** as well as **using space for cyclists and pedestrians** to load or unload packages.
- Drivers perceived the behavior of other road users as a difficulty in a daily work as well as one of the key causes for (near) crashes.
- Strong correlation is observed between **the experience of drivers** and their behaviors and attitudes. Disproportion between acceptability and frequency of the behaviors among drivers is also visible – they do perceive most of the proposed behaviors as unacceptable, yet often conduct them themselves.
- Van drivers tend to believe that their behavior is in general more compliant with the traffic rules that the opinion of their environment about the same matter.
- **Time pressure** has been indicated by different actors as one of the key issues impacting the safety and comfort of van drivers – however, drivers themselves did not confirm that. Although there exists a correlation between driver's experience and perceived difficulty resulting from time pressure, it seems to be a matter of the efficiency that comes with practice. On the other hand, time pressure has been indicated as one of the key reasons for accidents to occur.

Figure 33 Best practices from the sector



- Although many challenges lay in the responsibility of the providers, **certain problems cannot be properly addressed without the involvement of other stakeholders:** access to data, traffic intensity, infrastructure availability, connectivity, coherent strategy are among the things pointed out as out of their capacity to improve.
- Although both the number of crashes involving company-owned vans and their severity are decreasing (despite the increasing fleet size), the involvement of vulnerable road users in injury accidents with involvement of company-owned vans remains high and keeps growing.
- Accident data are in line with the self-declared by van drivers conflicts with other road users.

4.2 Possible solutions

Based on the results of the study, we propose a set of actions to improve the current situation in the short term as well as more long term changes. All proposed actions are shown in figure 34 with the expected impact and time horizon for implementation.

Change the delivery pattern – in particular, establishing urban distribution centers and creating more self-collection points. Centralization of operations allows for better training of drivers. Changing the patterns would make modal shift towards cargo bikes more feasible; such a shift has also been shown to mitigate road safety and mobility risks resulting from deliveries. *Retiming deliveries* has shown to be a highly successful solution to heavy traffic peaks in London. Public awareness of the real cost of deliveries and making van drivers' behavior more sustainable (less returns, less unsuccessful deliveries, lower delivery time expectations) will also play a key role in changing the patterns.

Self-pick-up facilitation - creating easily accessible self-location points to reduce unsuccessful deliveries will result in fewer unnecessary trips and reduced traffic flow. Many consumers declare their interest in using such a service. Additional nudging to encourage to walk / cycle to parcel lockers (e.g. by not providing parking in the proximity of parcel locker) will allow to improve the modal split and the overall environmental footprint of the delivery.

Modal shift – shifting as many deliveries as possible from large vehicles to (cargo) bikes, facilitating on foot last mile. Together with improving the patterns of deliveries, this measure is believed by some to be the most significant structural change to be achieved in the delivery industry.

Consumer awareness – consumers must be aware of the real cost of deliveries. Their awareness is vital for achieving an improvement of the situation because it requires a change in consumption behavior. A shift towards self-pickups and awareness of the impact of purchase and delivery choices is an important factor in achieving a strategic change. Better awareness about the challenges of delivery workers may help to address the problem of (verbal) aggression that drivers are exposed to. Current narrative about deliveries are very negative towards providers, which is often not justified. Many people have a very low tolerance even for legally allowed behavior of the drivers and public opinion in this topic is negatively biased.

Urban planning (improve infrastructure) – the volume of e-commerce is likely to grow and it should be accounted for in the urban planning. Allocation of parking space for safe operations, development of separate cycling paths, smart circulation plans and allocation of parking areas for deliveries should incorporated in future infrastructure developments, especially in urban areas. Such measures are seen as key elements to improve the safety and efficiency of the operations by the delivery workers themselves. Physical separation of infrastructure for vulnerable road users can be achieved in the short term. The provision of parking space for deliveries would require more effort, but has also been indicated as a quick-win. Such parking spaces are seen by the delivery workers as the most crucial action to take.

Improve the data - generation and sharing of data, and digital twin modelling techniques have been mentioned as a way of optimizing the processes and improving the image of the sector. This is crucial to motivate the workers themselves to maintain desirable behaviors as well as for the public to better understand the nature of their work and associated impact. Establishing certain KPIs (e.g. number of accidents per package, number of km driven per package, number of accidents per driver etc.) and facilitate the data sharing among providers will allow to have an evidence-based discussion, and increase the understanding of the real impact of deliveries. This is impossible with the information that is available now. Furthermore, the data needed for the providers themselves (addresses, information regarding constructions, deviations and real traffic condition in real time) are often inaccurate or insufficient.

Fleet innovation – implementation of telematic solutions allows to gather empirical data about driver behavior and act appropriately in real time. The automotive sector provides many tools and features to

improve the road safety – 360 degrees cameras, parking sensors etc. can support driver in his daily operations, especially when visibility is limited. Ensuring branding of vehicles will allow to associate the operations with a provider and further push the delivery workers to respect internal standards and traffic regulations.

Training & coaching – the importance of training, coaching and sensibilization of workers in the field cannot be ignored. A systematic approach to a continuing training as well as targeted training for delivery workers (specifically sensibilization towards cyclists) can help in building mutual trust and respect among road users. Stimulating a feedback culture is important for drivers to learn from their mistakes and improve the behavior. Internal development programs for drivers could be of help, by defining the objectives and career path oriented on experience, reward expected behavior and reduce the retention of skilled workers. Sensibilization about the traffic rules is needed as a large proportion of the drivers find even legal behaviors as unacceptable. Furthermore, many drivers have indicated that better compliance with the rules by other drivers is essential to improve the safety of the entire sector as well as other road users.

Road map – there is not common objective for how deliveries should develop in Belgium – it causes confusion with providers but also with cities who are forced to improvise in implementing changes. Development of a framework that would allow for the centralization of licensing, milestones and good practices will allow all stakeholders to better plan and execute their operations in the future.

Recognition – efforts for improving the situation should be recognized and rewarded (e.g. via grant schemes, financial incentives) . It is crucial to work on the image of the sector. Providing a "safe label" scheme to recognize providers making efforts in the area of road safety and mobility will encourage expected behavior. The *London recognition scheme for fleet operators* allowed for a great reduction in road crashes and emissions but also provided significant savings to the operators themselves due to decreased in insurance costs. Researches from UK suggest also that safe labels should in principle address the freelance workers, who are less likely to be covered by internal regulations of providers.

Figure 34 Mapping of possible solutions

Regulation – efforts towards changing working conditions towards less orientation on piece work will have a valuable contribution in terms of reducing time pressure and incentivizing risky behaviors. Drivers themselves indicated reduction of the time pressure as one of the key factors to improve the

safety of their operations. Additional regulation of driving and resting time as well as medical certificates of fitness to drive should be also considered to align delivery rules with the regulations in the transport sector. Hours clearance could be a way to reduce the incentive to rush, without imposing fixed schedules. Moving away from the per-package payment has been also indicated by the drivers as a mean to improve road safety.

Collaboration – strong collaboration among all actors is needed to address the problem comprehensively. Public authorities, insurance companies, the police, hospitals, the retail industry, consumers, logistics operators have all an important voice in the discussion. Specifically the three last ones and public authorities should work closely together. Given the multidimensional nature of the problem, a holistic approach is necessary to account for all aspects of it.

Address quality – the availability of detailed information on addresses in much lower in Belgium than in other countries. The distinction between paved and unpaved roads is not available, which may cause confusion to drivers. Solutions like what3words could improve the space allocation, but structural changes in the address standards are needed to improve the efficiency of deliveries (e.g. structure of addresses in Netherlands has been indicated as a good example).

Connectivity – 4G and 5G coverage is often not sufficient. This leads to issues with routing and access to real-time traffic information, causing delays and impacting the planning.

Enforcement – focusing traffic law enforcement on certain behaviors and geographical areas will allow to closely monitor the situation, prevent recidivism and protect all road users.

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6 Appendixes

ITEM	Never (1)				(2)				(3)				(4)				Always (5)			
	TOTAL	Pedestrian	Cyclist	Car driver	TOTAL	Pedestrian	Cyclist	Car driver	TOTAL	Pedestrian	Cyclist	Car driver	TOTAL	Pedestrian	Cyclist	Car driver	TOTAL	Pedestrian	Cyclist	Car driver
1	13%	12%	16%	11%	18%	19%	22%	18%	24%	25%	23%	25%	19%	20%	19%	21%	20%	19%	17%	21%
2	12%	12%	13%	13%	18%	19%	18%	20%	26%	24%	32%	24%	19%	22%	22%	20%	18%	17%	11%	19%
3	15%	18%	14%	13%	20%	20%	26%	20%	25%	26%	28%	24%	19%	19%	18%	20%	13%	11%	9%	19%
4	25%	24%	29%	28%	27%	26%	29%	31%	19%	19%	20%	18%	12%	14%	9%	11%	9%	8%	5%	7%
5	17%	18%	16%	19%	28%	27%	30%	34%	25%	24%	26%	20%	13%	15%	13%	13%	11%	9%	10%	8%
6	12%	12%	16%	11%	22%	21%	27%	24%	23%	24%	23%	24%	23%	24%	20%	22%	14%	15%	10%	14%
7	9%	9%	12%	8%	13%	14%	10%	15%	21%	21%	24%	21%	25%	27%	27%	24%	22%	21%	18%	25%
8	10%	10%	12%	8%	13%	12%	12%	14%	23%	24%	26%	28%	24%	24%	27%	21%	21%	23%	17%	24%
9	10%	9%	12%	9%	11%	12%	9%	14%	21%	21%	25%	20%	23%	24%	26%	23%	23%	24%	19%	28%
10	11%	11%	12%	12%	13%	15%	12%	16%	27%	24%	27%	24%	19%	20%	25%	20%	18%	21%	19%	21%
11	12%	13%	11%	14%	17%	17%	20%	17%	24%	25%	27%	24%	19%	19%	22%	19%	15%	15%	11%	15%
12	12%	12%	9%	13%	14%	15%	15%	17%	26%	27%	33%	24%	21%	20%	26%	21%	21%	22%	12%	21%
13	30%	30%	32%	36%	26%	26%	27%	26%	16%	18%	20%	16%	12%	11%	10%	9%	8%	8%	6%	7%
14	11%	11%	12%	11%	14%	13%	13%	16%	23%	24%	25%	21%	27%	25%	30%	27%	19%	21%	16%	20%
15	15%	16%	11%	20%	14%	15%	15%	14%	23%	22%	26%	24%	23%	22%	27%	21%	17%	17%	16%	15%
16	16%	18%	16%	20%	16%	15%	19%	16%	27%	25%	32%	26%	20%	21%	16%	19%	16%	17%	14%	15%
17	22%	23%	22%	25%	21%	19%	25%	19%	21%	20%	22%	21%	15%	16%	18%	15%	14%	14%	10%	13%
18	12%	13%	11%	12%	30%	28%	36%	32%	30%	30%	27%	31%	14%	16%	17%	14%	9%	9%	5%	8%
19	12%	12%	12%	12%	17%	18%	19%	21%	23%	23%	26%	21%	25%	25%	24%	24%	17%	17%	15%	19%

Table 10 Frequency of observed behavior of van drivers based on transport mode of the respondent

ITEM	Never (1)			(2)			(3)			(4)			Always (5)		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
1	14%	10%	17%	15%	19%	19%	25%	19%	25%	18%	27%	14%	17%	18%	17%
2	14%	13%	14%	18%	21%	18%	24%	32%	25%	19%	16%	23%	16%	10%	13%
3	16%	19%	22%	16%	15%	26%	24%	30%	24%	18%	21%	15%	13%	7%	7%
4	19%	30%	32%	22%	25%	29%	22%	22%	17%	15%	6%	9%	9%	8%	4%
5	16%	21%	25%	25%	33%	29%	24%	19%	22%	14%	10%	8%	8%	10%	8%
6	11%	21%	16%	21%	18%	23%	27%	24%	25%	18%	23%	18%	13%	11%	11%
7	10%	8%	12%	9%	19%	12%	23%	25%	18%	23%	25%	27%	23%	17%	18%
8	13%	11%	13%	10%	16%	10%	21%	26%	25%	25%	23%	21%	19%	20%	19%
9	13%	11%	11%	10%	16%	12%	18%	25%	15%	21%	22%	30%	20%	19%	25%
10	14%	13%	15%	9%	14%	13%	23%	27%	24%	16%	28%	20%	22%	11%	17%
11	15%	13%	15%	15%	17%	18%	23%	23%	23%	16%	26%	18%	15%	9%	12%
12	14%	10%	14%	13%	22%	16%	27%	24%	23%	16%	21%	23%	20%	19%	18%
13	24%	33%	34%	26%	28%	28%	20%	16%	14%	9%	9%	11%	8%	8%	5%
14	10%	15%	13%	12%	20%	16%	28%	19%	23%	22%	23%	24%	19%	21%	15%
15	14%	14%	20%	18%	17%	17%	17%	24%	20%	24%	15%	24%	15%	19%	11%
16	12%	23%	23%	16%	8%	16%	24%	27%	26%	20%	21%	17%	16%	14%	11%
17	20%	27%	26%	16%	21%	20%	24%	19%	20%	12%	15%	16%	14%	9%	10%
18	14%	16%	15%	28%	32%	34%	26%	26%	27%	14%	14%	12%	9%	6%	6%
19	15%	11%	14%	12%	20%	21%	25%	26%	19%	19%	22%	25%	18%	16%	13%

Table 11 Frequency of observed behavior of van drivers based on dominant environment

ITEM	Unacceptable (1)				(2)				(3)				(4)				Acceptable (5)			
	TOTAL	Pedestrian	Cyclist	Car driver	TOTAL	Pedestrian	Cyclist	Car driver	TOTAL	Pedestrian	Cyclist	Car driver	TOTAL	Pedestrian	Cyclist	Car driver	TOTAL	Pedestrian	Cyclist	Car driver
1	55%	51%	54%	53%	26%	28%	27%	30%	13%	14%	13%	13%	4%	4%	3%	1%	3%	3%	3%	1%
2	58%	59%	59%	62%	21%	23%	23%	23%	12%	11%	12%	12%	4%	5%	4%	2%	3%	2%	2%	1%
3	61%	60%	60%	62%	23%	23%	25%	25%	11%	11%	11%	10%	3%	3%	2%	3%	2%	2%	1%	0%
4	55%	49%	55%	49%	27%	28%	25%	34%	15%	17%	15%	15%	4%	5%	3%	2%	2%	2%	2%	0%
5	58%	49%	51%	52%	26%	28%	29%	30%	14%	15%	15%	13%	4%	5%	3%	4%	2%	2%	2%	1%
6	62%	69%	72%	74%	17%	16%	16%	16%	8%	9%	6%	7%	4%	4%	4%	2%	2%	2%	3%	1%
7	53%	55%	56%	57%	23%	24%	25%	25%	15%	15%	14%	16%	4%	5%	3%	2%	2%	1%	2%	1%
8	52%	55%	56%	54%	23%	23%	22%	26%	14%	15%	16%	15%	7%	6%	4%	5%	2%	2%	1%	1%
9	49%	49%	54%	52%	24%	26%	24%	25%	16%	16%	16%	17%	6%	6%	4%	6%	3%	3%	2%	1%
10	68%	71%	70%	73%	14%	13%	15%	15%	9%	9%	8%	8%	5%	5%	4%	3%	2%	2%	2%	1%
11	27%	27%	29%	27%	14%	15%	16%	12%	21%	19%	25%	19%	18%	20%	13%	20%	20%	19%	16%	21%
12	66%	72%	75%	74%	15%	13%	12%	14%	7%	8%	7%	8%	4%	6%	4%	3%	2%	1%	1%	0%
13	73%	71%	69%	74%	12%	14%	16%	14%	10%	10%	9%	8%	4%	4%	2%	2%	3%	2%	3%	1%
14	34%	33%	26%	36%	27%	27%	28%	25%	25%	23%	26%	25%	9%	10%	8%	10%	7%	7%	12%	5%
15	47%	49%	55%	50%	25%	25%	22%	28%	15%	16%	15%	15%	7%	7%	6%	5%	4%	4%	2%	2%
16	51%	49%	54%	51%	22%	23%	20%	24%	16%	17%	18%	18%	7%	8%	6%	5%	4%	3%	3%	2%
17	45%	48%	44%	47%	24%	25%	25%	26%	18%	17%	18%	18%	8%	7%	8%	7%	4%	3%	4%	2%
18	17%	11%	11%	11%	19%	19%	19%	21%	32%	34%	36%	33%	21%	21%	18%	22%	16%	15%	16%	13%
19	64%	63%	61%	64%	20%	21%	21%	20%	11%	11%	12%	12%	4%	4%	4%	3%	2%	2%	2%	1%
20	60%	63%	64%	64%	21%	21%	19%	22%	11%	10%	11%	10%	3%	5%	4%	3%	2%	2%	3%	1%

Table 12 Acceptability of observed behavior of van drivers based on transport mode of the respondent

ITEM	Unacceptable (1)			(2)			(3)			(4)			Acceptable (5)		
	Brussels	Wallonia	Flanders	Brussels	Wallonia	Flanders	Brussels	Wallonia	Flanders	Brussels	Wallonia	Flanders	Brussels	Wallonia	Flanders
1	52%	48%	53%	27%	24%	29%	9%	21%	13%	9%	4%	3%	4%	3%	2%
2	57%	58%	61%	17%	22%	21%	18%	14%	12%	3%	5%	4%	4%	2%	2%
3	59%	50%	64%	20%	26%	22%	13%	19%	10%	2%	5%	3%	6%	1%	1%
4	53%	49%	50%	19%	27%	27%	17%	19%	17%	5%	5%	4%	5%	0%	2%
5	47%	52%	50%	26%	25%	28%	15%	18%	15%	7%	4%	4%	5%	1%	2%
6	62%	63%	72%	19%	17%	14%	10%	15%	8%	5%	4%	4%	4%	1%	2%
7	53%	54%	57%	21%	24%	22%	16%	17%	16%	4%	4%	3%	5%	0%	1%
8	49%	53%	56%	22%	23%	22%	13%	17%	17%	10%	6%	4%	6%	0%	1%
9	48%	52%	51%	20%	25%	23%	18%	16%	18%	9%	6%	5%	5%	1%	3%
10	65%	67%	71%	13%	15%	14%	9%	14%	10%	11%	3%	4%	3%	1%	1%
11	26%	25%	29%	10%	15%	14%	26%	23%	21%	21%	20%	18%	18%	18%	18%
12	66%	69%	74%	15%	13%	13%	9%	13%	8%	6%	4%	4%	4%	1%	1%
13	67%	74%	68%	11%	10%	16%	14%	12%	11%	3%	4%	3%	5%	0%	2%
14	43%	46%	26%	21%	26%	26%	23%	21%	27%	7%	5%	13%	5%	3%	7%
15	47%	42%	51%	19%	27%	25%	18%	22%	16%	9%	6%	5%	7%	3%	2%
16	47%	43%	52%	21%	25%	24%	16%	21%	17%	9%	8%	5%	7%	3%	2%
17	48%	47%	45%	15%	25%	25%	19%	21%	20%	11%	5%	7%	7%	2%	4%
18	15%	16%	10%	14%	17%	22%	37%	36%	33%	18%	18%	23%	16%	14%	13%
19	63%	58%	63%	20%	20%	20%	11%	17%	11%	2%	4%	4%	4%	0%	2%
20	61%	60%	63%	17%	20%	20%	14%	16%	12%	4%	3%	4%	4%	1%	1%

Table 13 Acceptability of observed behavior of van drivers based on the region of habitation of respondent

ITEM	Unacceptable (1)			(2)			(3)			(4)			Acceptable (5)		
	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural	Urban	Suburban	Rural
1	51%	49%	55%	24%	26%	26%	17%	19%	15%	5%	4%	2%	3%	2%	2%
2	58%	52%	63%	20%	26%	22%	14%	18%	10%	5%	4%	3%	3%	0%	2%
3	59%	56%	67%	22%	22%	21%	13%	15%	10%	4%	7%	2%	3%	0%	0%
4	51%	44%	58%	19%	29%	24%	20%	22%	14%	7%	4%	4%	3%	1%	0%
5	52%	43%	57%	20%	38%	26%	18%	14%	13%	7%	5%	2%	3%	1%	1%
6	61%	64%	78%	19%	17%	12%	13%	10%	7%	4%	7%	2%	3%	2%	1%
7	52%	50%	60%	21%	30%	23%	18%	17%	14%	6%	3%	2%	3%	0%	1%
8	52%	49%	60%	21%	28%	21%	19%	16%	14%	6%	4%	4%	2%	3%	0%
9	47%	43%	56%	24%	33%	24%	19%	18%	14%	5%	5%	4%	5%	1%	2%
10	64%	65%	75%	14%	20%	13%	14%	11%	8%	6%	3%	3%	3%	1%	1%
11	28%	25%	31%	16%	16%	15%	26%	27%	24%	15%	19%	16%	14%	14%	15%
12	69%	63%	76%	12%	19%	12%	11%	13%	8%	5%	5%	3%	2%	1%	1%
13	69%	69%	73%	12%	10%	14%	12%	14%	9%	5%	6%	3%	3%	1%	1%
14	34%	30%	33%	23%	24%	31%	26%	26%	19%	12%	14%	9%	5%	6%	7%
15	45%	45%	54%	22%	23%	24%	19%	26%	15%	8%	4%	4%	5%	2%	2%
16	48%	44%	53%	19%	27%	28%	21%	21%	12%	9%	4%	6%	4%	4%	1%
17	47%	42%	49%	18%	24%	26%	23%	26%	14%	5%	5%	7%	6%	3%	4%
18	14%	5%	11%	17%	22%	21%	39%	40%	32%	20%	21%	22%	11%	13%	14%
19	63%	55%	67%	16%	28%	18%	14%	11%	11%	5%	5%	3%	3%	0%	0%
20	61%	58%	67%	18%	24%	17%	16%	15%	12%	4%	2%	3%	2%	1%	0%

Table 14 Acceptability of observed behavior of van drivers based on the dominant environment

ITEM	Unacceptable (1)			(2)			(3)			(4)			Acceptable (5)		
	Brussels	Wallonia	Flanders	Brussels	Wallonia	Flanders	Brussels	Wallonia	Flanders	Brussels	Wallonia	Flanders	Brussels	Wallonia	Flanders
1	53%	54%	60%	25%	24%	27%	14%	16%	11%	6%	4%	2%	2%	2%	0%
2	58%	63%	66%	21%	21%	22%	16%	11%	9%	3%	3%	2%	2%	2%	1%
3	51%	61%	64%	31%	20%	22%	13%	15%	11%	5%	1%	2%	0%	3%	0%
4	45%	50%	42%	31%	23%	28%	21%	19%	23%	2%	5%	6%	1%	3%	2%
5	67%	74%	78%	18%	12%	12%	12%	10%	7%	3%	3%	2%	0%	2%	1%
6	70%	74%	78%	16%	13%	11%	11%	8%	7%	3%	3%	3%	0%	2%	1%
7	53%	55%	34%	22%	21%	24%	19%	18%	24%	4%	4%	13%	2%	2%	5%
8	37%	37%	41%	27%	19%	25%	19%	24%	24%	12%	10%	7%	5%	10%	3%
9	44%	44%	46%	20%	18%	25%	20%	25%	20%	14%	7%	7%	2%	5%	2%
10	47%	44%	45%	16%	21%	21%	22%	24%	20%	5%	5%	9%	10%	5%	4%
11	63%	65%	62%	21%	18%	22%	13%	12%	13%	3%	3%	3%	0%	2%	1%
12	40%	43%	45%	21%	17%	22%	19%	26%	22%	14%	8%	7%	6%	7%	3%
13	70%	63%	72%	14%	17%	16%	9%	14%	7%	6%	3%	3%	1%	3%	2%
14	50%	58%	48%	19%	18%	20%	22%	19%	22%	5%	2%	6%	4%	3%	3%
15	69%	69%	79%	15%	13%	13%	11%	12%	6%	2%	4%	1%	3%	2%	1%
16	73%	75%	80%	17%	13%	13%	8%	8%	6%	2%	1%	1%	0%	3%	1%
17	65%	58%	60%	23%	20%	26%	9%	16%	11%	2%	3%	2%	1%	2%	1%

Table 15 Acceptability of observed behavior of cargo cyclists based on the region of habitation of respondent

ITEM	Unacceptable (1)			(2)			(3)			(4)			Acceptable (5)		
	Pedestrian	Cyclist	Car Driver	Pedestrian	Cyclist	Car Driver	Pedestrian	Cyclist	Car Driver	Pedestrian	Cyclist	Car Driver	Pedestrian	Cyclist	Car Driver
1	55%	53%	58%	28%	33%	28%	12%	11%	11%	3%	3%	2%	1%	2%	0%
2	65%	62%	65%	21%	23%	23%	10%	11%	9%	2%	3%	2%	1%	2%	1%
3	62%	58%	64%	22%	22%	22%	13%	16%	11%	2%	5%	2%	1%	1%	1%
4	44%	44%	45%	27%	25%	28%	22%	23%	20%	5%	8%	5%	2%	2%	1%
5	76%	72%	78%	14%	14%	13%	7%	10%	6%	2%	4%	2%	1%	1%	1%
6	76%	75%	79%	14%	13%	12%	7%	7%	6%	2%	5%	3%	1%	1%	1%
7	41%	33%	42%	23%	26%	23%	23%	24%	22%	11%	12%	10%	3%	6%	3%
8	37%	41%	38%	25%	32%	24%	23%	15%	24%	11%	8%	10%	5%	5%	4%
9	43%	47%	45%	24%	23%	24%	21%	24%	20%	9%	4%	9%	3%	3%	2%
10	44%	44%	47%	21%	21%	22%	20%	21%	19%	8%	8%	8%	6%	7%	4%
11	61%	56%	65%	24%	21%	20%	12%	19%	11%	2%	4%	2%	1%	1%	1%
12	45%	41%	45%	21%	22%	21%	21%	22%	23%	9%	11%	8%	4%	5%	3%
13	70%	70%	70%	15%	15%	19%	10%	10%	8%	3%	4%	2%	2%	3%	1%
14	52%	40%	55%	21%	23%	19%	19%	26%	18%	4%	7%	5%	3%	5%	2%
15	75%	74%	78%	15%	13%	14%	7%	9%	6%	2%	3%	2%	1%	1%	1%
16	77%	73%	82%	15%	18%	12%	6%	6%	5%	1%	2%	1%	1%	2%	1%
17	61%	60%	59%	26%	27%	28%	10%	9%	10%	2%	4%	3%	1%	1%	1%

Table 16 Acceptability of observed behavior of cargo cyclists based on transport mode of the respondent

Figure 35 Respondent's acceptability of cargo cyclist behavior (1/2)

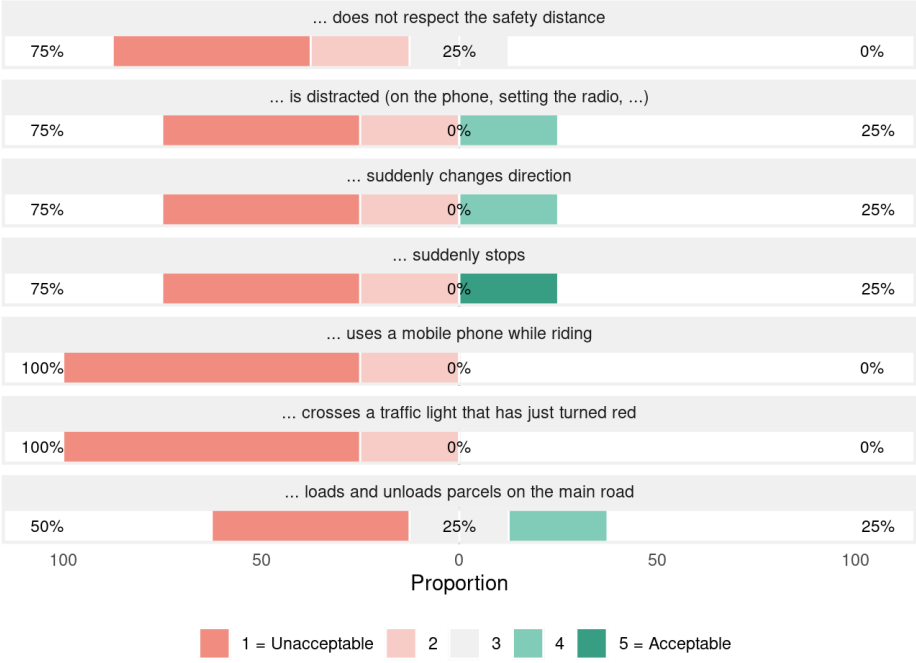


Figure 36 Respondent's acceptability of cargo cyclist behavior (2/2)

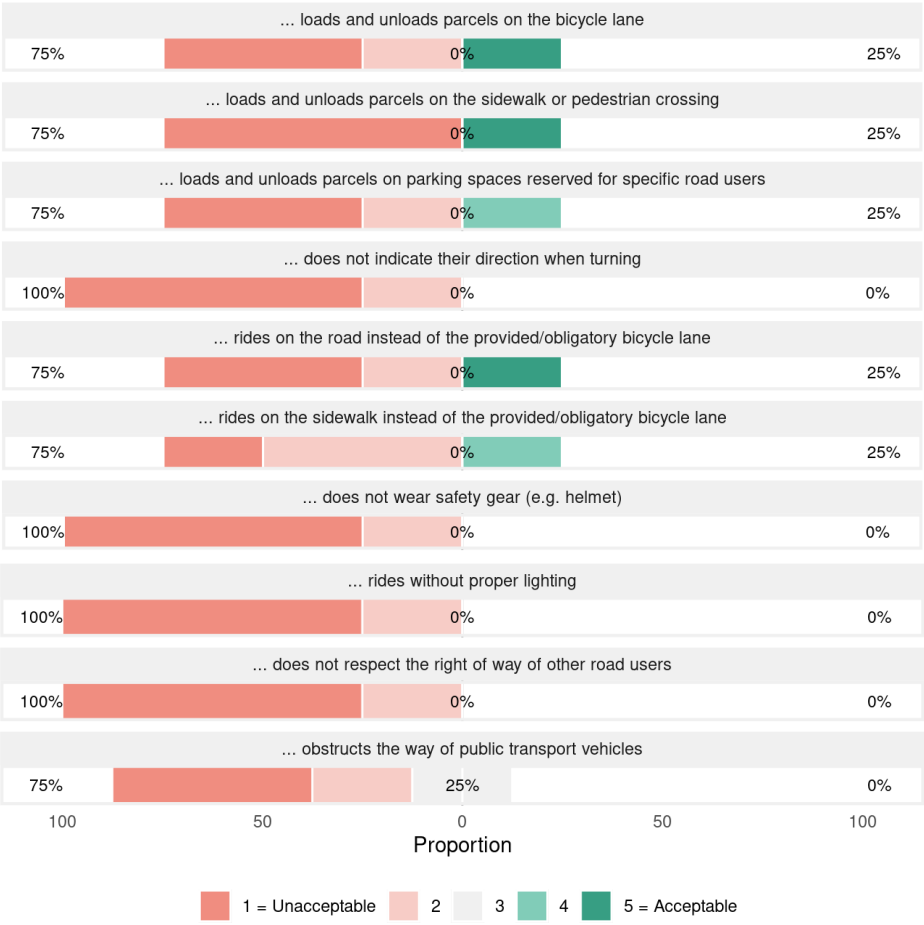


Figure 37 Respondent's perception on acceptability of cargo cyclist behavior by cargo cyclists in general (1/2)

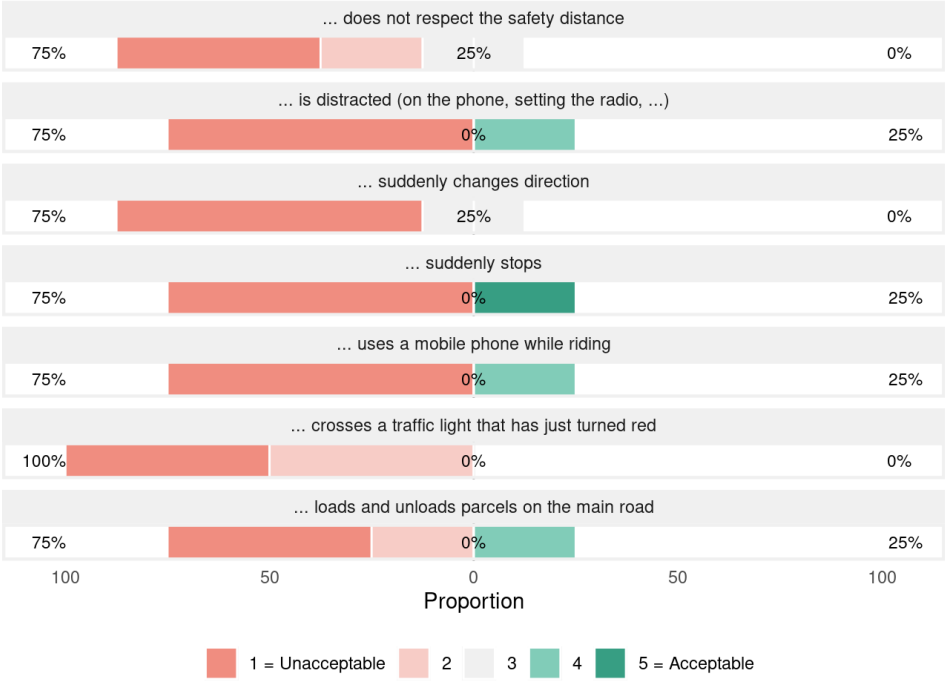
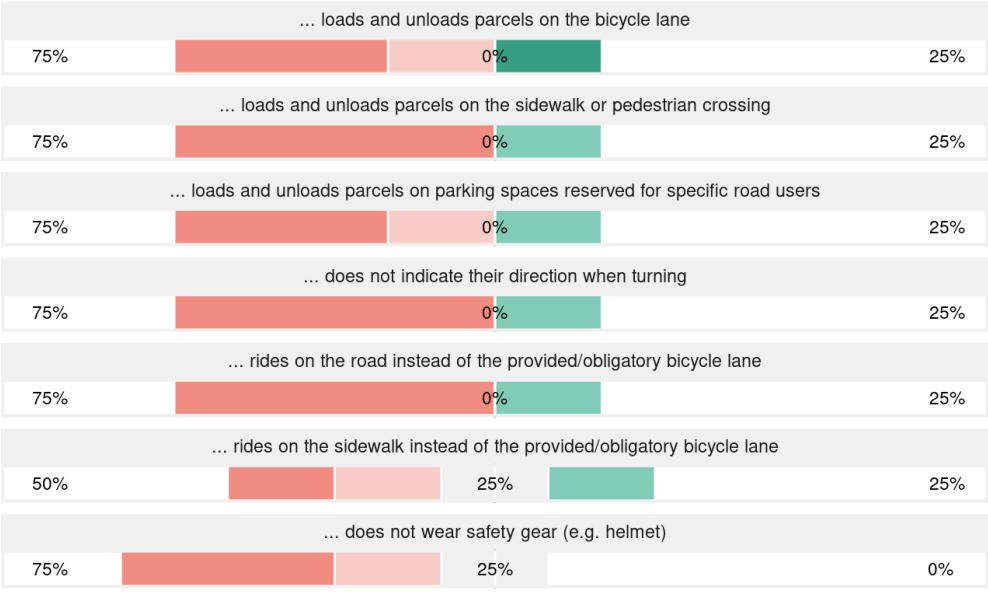
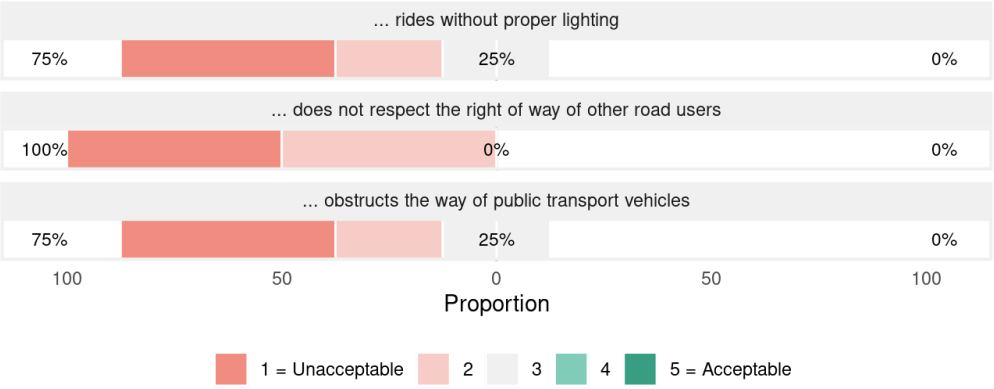


Figure 38 Respondent's perception on acceptability of cargo cyclist behavior by cargo cyclists in general (2/2)




... rides without proper lighting
75%
25%
0%
... does not respect the right of way of other road users
100%
0%
0%
... obstructs the way of public transport vehicles
75%
25%
0%
100
50
0
50
100
Proportion
1 = Unacceptable
2
3
4
5 = Acceptable