Pedal Cyclist Fatalities Involving Goods Vehicles From January 1999 – May 2004

Between January 1999 and May 2004, 49 of the total of 87 (56%) pedal cycle fatalities involved collision with a goods vehicle. To investigate the circumstances of these 49 collisions, three data sources were combined and analysed: Stats19 data, Enhanced Vehicle Registration data, and Police Collision Investigation files.

Fatal collisions with goods vehicles were more frequent at signal junctions and pedestrian crossings and during the morning peak than fatal collisions with other vehicles. Over half involved left-turning goods vehicles when one or both of the road users had been stationary at the signals.

The construction industry accounted for over a third of all goods vehicles involved. Suitable data to normalise this for London is not available. Four axle rigid goods vehicles were over-represented compared with the number of licensed vehicles and traffic make-up in London.

The available data suggest that neither drivers of goods vehicles nor cyclists involved in these collisions were particularly inexperienced. Women cyclists were more likely to be involved in fatal collisions with goods vehicles than they were with vehicles of other types.

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1. Introduction

Collisions with goods vehicles account for a relatively high proportion of pedal cyclist fatalities. A request was made by the London Bicycle Messenger Association to investigate these collisions in Greater London.

In addition, there is anecdotal evidence that pedestrian guard railing has been implicated in pedal cyclist injuries and deaths. It has been suggested that pedestrian guard railing at junctions can reduce the means of escape for cyclists involved in collisions with turning vehicles and increase the likelihood and severity of injury.

Stats19 collision and casualty data were used with the more detailed police collision investigation reports to analyse the characteristics of these fatal collisions. In addition, the DfT provided enhanced vehicle registration information from DVLA records for each case.

2. Aims and Objectives

This analysis aims to provide information on fatal collisions between pedal cyclists and goods vehicles between January 1999 and May 2004 in Greater London. Goods vehicles are defined as vehicles with a gross weight of over 3.5 tons and used for the transportation of goods.

The following factors were of particular interest in these types of collisions:

- The exact vehicle type (number of axles, wheel configuration etc.)
- The sector the vehicle driver worked in
- The level of experience of the goods vehicle driver
- The manoeuvres undertaken by each road user
- The role (if any) played by guard railing in the collision or injuries

3. Method

Three sources of data were combined in the analysis. The three sources of data sometimes offered conflicting results and it was not always possible to determine which source was more reliable. In these cases, the source of the data is identified when reported.

3.1. Stats19 data

The Stats19 collision and casualty data for the period Jan 1999 – May 2004 were extracted from the London Road Safety Unit's ACCSTATS database. This represented the most recent full five year period for which data were available plus the five months of most recent data at the time of the study.

3.2. Enhanced Vehicle Registration (EVR) Data

Enhanced vehicle registration information was requested from the DfT for all the collisions for 1999 to 2003 (84 cases). Information was available for 41 of the 48 goods vehicles involved in collisions during that period.

3.3. Police Collision Investigation Files

The Metropolitan Police Service (MPS) and the City of London Police provided information from their collision investigation files for the relevant cases since January 1999. Four garages collated data themselves and visits were made to the Metropolitan Police central traffic garage and the City of London Police traffic garage.

Information on a total of 44 out of the 49 fatalities involving goods vehicles was received. The level of detail available for each case was high. However, because each incident (and therefore each investigation) is different, the data collected and provided varies for each variable of interest in this analysis. Only those variables where there were sufficient or robust enough data are reported here. The missing files reflect the fact that some files had been sent to the police general registry or other locations.

4. Results

ACCSTATS holds Stats19 records of 87 pedal cyclist fatalities in Greater London during the study period (Jan 1999 – May 2004). Of these, 56% (49) also involved a goods vehicle. This compares with goods vehicles making up just over 1% of licensed vehicles in London.

4.1. Who was Involved in Fatal Collisions?

Table 1 shows that a higher proportion of female cyclists (18 out of 21) were involved in fatal collisions with goods vehicles than fatal collisions with other types of vehicle. Women may be over-represented in this type of collision because they are less likely than men to disobey red lights.[*] This might increase the likelihood of coming into conflict with turning goods vehicles waiting at junctions.

Table 1: Gender Comparison of cyclists involved in fatal collisions with goods and other vehicles.

	Pedal cycle fatalities involving goods vehicles		All other pedal cycle fatalities		All pedal cycle casualties in 2003
Gender	**Frequency**	**Proportion (%)**	**Frequency**	**Proportion (%)**	**%**
Female	18	36.7	3	7.9	21%
Male	31	63.3	35	92.1	79%

Riders and drivers were not inexperienced

Table 2 and Table 3 show the levels of experience of cyclists and goods drivers as reported in the police investigation files. The level of experience is easier to quantify and, therefore, more often reported for goods vehicle drivers than for cyclists. The available data suggest that neither the drivers nor cyclists appear to be particularly inexperienced; mean number of years experience was 9.3 for cyclists and 18.7 for goods vehicle drivers.

Table 2: Level of Experience of Cyclist as Reported in Police Files

Cyclists' Experience (Years)	Frequency
Less than 1	1
1	1
1.5	1
8	1
20	1
25	1
Total	6
Missing	43
Total	49

[*] A recent study of cyclists in London showed that, over a selection of 14 London sites, 27% of cyclists were female. (Allen, D., Bygrave, S. & Harper, H. (2005) Behaviour at Cycle Advanced Stop Lines. Transport Research Laboratory Unpublished Project Report).

Table 3: Level of Experience of Driver as Reported in Police Files

Drivers' Goods Experience (Years)	Frequency	Valid Percent
1.5	1	5.3
3	1	5.3
7	2	10.5
8	1	5.3
10	1	5.3
12	1	5.3
15	2	10.5
17	1	5.3
20	1	5.3
21	1	5.3
25	1	5.3
26	2	10.5
27	1	5.3
30	1	5.3
32	1	5.3
45	1	5.3
Valid Total	19	100.0
Missing	30	
Total	49	

Pedal cyclists tend to be aged over 16

Table 4 shows the age band of pedal cycle riders and goods vehicle drivers involved in fatal pedal cycle casualties as reported in Stats19 compared with the distribution of ages of other pedal cycle fatalities and all pedal cyclist casualties. A smaller proportion of pedal cyclists who were fatally injured in collisions involving goods vehicles were under 16 than the proportion of all casualties in this age group.

Table 4: Comparison of age of riders/drivers involved in fatal pedal cycle collisions in study period (January 1999 – May 2004) and all pedal cyclist casualties in 2003 (excluding City of London)

Age band	All pedal cycle casualties 2003 (excl City of London)	Pedal cycle riders in fatalities with goods vehicles	Goods vehicle drivers	Pedal cycle casualties with other/no vehicles	Other vehicle drivers
Under 16	389 13%	2 4%	0 0%	10 27%	0 0%
16-24	452 15%	7 14%	2 4%	1 3%	6 6%
25-59	1879 63%	33 67%	40 82%	14 38%	26 72%
60+	89 3%	3 6%	2 4%	10 27%	0 0%
Unknown	183 6%	4 8%	5 10%	2 5%	4 11%
Total	2992	49	49	37	36

4.2. Who were Goods Vehicle Drivers working for?

The goods vehicles were operated by a wide variety of companies. The construction industry accounted for 12 of the 34 known operators.

4.3. What Type of Goods Vehicle were they driving?

Table 5 and Table 6 set out the wheelplan and bodytype descriptions of the goods vehicles involved using EVR data obtained from the DfT[†]. Only data to the end of 2003 was available so no data was supplied for the one collision which occurred in 2004.

Table 5: DVLA data on Wheelplan Descriptions for 48 goods vehicles

Wheelplan Description	**Frequency**	**Proportion of all goods vehicle collisions (%)**	**Proportion of all goods vehicles licensed in London (%)[‡]**
2 axle rigid	14	29.2	67.7
3 axle rigid	2	4.2	7.7
4+ axle rigid	13	27.1	8.1
2 axle + artic	3	6.3	4.4
2 + 2 artic	2	4.2	1.6
2 + 3 artic	4	8.3	3.6
3 + 3 artic	3	6.3	6.0
data missing	7	14.6	
Total	48		

Table 6: DVLA data on Body Type Descriptions for 48 goods vehicles

Body Type Description	**Frequency**	**Proportion of all goods vehicle collisions (%)**
tipper	8	16.7
box van	7	14.6
tractor	6	12.5
goods	4	8.3
car derived van	3	6.3
skip loader	2	4.2
panel van	2	4.2
insulated van	2	4.2
flat lorry	2	4.2
concrete mixer	2	4.2
breakdown truck	1	2.1
not recorded	2	4.2
data missing	7	14.6
Total	48	

Even though the highest proportion of collisions involved 2 axle rigid vehicles, 4 axle rigid vehicles were over-represented in fatal collisions compared with their licensed numbers in London. However, vehicles which are licensed

[†] The information on vehicle make, body type, wheelplan description and weight for the 44 cases from the police files were checked against the enhanced vehicle data provided by the DVLA/DfT. Generally the vehicle manufacturer matched well. There were mismatches on 8 gross weights, 5 wheelplan descriptions and 2 body type descriptions. The EVR data has been used as definitive.

[‡] Department for Transport (2004).Transport Statistics Bulletin. Vehicle Licensing Statistics 2003.

outside London come into London for work. The relatively high frequency of involvement of four-axle rigid vehicles in cyclist fatalities may in part be a function of the close proximity of the axles which, once under the vehicle, made escape unlikely. Articulated vehicles often have larger gaps between axles.

Since 4 axle rigid vehicles were over-represented in the fatal collisions compared with the numbers licensed in London, Table 7 provides a further breakdown for these vehicles by body type as described in the EVR data.

Table 7: Body type of 4 axle rigid goods vehicles involved in pedal cycle fatalities

Body Type	Frequency
Tipper	8
Concrete mixer	1
Goods	1
Panel van	1
Not recorded	2
Total	13

Table 8 shows that, where data were available, relatively few vehicles involved (11%) had recorded defects during police examinations following the collision.

Table 8: Incidence of Vehicle Defects Reported by Police

Presence of Vehicle Defects	Frequency	Valid Percent
No defects reported	31	88.6
Defects reported	4	11.4
Valid Total	35	100
data missing	14	
Total	49	

Table 9 indicates that over a third of all goods vehicles did not have side underrun bars fitted. However, the amount of missing data is quite high so it may not be wise to assume that such a high proportion of all vehicles were equally unequipped. In addition, the proportion of goods vehicles that should have underrun bars fitted is not known.

Table 9: Proportion of Goods Vehicles with fitted and/or lowered Side Underrun Bars

Were Side Underrun Bars fitted and lowered?	Frequency	Valid Percent
Underrun bars not fitted	8	38.1
Underrun bars fitted and lowered	13	61.9
Valid Total	21	100.0
data missing	28	
Total	49	

Table 10 shows the spread of recorded gross weight (as recorded in police files) of the goods vehicles and table 11 provides a summary of DVLA data on engine size and weight.

Table 10: Gross Weight of Goods Vehicles as recorded in Police Files

Gross Weight (T)	Frequency	Valid Percent
3.5	1	4
7.5	3	12
17	4	16
18	1	4
24	2	8
28.8	1	4
31	3	12
32	4	16
38	3	12
44	3	12
Valid Total	25	100
data missing	24	
Total	49	

Table 11: Summary of enhanced vehicle registration information on engine capacity and gross weight for 48 goods vehicles in fatal pedal cyclist collisions

Engine Capacity (cc)	
min	1100
max	12600
mean	7957
mode	11000
Gross Weight (kg)	
min	1675
max	44000
mean	25653
mode	31000

4.4. What were the circumstances?

Table 12 summarises Stats19 data and illustrates that a larger proportion of collisions with goods vehicles occurred at signalled junctions or crossings and during the morning peak compared with other fatal collisions.

Table 12: Characteristics of cyclist fatal collisions involving goods and other vehicles

Circumstance	All pedal cycle fatal collisions involving goods vehicles	All other pedal cycle fatal collisions	All collisions involving pedal cycles in 2003
	frequency (%)	frequency (%)	frequency (%)
Signalled junction/ crossing	28 (57.1%)	9 (23.7%)	789 (25%)
Time of Day			
0700-1000	12 (24.5%)	3 (7.9%)	732 (23%)
1000-1600	20 (40.8%)	15 (39.5%)	869 (28%)
1600-1900	9 (18.4%)	9 (23.7%)	891 (28%)
1900-2300	3 (6.1%)	4 (10.5%)	472 (15%)
2300-0700	5 (10.2%)	7 (18.4%)	164 (5%)
Conditions			
Wet	8 (16.3%)	3 (7.9%)	290 (9%)
Dark	10 (20.4%)	12 (31.6%)	693 (22%)
Total	49	38	3128

Location

Table 12 shows that just over half of cyclist fatalities involving goods vehicles (57%) occurred at signalled junctions or crossings

In addition, while 40.2% of all cyclist fatalities occurred on the Transport for London Road Network (TLRN), 49% of cyclist fatalities involving goods vehicles occurred on the TLRN. This compares with 32.9% of all London road user fatalities during this period and 26.8% of all pedal cycle casualties in 2003. These figures show that a higher proportion of cyclist fatalities occur on the TLRN than total fatalities and casualties.

Manoeuvres Undertaken by each Vehicle

Table 13 shows the manoeuvres made by the goods vehicles as recorded in the police files. These give the most detailed information of all the data sources used. Over half (54.5%) were turning left and nearly a third (31.8%) going ahead. The proportion of left turning conflicts is much higher than for pedal cycle fatal collisions with other vehicles (5.3%). These findings support previous analyses and highlight an important cause of conflict between cyclists and goods vehicles. In addition, the detailed police files revealed that a large proportion of collisions occurred as one or both vehicles moved away after having been stopped at the lights.

As many collisions occur at signalised junctions when goods vehicles are turning left, nearside lead-in lanes to advanced stop line reservoirs may exacerbate the problem by encouraging cyclists to approach along the nearside kerb. A recent study[§] found that a larger proportion of cyclists approach junctions along the nearside kerb when a kerbside feeder lane is provided that when it is not.

[§] Behaviour at Advanced Stop Lines (2005) London Road Safety Unit Research Summary No.5. London Road Safety Unit, Transport for London

Table 13: Manoeuvres undertaken by Goods Vehicles and other Vehicles

	All pedal cycle fatalities involving goods vehicles		All other pedal cycle fatalities	
Goods vehicle manoeuvre	**Frequency**	**Proportion (%)**	**Frequency**	**Proportion (%)**
left turn	24	54.5	2	5.3
Going ahead	14	31.8	26	68.4
turn right	2	4.5	3	7.9
parked	2	4.5	2	5.3
change lane to left	1	2.3		
change lane to right	1	2.3		
Valid Total	44	100.0		
data missing	5			
Total	49			

Table 14 shows the recorded manoeuvres of the pedal cycles. The vast majority (89%) were going ahead or overtaking on the nearside. The distinction between these two categorisations is often a matter of opinion. In addition, the detailed files show that it is often difficult to tell the direction in which the cyclist was intending to travel unless there were clear eyewitness accounts or other evidence.

Table 14: Pedal Cycle Manoeuvres

Pedal Cycle Manoeuvre	**Frequency**
Ahead	32
Overtaking on nearside	6
Left turn	5
Overtaking on offside	1
Valid Total	44
data missing	5
Total	49

Given that 4 axle rigid vehicles appear to be over-represented in fatal collisions compared with licensed numbers in London, the manoeuvres of only this type of goods vehicle are shown in Table 15. The majority involve left turns and display a similar pattern to the collisions of other vehicles.

Table 15: Manoeuvres of 4 axle rigid goods vehicles involved in pedal cycle fatalities

Manoeuvre		**Frequency**
Goods vehicle	**Pedal Cycle**	
Left turn	Ahead	5
Left turn	Overtake on nearside	2
Left turn	Left turn	3
Ahead	Ahead	1
Change lane to right	Ahead	1
Right turn	Overtake on offside	1
Total		13

First Point of Impact

Table 16 shows the first point of impact as recorded in the police collision investigation files.

Table 16: First Point of Impact between Cyclist and Vehicle

Point of first impact on goods vehicle	Frequency
1st axle	9
2nd axle	6
3rd axle	3
“rear nearside”	5
“side”	7
“front nearside”	2
“rear offside”	1
“door”	1
Valid total	34
data missing	15
Total	49

Table 17 displays this information in relation to the number of axles (for the 29 cases where this information was recorded). Where the precise axle number of initial impact was not provided, a general description denoting front, rear or side was used. This table shows that the first point of contact in collisions involving 4 axle rigid vehicles was most often the first or second axles.

Table 17: First Point of Impact by Number of Axles (where provided in police files)

				Axles				**Total**
Point of First Impact	2 Axle Rigid	3 Axle Rigid	4 Axle Rigid	3 Axle Artic (2+1)	4 Axle Artic (2+2)	5 Axle Artic (2+3)	6 Axle Artic	
1st axle	3	0	4	0	2	0	0	**9**
2nd axle	2	0	3	1	0	0	0	**6**
3rd axle	0	0	2	0	0	1	0	**3**
"rear nearside"	0	1	0	0	1	0	1	**3**
"side"	2	0	1	0	0	2	0	**5**
"front nearside"	0	0	1	0	1	0	0	**2**
"door"	1	0	0	0	0	0	0	**1**
Total	**8**	**1**	**11**	**1**	**4**	**3**	**1**	**29**

Pedestrian Guard Railing (PGR)

The detailed police files showed that pedestrian guard railing was present at 8 sites on the relevant arm of the junction. In 3 of these eight cases, it was felt that there *might have been the opportunity* for PGR to have contributed in some way to the injuries sustained by the cyclist. However, it was often difficult to tell exactly where the initial contact between the pedal cycle and goods vehicles took place. The role of PGR was very rarely explicitly mentioned or directly implicated in the police files. The small number of times it was mentioned suggests that this information was only noted if it was

considered relevant to the collision. Therefore the high proportion (3/8) should not be extrapolated to the whole sample.

Advanced Stop Lines (ASL)

Information on the provision of ASLs was available for 11 of the signalled junctions. Only 2 of these junctions had ASL provision for cyclists on the relevant arm and the ASL was not mentioned as being related to the collision.

Injuries Sustained

Table 18 sets out the types of injuries sustained by cyclists as described in the collision investigation files. It shows that the most common injuries were to the head and to the chest.

Table 18: Injuries Sustained by Cyclists

Injuries Sustained	Frequency
head	12
multiple	9
chest	8
head and chest	6
internal	6
pelvis	1
Valid Total	**42**
data missing	7
Total	49

5. Conclusions

Casualty data indicate that over half of pedal cycle fatalities between January 1999 and May 2004 resulted from collisions with goods vehicles. Data from various sources were investigated for these 49 pedal cyclist fatalities involving goods vehicles.

Over half of those collisions occurred at signalled junctions or crossings, often when goods vehicles had been stationary at the signals. A larger proportion of these fatalities (49%) compared with all pedal cycle casualties (27%) in 2003 occurred on the TLRN.

A higher proportion of female cyclists were fatally injured in collisions with goods vehicles than were injured in other fatal collisions or in all collisions in 2003. Pedal cyclists under 16 made up a smaller proportion of fatalities involving goods vehicles than they did of all casualties in 2003 so this is not specifically a child problem. This may reflect the time of day that collisions occurred (with the largest single number occurring during the school day between 1000 and 1600).

Where reported, lack of experience of drivers or riders does not appear to be a problem.

A wide variety of goods vehicle body types and wheel plans were involved in the collisions. Most common wheelplans were 2 axle rigid and 4+ axle rigid and the latter appears to be overrepresented in relation to licensed vehicle records in London. The majority of these were tipper vehicles.

The study of the manoeuvres supported previous analysis showing that left-turning goods vehicles were coming into conflict with cyclists on their nearside. The first point of contact tends to be the front of larger vehicles and injuries were most often sustained to head although most collisions involved more than one injury. Only two junctions were recorded as having had advanced stop lines and in three cases pedestrian guard railing was felt to have possibly played a role in the conflicts and or injuries.