Road accident casualties: a comparison of STATS19 data with Hospital Episode Statistics

Summary

Hospital Episode Statistics (HES) data provide a means of monitoring the number of road traffic accident casualties admitted overnight to hospital. This provides an alternative, but not equivalent, measure to the number of seriously injured casualties reported to the police and compiled by the Department for Transport under STATS19 data. Comparison with HES data can complement and inform the current use of STATS19 data to monitor casualty reduction targets.

Trends in the number of road accident casualties admitted to hospital as recorded in HES shows a lower fall in recent years than the number of seriously injured casualties recorded in STATS19 data. Such differences may reflect either a decrease in the level of reporting of casualties to or by the police and / or that the number of the most severely injured casualties has declined less than the number of casualties classified as "seriously injured" in STATS19 but not sufficiently seriously injured as to require admission to hospital.

In addition to the research reported here the Department for Transport also has also published a research report *Under-reporting of road casualties - Phase 1 (Road Safety Research Report No. 69)* into under-reporting in STATS19. The report aims to assess the overall levels of under-reporting in STATS19 and provides a comprehensive review of previous studies of under-reporting. This report is available from the Department's website at:

http://www.dft.gov.uk/stellent/groups/dft_rdsafety/documents/page/dft_rdsafety_611755.pdf

Introduction

Government and European policies set targets to reduce the number of people killed or injured in road traffic accidents.

- In March 2000[1] the Government announced new targets for reducing the number of road accident victims. The targets include a 40 per cent reduction in the number of people killed or seriously injured in road accidents by 2010 compared with the average for 1994-98. These targets form a Public Service Agreement (PSA) for the Department for Transport, against which its performance in delivering improved public services is monitored.

- The Department of Health Cross-Cutting review[2] of health inequalities identified reducing the number of road accidents especially those involving young or elderly pedestrians and car occupants, as a priority area for action.

- The European Commission's 3rd European Road Safety Action Plan[3] has outlined an EU wide objective of halving the overall number of road casualty deaths by 2010.

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[1] Tomorrow's Roads - Safer for Everyone, The Government's road safety strategy and casualty reduction targets for 2010.

[2] This was a result of the report of the cross-Government Task Force on Preventing Accidental Injury.

Within the GB, STATS19 is the primary source of data used to monitor the number of road accident casualties and progress towards policy targets. This consists of data collected to an agreed national standard by local police forces and local authorities. STATS19 also forms the basis for comparing GB statistics with road accident statistics reported by other nations.

A key element in monitoring the number of road casualties is understanding the accuracy and comprehensiveness of STATS19 data. One way to do this is by comparing numbers reported in STATS19 with other sources of data, at either a local or national level. Several studies have matched STATS19 accident data from a defined geographic area with local hospital records[4,5]. National and regional reporting levels for STATS19 have been estimated by extrapolation from these local comparisons. Most recently an associated document to this report, *Under-reporting of road casualties: Phase 1*[6] aims to assess the overall level of under-reporting in STATS19 and provides a comprehensive review of previous studies of under-reporting.

Such studies provide evidence that an appreciable proportion of non-fatal accidents are not reported to the police and, in addition, that up to a fifth of casualties reported to the police are not included in the statistical returns to STATS19[7]. Recent studies have confirmed that there is under reporting of serious casualties in STATS19 and that there are good reasons to believe that the level of reporting differs among road user groups. In regard to misclassification, studies suggest that the police tend to underestimate the severity of injury more frequently than they overestimate it because of the difficulty in distinguishing severity at the scene of the accident. Although a high proportion of casualties are not reported in STATS19, there has not been evidence that the levels of reporting were subject to systematic change. Therefore, it was appropriate to use STATS19 to monitor targets, while at the same time undertaking further work to examine whether reporting levels might be changing.

This report compares the number of seriously injured casualties from accidents in England, recorded by STATS19, with Hospital Episode Statistics, collated by the Department of Health and covering all hospitals in England. Figures are compared both in terms of absolute numbers and in terms of recent trends in the number of road traffic casualties. HES and STATS19 categories are not directly equivalent and the results in the following sections are therefore presented in separate tables.

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[3] European Road Safety Action Programme. *Halving the number of road accident victims in the European Union by 2010: A shared responsibility*. Communication from the Commission of the European Communities COM (2003) 311.

[4] Simpson, H.F. (1996) *Comparison of hospital and police casualty data: a national study*. TRL Report 173.

[5] Ward, H. *et al.* Reporting of road traffic accidents in London: matching police force STATS19 with hospital accident and emergency department data. TRL Project Report PR/T/069/2002 (unpublished report).

[6] Heather Ward, Ronan Lyons and Roselle Thoreau *Under-reporting of road casualties: Phase 1*

[7] From the preface of Road Casualties Great Britain 2002: Annual Report

Data sources and terminology

STATS19

STATS19 data provide information on personal injury road accidents that occur on the public highway in Great Britain and their consequent casualties. Data are collected by police forces and local authorities using a standard specification and collated and analysed by the Department for Transport.

A casualty is recorded as seriously or slightly injured by the police. STATS19 defines a "serious injury" as an injury for which a person is detained in hospital as an "in-patient" or any of the following injuries whether or not they are detained in hospital: fractures, concussion, internal injuries, crushings, non-friction burns, severe cuts and lacerations, severe general shock requiring medical treatment and injuries causing death 30 or more days after the accident. Therefore any casualty admitted as an in-patient to a hospital overnight should be recorded as "seriously injured". However, the police are not necessarily told that a casualty has been admitted to hospital, nor is there a duty on the hospital to reveal this personal information about an individual if it is requested.

International Classification of Diseases (ICD)

The ICD is used to record a wide range of health related statistics. The most recent revision of the classification is ICD-10 which allows more detailed coding of external causes of morbidity (codes V01-Y98) than the previous revision (ICD-9).

Hospital Episode Statistics (HES)

The Department of Health compiles Hospital Episode Statistics which record all hospital over-night admissions, consultant episodes and discharges for England. The statistics do not include casualties treated in A&E that are not admitted to a hospital. Diagnostic and external cause of injury information has been recorded to ICD-10 coding since 1995, with previous years coded to ICD-9.

All traffic accident casualties admitted to a bed in a hospital in England should be recorded as an admission episode in HES data. The external causes of injury for all admissions are recorded according to ICD10 and this allows those patients injured in road accidents to be identified.

Definitions and data matching

A wide range of factors influence the method used for calculating and comparing the number of casualties in STATS19 and HES data. Given the variety of factors involved, detailed discussion has been restricted primarily to the annexes of this report.

Three steps to STATS19 and HES matching can be distinguished:

i. **Counting hospital admissions** - A count of finished emergency admissions for traffic accidents in HES data was used as the basis for determining the number of casualties admitted to hospital. The count was corrected for the number of recorded in-hospital deaths to be more comparable with the STATS19 number of seriously injured casualties. Annex 1 provides information on the method and reasoning used to determine an appropriate count of seriously injured casualties from HES data.

ii. **Identification and classification of road casualties** - ICD10 coding of the external cause of injury was used to identify admissions of road traffic casualties. These codes also allow the classification of admissions according to road user and type of accident so as to be comparable with STATS19 categories. Annex 2 provides further details of how ICD10 codes are matched to STATS19 variables. Annex 3 discusses some of the issues associated with distinguishing between HES traffic casualties, that occur on the public highway, and other road transport casualties.

iii. **Interpretation of comparisons**. The interpretation of results is limited by the nature of HES and STATS19 data. The definition of a seriously injured casualty in STATS19 is not restricted to those admitted to hospital, and therefore one would expect, in principle, the number of admissions to be lower than the number seriously injured in STATS19. Furthermore, different factors influence the level of reporting and classification of data in HES and STATS19. A summary table outlining and estimating the importance of many of these factors is given in Annex 4.

Comparison of STATS19 and HES data by road user group

Table 1 and table 2 provide a comparison of seriously injured casualties recorded in STATS19 with HES data for the financial years 1995-96 to 2002-03. The two tables below also show the percentage change in the number of casualties for 2002-03 compared with a baseline calculated as the average for 1996-97 and 1997-98. Because 1995-96 was the first year ICD-10 was used to record HES data, this year was not used to calculate the baseline. The change from ICD-9 coding may have affected figures for 1995-96, which are considerably lower than for any other year, the total number of casualties rising by 16 per cent in 1996-97. This years' data are therefore excluded from most later tables.

Table 1 shows that the number of HES admissions injured in road traffic where their mode of transport was unknown comprises 4 to 6 percent of all road traffic casualties. Of these "unknowns" almost three quarters are cases classified as "person injured in unspecified motor-vehicle traffic accident" (V89.2).

Table 1: HES finished emergency admissions, excluding in-hospital deaths: England

	Pedestrian	Cyclist	TWMV	Car	Bus	LGV	HGV	Unknown[1]	Total
1995-96	7,602	5,273	4,134	11,361	405	347	310	2,853	32,285
1996-97	8,611	6,325	4,700	13,342	473	410	400	2,968	37,229
1997-98	8,627	6,609	5,072	13,195	524	406	413	2,695	37,541
1998-99	8,434	6,291	5,059	13,056	533	402	426	2,329	36,530
1999-00	8,080	6,899	5,949	13,062	611	450	460	2,262	37,773
2000-01	7,500	6,111	5,960	12,602	622	434	433	2,136	35,798
2001-02	7,857	6,016	6,345	12,774	597	460	424	2,220	36,693
2002-03	7,457	5,661	6,885	13,041	669	451	403	2,044	36,611
Change from baseline:[2]	-13%	-12%	41%	-2%	34%	11%	-1%	-28%	-2%

[1] Admissions from road traffic accidents where the mode of transport was coded as unknown

[2] Average for the years 1996-97 and 1997-98.

Table 2: STATS19 seriously injured casualties by road user group: England

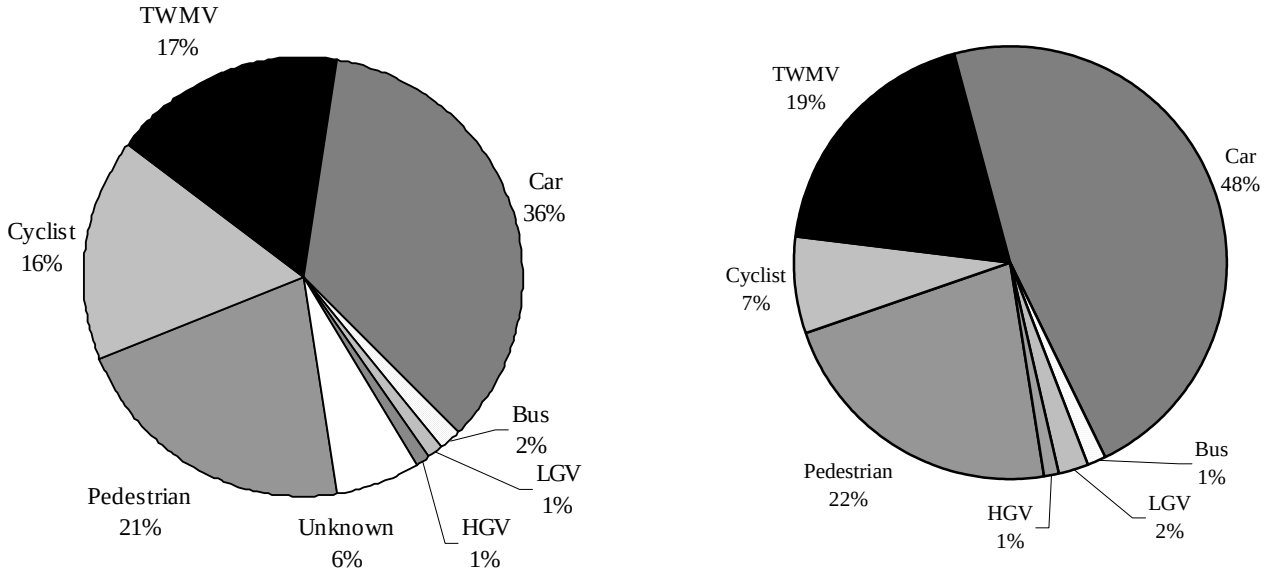
	Pedestrian	Cyclist	TWMV	Car	Bus	LGV	HGV	Total[3]
1995-96	9,196	3,312	5,444	18,517	685	842	463	38,641
1996-97	8,922	3,317	5,371	18,936	530	797	439	38,464
1997-98	8,519	3,111	5,449	17,890	534	758	435	36,881
1998-99	8,143	2,839	5,360	16,581	532	757	435	34,805
1999-00	7,604	2,691	5,911	15,836	494	673	449	33,836
2000-01	7,196	2,352	5,938	15,205	484	654	442	32,448
2001-02	7,064	2,326	6,083	14,934	470	670	382	32,078
2002-03[1]	6,665	2,068	6,336	14,358	443	568	373	31,010
Change from baseline:[2]	-24%	-36%	17%	-22%	-17%	-27%	-15%	-18%

[1] Provisional estimates
[2] Average for the years 1996-97 and 1997-98
[3] Includes other road user groups

The two tables indicate that numbers of casualties in HES and STATS19 are of a similar order of magnitude. The only road user group for which there is a major discrepancy between HES and STATS19 data is pedal cyclists. This difference is illustrated by Figure 1 which presents the percentage breakdown of all casualties by road user group according to STATS19 and HES data. These figures clearly show how pedal cyclists make up a much greater proportion of all casualties in HES compared with STATS19 data. This is consistent with the findings of earlier research.

Figure 1: Percentage of (a) finished emergency admissions excluding recorded in-hospital deaths, and (b) seriously injured casualties by road user type: England 2001-02

a) HES finished admissions excluding recorded in-hospital deaths b) STATS19 seriously injured



The percentage change from the baseline, given in the preceding tables, shows that the total number of recorded casualties has fallen more in STATS19 than in HES data. This is reflected in the changes from the baseline for road user groups, STATS19 figures showing a greater fall, or in the case of TWMV users a smaller rise, compared with HES data.

Several reasons can be proposed to explain the high number of road traffic casualties admitted to hospital relative to the number of seriously injured casualties reported to the police, and the different trends observed for HES and STATS19 data. These are not mutually exclusive. The number of road accident victims recorded as admitted as in-patients to hospital in HES data may include casualties that would not qualify as road accident casualties in STATS19 as they happen off the road. Clearly, the correct classification of casualties using the ICD-10 codes depends on adequately trained staff. It is difficult to measure the accuracy of HES coding, but in fact a significant number of casualties are coded as non traffic accidents. The number of admissions from traffic and non-traffic recorded in HES data varies according to the type of road user, with the highest proportion of non-traffic admissions found for the users of vehicles most associated with off-road use. The number of non-traffic admissions accounts for around half of all pedal cyclist admissions to hospital. Without

independent estimates of the number of non-traffic accident casualties, it is difficult to reach firm conclusions on the accuracy of HES data. Nevertheless, the results refute any suggestion that HES data systematically fail to account for the difference between traffic casualties, which are recorded as seriously injured in STATS19, and non-traffic casualties that are not recorded in STATS19.

It is also possible that the accuracy of HES coding may have gradually increased since the adoption of ICD-10 codes in 1995-96. Clearly such a trend in the accuracy of the data would affect the trend in the number of hospitalised casualties according to HES data. Other factors which might influence the recorded number of road accident casualties admitted to hospital are factors resulting from HES data collection methods and others relating to changing trends in hospital admission practices.

In STATS19 the category of serious injury is very broad, ranging from life threatening to fairly minor injuries. The more seriously injured are those most likely to be admitted to hospital overnight. The different trends found for HES and STATS19 data may therefore reflect different trends among the more or less gravely injured casualties within the STATS19 seriously injured category. If this is the case then the results suggest that there has been a considerable decline in the number of less serious, non-hospitalised casualties (as reflected by STATS19 data) while there has been little or no change in the number of the more seriously injured casualties admitted to hospital. In the latter case, the trend more closely matches that observed for the number of deaths in road accidents. Many of the safety features introduced over recent years may have effectively prevented or reduced injury in most accidents but still fail to offer effective protection in the most serious crashes. Unfortunately, any attempt to identify trends among more or less seriously injured casualties is complicated by the fact that under-reporting is most likely to affect casualties who receive relatively minor injuries and are not hospitalised.

The relative importance of these three factors is likely to vary among different road user groups, but the relative significance of each cannot be determined from currently available information. The matching of individual HES admissions to individual STATS19 records (1 to 1 matching) may provide a better understanding of the impact of these three factors in each road user group.

Seriously injured casualties by age class

Child casualties

Government targets include a 50 per cent reduction by 2010 in child casualties (defined as under-15) compared with the 1994-98 baseline. The tables below give HES and STATS19 values for the number of children (defined as under 14 years old) seriously injured in road accidents. In both cases the number of child casualties has fallen since 1996, but the level of decline is much lower for HES cases compared with STATS19 data.

The majority of casualties in this age group are pedestrians or cyclists (around 80 per cent of the total). The number of child pedal cyclists seriously injured according to HES data is more than five times the number in STATS19. Furthermore, the level of decline in HES cyclist cases from 1996-98 to 2002/3 is less than half of that under STATS19. The tables also show that the number of car occupants under-15 year olds recorded as seriously injured in STATS19 has fallen by almost a third, compared with a negligible fall in HES cases. For this age group we find that in recent years the number recorded in HES data is higher than in STATS19.

Table 3: HES finished emergency admissions, excluding recorded in-hospital deaths, aged 0 to 14 years old: England

	Pedestrian	Cyclist	TWMV	Car	Other[3]	Total[1]
1996-97	3,233	2,814	150	708	76	7,458
1997-98	3,298	2,929	146	716	65	7,537
1998-99	3,294	2,619	136	784	87	7,223
1999-00	3,155	3,234	182	768	68	7,714
2000-01	2,786	2,770	195	729	89	6,827
2001-02	3,075	2,567	222	738	69	6,935
2002-03	2,655	2,301	220	713	68	6,179
Change from baseline[2]:	-19%	-20%	49%	0%	-4%	-18%

[1] Includes casualties where their mode of transport was unknown

[2] Average for the years 1996-97 and 1997-98

[3] Bus, HGV and LGV occupants

Table 4: STATS19 seriously injured casualties aged 0 to 14 years old

	Pedestrian	Cyclist	TWMV	Car	Other[3]	Total[4]
1996-97	3060	921	52	855	97	5004
1997-98	2911	760	52	817	81	4630
1998-99	2910	676	42	783	77	4502
1999-00	2611	709	57	710	68	4167
2000-01	2382	555	60	652	56	3727
2001-02	2362	484	48	598	56	3566
2002-03[1]	2122	417	80	583	44	3272
Change from baseline[2]:	-29%	-50%	54%	-30%	-51%	-32%

[1] Provisional estimates

[2] Average for the years 1996-97 and 1997-98.

[3] Bus, HGV and LGV occupants

[4] Includes other motor and non-motor vehicle users

Over-65 year olds

Comparing data for over 65 year old casualties gives quite different results from those for under-14 year olds, as shown in the tables below. Overall, there is a better match between the two datasets in the number of casualties. Pedal cyclists make up a much smaller proportion of these casualties and a three-fold difference is observed between HES and STATS19 for pedal cyclists over-65 compared with a five-fold difference observed for child casualties.

Table5: HES finished emergency admissions, excluding recorded in-hospital deaths, aged over 65: England.

	Pedestrian	Cyclist	TWMV	Car	Other[3]	Total[1]
1996-97	1,654	495	176	1,965	297	4,983
1997-98	1,563	527	161	2,012	328	4,967
1998-99	1,485	400	122	1,836	346	4,485
1999-00	1,323	390	113	2,061	390	4,557
2000-01	1,301	368	109	1,930	357	4,334
2001-02	1,215	396	132	1,872	372	4,240
2002-03	1,161	381	122	1,906	437	4,271
Change from baseline[2]:	-28%	-25%	-28%	-4%	40%	-14%

[1] includes casualties where mode of transport unknown

[2] Average for the years 1996-97 and 1997-98.

[3] Bus, HGV and LGV occupants

Table 6: STATS19 seriously injured casualties aged over 65

	Pedestrian	Cyclist	TWMV	Car	Other	Total[4]
1996-97	1475	172	95	1858	225	3834
1997-98	1431	191	78	1764	231	3711
1998-99	1339	138	60	1738	234	3525
1999-00	1204	142	71	1725	207	3375
2000-01	1147	112	71	1528	223	3109
2001-02	1039	130	69	1509	196	2971
2002-03[1]	983	133	59	1497	192	2888
Change from baseline[2]:	-32%	-27%	-32%	-17%	-16%	-23%

[1] Provisional estimates

[2] Average for the years 1996-97 and 1997-98.

[4] Includes other motor and non-motor vehicle users

Over 65 year olds make up between 9 to10 per cent of all casualties in STATS19 but between 12 to 13 per cent in HES data. This is may be due to a greater proportion of elderly casualties being admitted into hospital rather than treated as day-patients.

Analysis of major road user groups

Both STATS19 and HES provide information on how a casualty was injured. Accidents provide the primary level of STATS19 data to which all vehicles and casualties can be traced. All casualties can therefore be classified according to the type of accident they were involved in, both in terms of the number and type of vehicles involved.

HES provides less information on the type of accident, being primarily concerned with the patient. ICD-10 codes do however allow recording of the type of collision which caused an injury. It is therefore possible, for example, to determine the number of pedal cyclists admitted after injury in collision with a car or light goods vehicle. This can be compared with STATS19 casualties resulting from accidents involving a pedal cyclist and car or LGV. The two categories are not perfectly matched, as HES data provides no information on the total number of vehicles involved in an accident, nor distinguishes between certain types of collision (such as cyclists colliding with cars separately from those colliding with LGVs). Nonetheless they provide the opportunity to compare more closely the types of casualty recorded under each system.

Pedestrians

In the STATS19 data, seriously injured pedestrian casualties have fallen by 25 per cent over the past 7 years. This compares with a fall of 13 per cent for the same period in HES statistics. The number of HES admissions is similar to the number of STATS19 casualties, yearly STATS19 figures varying from 104 to 89 per cent of HES figures for the years 1996-97 to 2002-03. It has already been seen that pedestrians make-up a large proportion of casualties aged under-15 and over-65.

The tables below apportion pedestrian casualties according to the type of accident or collision causing injury.

The greatest percentage differences between the HES and STATS19 tables are for the number of pedestrians injured in collisions with pedal cyclists. The number recorded under STATS19 is generally between one third and one quarter of that recorded in HES. The only category for which the numbers recorded under STATS19 are marginally higher than HES admissions is that of pedestrians injured by a collision with a bus or HGV.

Trends are similar for both tables showing a reduction in the numbers injured for most categories. STATS19 numbers, however, decline by up to twice the amount of HES figures. The largest difference in trends is for the number of pedestrians injured in collision with motorcyclists, which increased by 20 per cent in HES data, but only 4 per cent under STATS19.

Table 7: HES pedestrian finished emergency admissions, excluding recorded in-hospital deaths: England

	In collision with:						
	Pedal cycle	TWMV	Car & LGV	Bus & HGV	All[1]	Not specified	Total
1996-97	206	291	7,148	402	8,168	443	8,611
1997-98	201	281	7,177	417	8,218	409	8,627
1998-99	233	277	7,031	365	8,021	413	8,434
1999-00	222	271	6,677	432	7,715	365	8,080
2000-01	189	283	6,137	394	7,138	362	7,500
2001-02	195	328	6,405	415	7,446	411	7,857
2002-03	159	342	6,047	430	7,093	364	7,457
Change from baseline[2]:	-22%	20%	-16%	5%	-13%	-15%	-13%

[1] Includes pedestrian casualties injured in collision with non motor vehicles.

[2] Average for the years 1996-97 and 1997-98.

Table 8: STATS19 seriously injured pedestrian casualties: England

	Single vehicle accidents					Two+	Total
Pedestrian hit by:	Pedal cycle	TWMV	Car & LGV	Bus & HGV	All[1]	All	
1996-97	66	285	7,447	480	8,331	663	8,994
1997-98	78	275	7,064	433	7,908	690	8,598
1998-99	70	304	6,748	435	7,602	589	8,191
1999-00	61	284	6,149	496	7,063	611	7,674
2000-01	54	290	5,833	442	6,679	575	7,254
2001-02	50	325	5,709	413	6,557	539	7,096
2002-03	34	291	5,362	431	6,177	424	6,601
Change from baseline[2]:	-53%	4%	-26%	-6%	-24%	-37%	-25%

[1] Includes pedestrian casualties in other types of single vehicle accident.

[2] Average for the years 1996-97 and 1997-98.

Pedal cyclists

The number of seriously injured pedal cyclists recorded under STATS19 is between one third and a half of the number in HES data. The tables below show that the greatest difference between the two systems is for the number of single vehicle cycle accidents where there is no collision with another vehicle. HES figures for this category are up to almost thirty times those of STATS19, with 3,871 admissions recorded in HES for 2001-02 compared with 138 casualties in STATS19. This difference also appears to be increasing, with the number of such accidents in

STATS19 almost halving from 1996-2003, while HES figures have remained more or less constant.

For other types of pedal cyclist accidents, HES and STATS19 numbers are much closer. The number of cyclists injured in collisions with light goods vehicles and cars is actually higher in STATS19 data than in HES data. This remains the case even if one redistributes the number of casualties from unspecified accidents among other casualty groups[8].

Table9: HES pedal cyclist finished emergency admissions, excluding recorded in-hospital deaths: England

		In collision with:						
	No other vehicle	Pedal cycle	TWMV	Car & LGV	Bus & HGV	All[1]	Not specified	Total
1996-97	3,703	88	50	1,687	101	2,082	540	6,325
1997-98	4,019	71	49	1,633	104	2,006	584	6,609
1998-99	3,912	78	52	1,498	107	1,876	503	6,291
1999-00	4,494	106	52	1,560	101	1,928	477	6,899
2000-01	3,931	83	29	1,391	96	1,683	497	6,111
2001-02	3,871	73	45	1,326	88	1,613	532	6,016
2002-03	3,644	90	54	1,287	97	1,599	418	5,661
Change from baseline[2]:	-6%	13%	9%	-22%	-5%	-22%	-26%	-12%

[1] includes pedal cycle casualties injured in collision with non motor vehicles.

[2] Average for the years 1996-97 and 1997-98.

Table 10: STATS19 seriously injured pedal cyclist casualties: England

Num. vehicles:	One	Two					Three+	Total
	All	Pedal cycle	TWMV	Car & LGV	Bus & HGV	All[1]	All	
1996-97	257	28	39	2,657	181	2,926	134	3,317
1997-98	223	21	56	2,455	173	2,731	157	3,111
1998-99	217	24	54	2,241	147	2,489	133	2,839
1999-00	188	17	52	2,127	171	2,387	116	2,691
2000-01	163	14	44	1,833	163	2,082	107	2,352
2001-02	138	18	44	1,862	134	2,085	103	2,326
2002-03	128	17	42	1,634	132	1,842	98	2,068
Change from baseline[2]:	-47%	-31%	-12%	-36%	-25%	-35%	-33%	-36%

[1] Includes cyclists injured in other types of single vehicle accident.

[8] For example, the number of cyclists injured in collisions with cars and lgv was 24% of all HES pedal cyclist casualties (excluding unspecified) for 2001-02. Therefore the figure of 1326 could be increased by 25% of the number of casualties from unspecified accidents (0.24*532) giving a total of 1454. This is still less than the Stats19 figure of 1862 seriously injured casualties.

[2] Average for the years 1996-97 and 1997-98.

The percentage of pedal cycle casualties from accidents which do not involve another vehicle is much higher in the HES data than among serious pedal cycle casualties in STATS19. Comparison for the year 2001-02 shows that 64 per cent of pedal cyclist casualties in HES were in accidents involving no other vehicle while only 6 per cent of serious pedal cycle casualties in STATS19 were injured in such accidents. The proportion of pedal cycle casualties from accidents involving two pedal cyclists were also higher in the HES data.

Two-wheeled motor vehicle users

Tables 11 and 12 show numbers of TWMV users recorded as emergency admissions under HES and seriously injured casualties in STATS19 respectively. Both sources record an increase from 1996 to 2003 in the number injured. The number of HES casualties, however, increased by 41 per cent on the average used as a baseline, compared with a 17 per cent increase in STATS19.

The number of HES admissions from non-collision accidents was nearly double the those in STATS19 casualties in 2002-03, while the number of admissions from collisions with cars was only about 70 per cent of the number of STATS19 seriously injured casualties for the same year.

Table 11: HES motorcyclist finished emergency admissions, excluding recorded in-hospital deaths: England

	In collision with:							
	No other vehicle	Pedal cycle	TWMV	Car & LGV	Bus & HGV	All[1]	Not specified	Total
1996-97	1,599	4	76	2,006	103	2,364	737	4,700
1997-98	1,704	7	78	2,121	125	2,531	837	5,072
1998-99	1,768	20	91	2,176	103	2,568	723	5,059
1999-00	2,340	10	85	2,372	144	2,823	786	5,949
2000-01	2,308	14	115	2,415	143	2,861	791	5,960
2001-02	2,602	15	125	2,527	123	2,975	768	6,345
2002-03	2,865	15	118	2,692	151	3,169	851	6,885
Change from baseline[2]:	73%	..	53%	30%	32%	29%	8%	41%

[1] includes motorcyclist casualties injured in collision with non motor vehicles.

[2] Average for the years 1996-97 and 1997-98.

Table 12: STATS19 seriously injured motorcyclist casualties: England

Number of. vehicles:	One	Two					Three +	Total
	All	Pedal cycle	TWMV	Car & LGV	Bus & HGV	All[1]	All	
1996-97	1,229	24	75	3,367	151	3,677	465	5,371
1997-98	1,221	23	85	3,376	161	3,704	524	5,449
1998-99	1,232	24	98	3,295	144	3,627	501	5,360
1999-00	1,434	28	102	3,575	192	3,969	508	5,911
2000-01	1,402	33	100	3,610	179	3,993	543	5,938
2001-02	1,437	24	123	3,698	169	4,060	586	6,083
2002-03	1,464	22	138	3,857	180	4,286	586	6,336
Change from baseline[2]:	20%	..	73%	14%	15%	16%	19%	17%

[1] Includes motorcyclist casualties in other types of single vehicle accident.

[2] Average for the years 1996-97 and 1997-98.

Although the total number of TWMV casualties in STATS19 was higher than HES admissions in 1996-97, it fell to below the HES number by 2002. This trend is largely explained by the growing difference in the number of casualties from single vehicle accidents reported under the two systems. From 1996-2003, the number of these casualties recorded in HES rose by over 70 per cent, compared with a rise of 20 per cent in STATS19.

Car occupants

Car occupants is the only major road user group for which the number of seriously injured casualties recorded under STATS19 is consistently higher than the number of emergency admissions given in HES data. The trends are different with a decline of 20 per cent in the number of STATS19 seriously injured casualties compared with a fall of only 2 per cent in HES numbers over the same period. The tables below show the difference between trends in the STATS19 and HES figures for different types of collision. For accidents involving no other vehicle the trends are very different; STATS19 records a 13 per cent decline in such casualties, HES numbers rise by 20 per cent for the same period. For all accident types the HES trend shows a much smaller decline (and a rise for casualties injured in collision with a TWMV) compared with trends observed in STATS19.

Table 13: HES car and 3WMV occupant finished emergency admissions, excluding recorded in-hospital deaths: England

		In collision with:						
	No other vehicle	Pedal cycle	TWMV	Car & LGV	Bus & HGV	All[1]	Not specified	Total
1996-97	3,361	8	74	6,066	643	8,288	1,693	13,342
1997-98	3,387	13	70	6,045	656	8,177	1,631	13,195
1998-99	3,316	9	80	6,174	709	8,277	1,463	13,056
1999-00	3,556	8	71	6,045	652	8,061	1,445	13,062
2000-01	3,615	8	70	5,750	679	7,619	1,368	12,602
2001-02	3,849	8	65	5,639	645	7,528	1,397	12,774
2002-03	4,054	7	83	5,754	639	7,669	1,318	13,041
Change from baseline[2]:	20%	-33%	15%	-5%	-2%	-7%	-21%	-2%

[1] includes car occupant casualties injured in collision with non motor vehicles.

[2] Average for the years 1996-97 and 1997-98.

Table 14: STATS19 seriously injured car occupant casualties: England

Number of vehicles involved:	One	Two					Three +	Total
Other vehicle type:	All	Pedal cycle	TWMV	Car & LGV	Bus & HGV	All[1]	All	
1996-97	4,925	23	155	9,274	1,048	10,662	3,349	18,936
1997-98	4,470	25	158	8,865	987	10,192	3,228	17,890
1998-99	4,115	23	124	8,157	984	9,444	3,022	16,581
1999-00	4,076	28	141	7,643	1,000	8,965	2,795	15,836
2000-01	3,955	13	121	7,332	962	8,586	2,664	15,205
2001-02	4,230	17	112	6,856	840	7,956	2,748	14,934
2002-03	4,104	12	89	6,759	739	7,735	2,519	14,358
Change from baseline[2]:	-13%	-50%	-43%	-25%	-27%	-26%	-23%	-22%

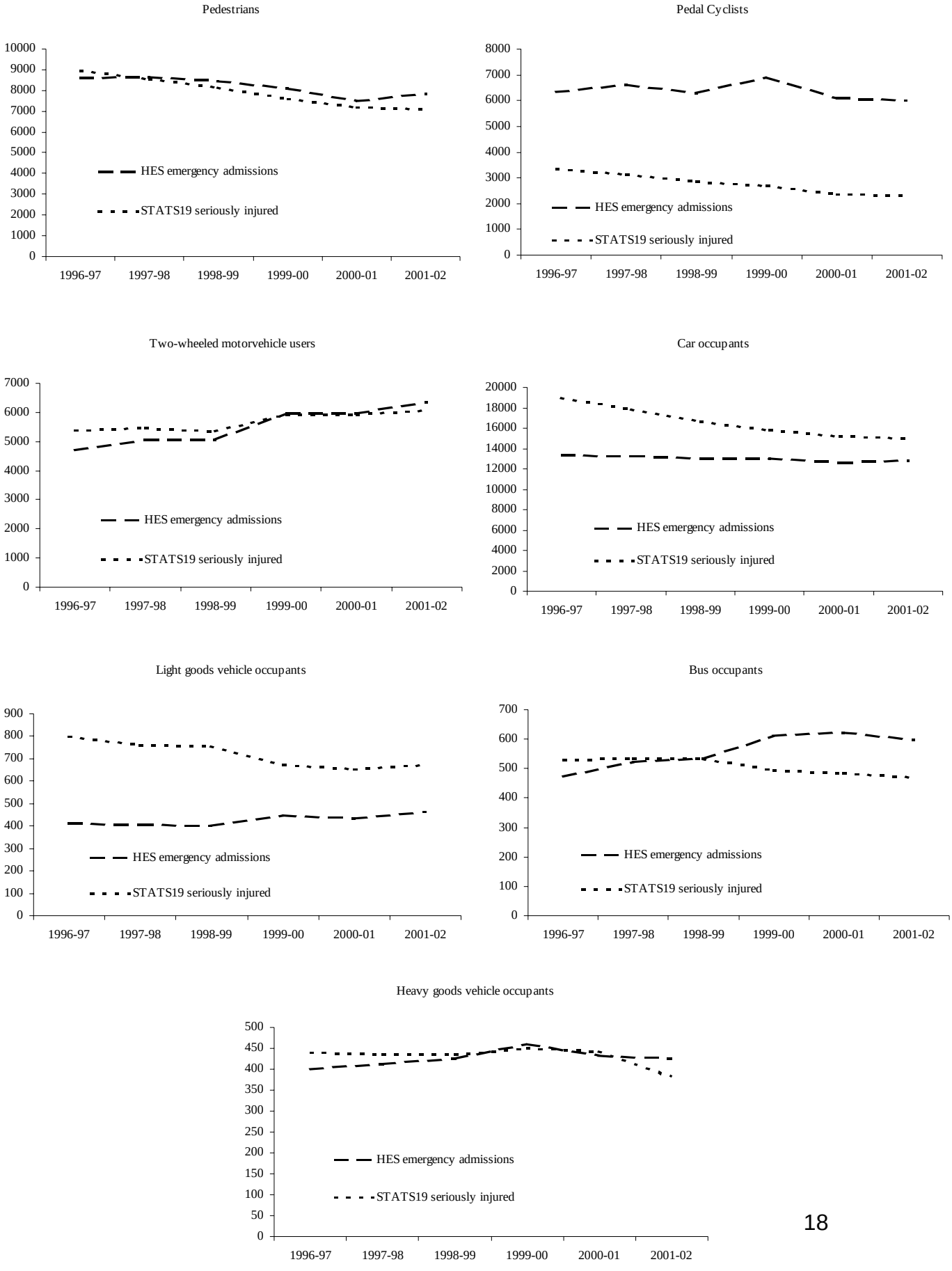
[1] Includes car occupants injured in other types of single vehicle accident.

[2] Average for the years 1996-97 and 1997-98.

Summary

Overall, the results show how the greatest difference between the number of STATS19 seriously injured casualties and the number of HES emergency admissions is for pedal cycle and TWMV users injured in single vehicle accidents. For such casualties the number of STATS19 casualties is considerably lower than the number of HES admissions. The figures also indicate that the difference in the number of such casualties has grown over the past seven years.

Figure 2 (a-g): The number of HES emergency admissions, excluding recorded in-hospital deaths, and the number of seriously injured casualties in STATS19 by road user group and year.



Comparing HES data with trends in fatal and seriously injured casualties

Recent trends

The results have shown that the trend in the number of HES cases is not identical to the trend in the number of seriously injured in STATS19. The following figures compare trends in the number of seriously injured STATS19 casualties and HES emergency admissions of traffic accident casualties with the recent trend in the number of road traffic deaths.

Figure 3: All traffic accident casualties. Indices (1996-97 & 1997-98 average = 100) of the number of (i) HES finished emergency admissions excluding recorded in-hospital deaths, (ii) STATS19 seriously injured casualties and (iii) STATS19 fatal casualties: England

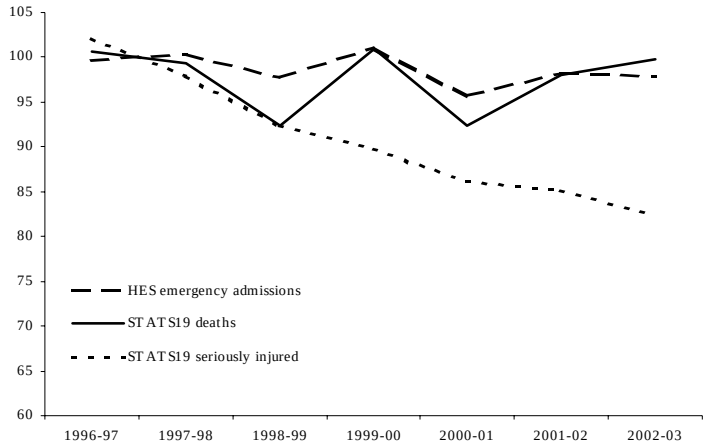


Figure 4: Child casualties (0-14 years old). Indices (1996-97 & 1997-98 average = 100) of the number of (i) HES finished emergency admissions excluding recorded in-hospital deaths, (ii) STATS19 seriously injured casualties and (iii) STATS19 fatal casualties: England

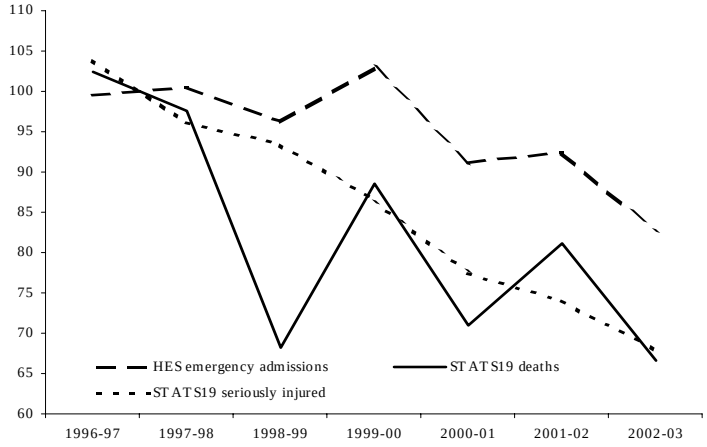
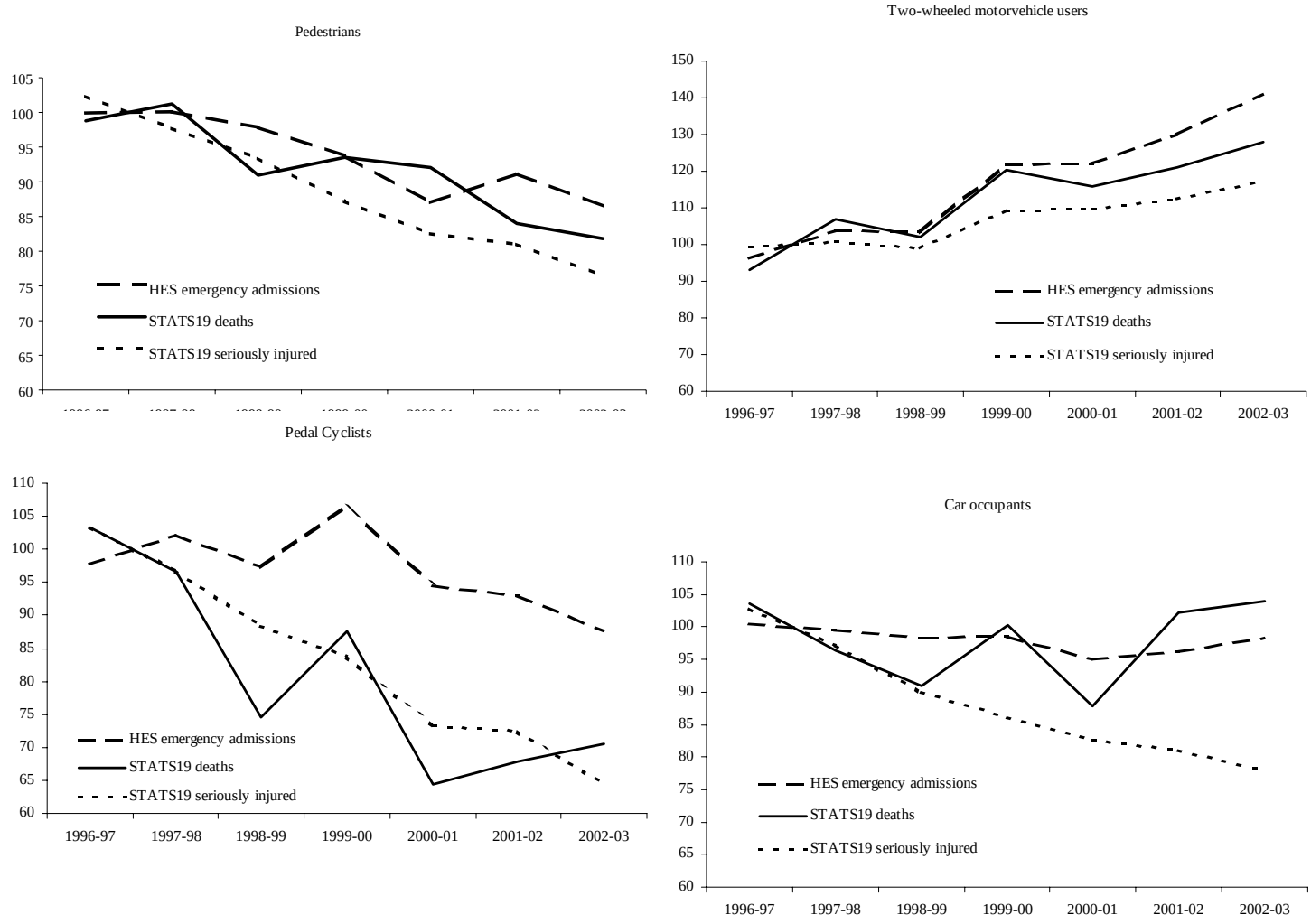


Figure 5 shows that the trend in the number of HES emergency admissions matches the trend in the number of road traffic deaths while the trend in number of seriously injured casualties in STATS19 shows a higher rate of decline. That does not seem to be the case for child casualties (figure 6). Figure 7 show the trends for each of the major road user groups.

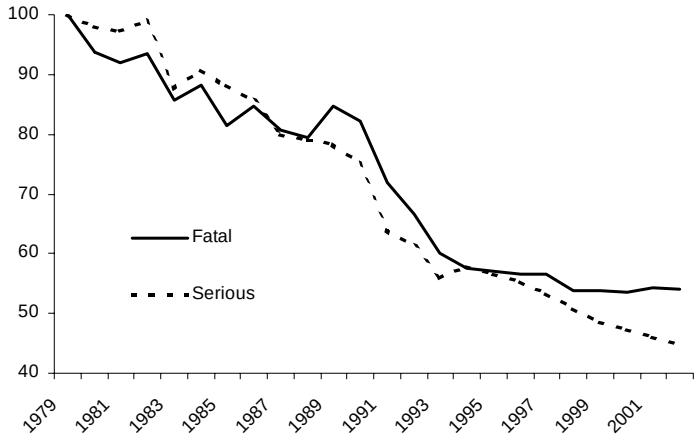
Figure 5 (a) Pedestrian, (b) pedal cyclist, (c) TWMV user and (d) car occupant traffic accident casualties. Indices (1996-97 & 1997-98 average = 100) of the number of (i) HES finished emergency admissions excluding recorded in-hospital deaths, (ii) STATS19 seriously injured casualties and (iii) STATS19 fatal casualties : England



Long-term variation of fatal and seriously injured casualties in STATS19

Figure 6 shows the trend in STATS19 numbers of killed and seriously injured casualties since 1979. The downward trend in the number of deaths from road accidents stopped in the late 1990s and numbers of fatalities have remained fairly constant over recent years while numbers of seriously injured casualties in the STATS19 record have continued to fall.

Figure 6: Indices of the number of killed and seriously injured casualties recorded in STATS19 (100 = number in 1979): Great Britain 1979-2002.



Conclusions and Recommendations

HES data provides an alternative (but not equivalent) measure of the number of seriously injured road accident casualties to that provided by STATS19. In general, the magnitude and the breakdown of HES casualty numbers by road user group and accident type is similar to the numbers reported in STATS19. The rise in TWMV user deaths is reflected not only by a rise in hospital admissions of TWMV users but also a rise in admissions of pedestrians injured from a collision with a TWMV, despite the general fall in pedestrian casualties. Overall, the trend in HES admissions is similar to that in numbers of fatalities recorded in STATS19. Nonetheless, the results of comparing HES and STATS19 figures highlight differences in terms of both absolute numbers and recent trends.

In principle all casualties admitted to hospital from a road traffic accident should be recorded in STATS19 data as "seriously injured". Also, HES data do not include casualties treated in A&E departments as an outpatient, but a number of these casualties may be included as serious injuries within STATS19. Given these two factors, one would expect that the number of seriously injured casualties in STATS19 to be greater than the number of hospital admissions. However, HES figures are often similar to or exceed the number of seriously injured casualties recorded in STATS19. That is consistent with the issue of levels of recording of serious injuries in STATS19 found in earlier research. Moreover, the fact that the greatest difference between HES and STATS19 data was found to be for the number of pedal cyclist casualties and among children aged 14 or less is also consistent with earlier research findings of the low level of recording for vulnerable road users.

As well as differences in absolute numbers, different trends are also observed for STATS19 and HES data. The trend in the total number of HES road accident casualties showed a much smaller decline than that of STATS19 serious casualties. In 1996-97, the total number of seriously injured casualties in STATS19 was higher than the number of HES admissions. By 2002-03, however, the number of seriously injured casualties was less than the number of HES admissions. For every road user group the number of casualties admitted to hospital according to HES figures either fell less or rose more than the number seriously injured in STATS19.

The data reported to and by the police which underpin the public record are not perfect. It is well known that under-reporting is significant, although fatalities are reported according to the STATS19 requirement. Studies have shown that there are about as twice as many casualties in road accidents as there are reported to and by the police, and under-reporting for some types of vulnerable road users is very much higher. There are many reasons for under-reporting reflecting the unwillingness of the public to report accidents to the police and this is not a legal duty in all cases. In addition, where the accidents are known to the police, it can be difficult to distinguish severity at the scene of the accident, especially for a police officer who is not a medical expert. The definition of serious injury is broad in order to allow a layman to make a determination of severity. Even so, studies reinforce the view that the police are more likely to underestimate severity of an injury then to overestimate it. The study published by TRL in 1996 which compared information on patients treated at a sample of accident and emergency units, estimated that to take account of the estimated levels of misclassification, under-reporting and under-recording, the number of serious casualties should be increased by a factor of 2.76 and the number

of slight casualties should be increased by a factor of 1.7. Other studies make different estimates but all indicate a high level of under-reporting.

In itself, this phenomenon is not critical for the monitoring of trends in numbers of casualties, provided that the level of reporting and misclassification does not change systematically. The purpose of the comparison with the HES data was to study the validity of trends from the STATS19 survey. There are reasons why this match may not be exact and the differences in trend which are shown can be explained in different ways. Nevertheless the difference in trends warrants further study to establish the reasons for the difference – in particular, whether the different trends found for HES and STATS19 data reflect different trends among the more or less gravely injured casualties within the STATS19 seriously injured category or whether there has been some systematic shift in the level of reporting of injury accidents in STATS19.

The matching of individual STATS19 records to individual HES records (1 to 1 matching) may provide a better understanding of the differences between the trends. For instance, 1 to 1 matching could show whether, for particular road user groups, there has been a change over time in the number of injuries classed as less serious in HES and serious under STATS19. This would indicate a decline in the number of less seriously injured road users, which may be attributed to the increase of safety features introduced over recent years.

From the comparison of HES and STATS19 data presented in this report the following key conclusions are drawn:

i. HES data provides a means of monitoring the number of hospitalised road traffic accident casualties that can complement and inform the current use of STATS19 data.

ii. Trends in the number of hospitalised road accident victims calculated from HES data shows a lower fall in recent years than trends in the number of seriously injured casualties according to STATS19 data.

iii. Such differences may reflect either an increase in the level of under-reporting of casualties in STATS19 or different trends in the number of hospitalised and non-hospitalised casualties classified as "seriously injured" in STATS19. In general it is not possible to determine the relative importance of these two factors.

The following recommendations for action to address the issues raised in the report are proposed:

1. Undertake regular comparison of STATS19 and HES data on road accident casualties.

2. Consult with the Department of Health to obtain available information on the reliability and consistency of coding of HES data and recent trends in data collection practices.

3. Attempt one-to-one matching of STATS19 and HES records to try to establish the trend of more seriously injured casualties within STATS19.

Glossary

DfT	Department for Transport
DoH	Department of Health
HES	Hospital Episode Statistics
HGV	Heavy Goods Vehicle
ICD-10	International Classification of Disease - 10th revision
LGV	Light Goods Vehicle
PSA	Public Service Agreement
STATS19	Name used for DfT data on road traffic accidents and casualties
TWMV	Two-wheeled motor vehicle

Annexes

Annex 1: HES casualty counts

The number of seriously injured casualties according to HES data was defined as the number of finished emergency admission episodes minus the corresponding number of discharge episodes where death was recorded.

Finished admission episodes - are used as the basis of the count and refer to the first period of in-patient care under one consultant within one healthcare provider. Admissions do not represent the number of in-patients, as a person may have more than one admission within the year. Under the method chosen to determine casualties, transfer between hospitals will lead to a double count.

Emergency admissions - only admissions resulting from an emergency were counted so as to remove most admissions associated with on-going treatment and transfers between hospitals.

Discharge episodes - A discharge episode is the last episode during a spell, where the patient is discharged from the hospital (including transfer to another hospital).

Recorded deaths - deaths are recorded in the discharge episode.

Admission episodes are chosen as the basis for the count, as the ICD-10 cause code (used to identify road accident casualties) is not always carried forward from the admission episode to subsequent episodes[9] and so discharge figures are likely to undercount compared with admissions. As not all admissions can be checked with the corresponding discharge episode, some admissions where the patient died may be included, although the number of such cases is likely to be negligible compared with total numbers.

The relationship between finished admissions and discharge episodes of road accident casualties was examined by expressing the number of discharges after emergency admissions as a percentage of finished emergency admissions for road accident victims. Table A1 shows that discharges have fallen faster than admissions. This divergence between discharges and admissions probably reflects a relative increase in the proportion of patients admitted for multiple spells where cause code information is not carried forward to the discharge episode. This may be due to the general trend among hospitals to only keep the more complex cases in overnight.

[9] In over 90% of cases the discharge episode is also the admission episode

Table A1.1: Discharges after emergency admission expressed as a percentage of finished emergency admissions (deaths subtracted from both counts).

	Discharges as percentage of finished emergency admissions					All casualties	
	Pedestrian	Cyclist	TWMV users	Car occupants	All casualties	Number of Admissions	Number of Discharges
1995-96	98%	99%	99%	99%	99%	32,285	32,005
1996-97	98%	100%	100%	100%	99%	37,229	37,003
1997-98	99%	100%	100%	100%	100%	37,541	37,618
1998-99	97%	99%	97%	97%	98%	36,530	35,713
1999-00	97%	99%	98%	97%	98%	37,773	36,888
2000-01	97%	98%	98%	97%	97%	35,798	34,841
2001-02	97%	99%	96%	96%	97%	36,693	35,463
2002-03	94%	97%	94%	93%	94%	36,611	34,435
Change compared with 1996-98 baseline:						-2%	-8%

Annex 2: STATS19 and ICD10 matching

Geographical and temporal range

Only STATS19 casualties injured in accidents that occur in England are compared with HES data. Furthermore, as the DoH produce HES on a financial year basis, this convention has been adopted for comparing with STATS19 data.

Definition of "traffic accident" casualties

STATS19 records personal injury accidents that occur on the public highway in which at least one road vehicle or a vehicle in collision with a pedestrian is involved. This includes accidents involving stationary vehicles.

The ICD-10 coding distinguishes between "traffic" and "non-traffic" accidents at the lowest level of detail. The ICD defines a "traffic" accident as any vehicle accident occurring on the public highway and therefore this category corresponds to those accidents recorded under STATS19. A third ICD category comprises people injured while boarding or alighting from a vehicle. These have been taken as "traffic" accidents for the purposes of comparing with STATS19.

ICD also allows patients to be assigned codes where the nature of the accident and/or the mode of transport are "unknown" or "unspecified". All cases recorded under a code that could potentially include road traffic accident casualties are included for comparison with STATS19 data.

Road user groups- casualty mode of transport

Detailed ICD-10 and STATS19 definitions of the road user groups used in the tables are given in Table A2.1. Definitions are broadly similar for STATS19 and ICD-10 although certain categories under STATS19 (horse riders, non-motor vehicle and "other" motor vehicle) are not directly comparable with ICD-10 coding.

Type of collision

ICD-10 coding allows the type of collision causing a patient's injuries to be defined. However, the breakdown in terms of the type and number of vehicles involved is very limited and restricts the type of comparisons that can be made with STATS19 data. The following tables show the ICD-10 codes used to define pedestrian, cyclist, TWMV and car occupant casualties injured in different types of accident.

Table A2.1 ICD-10 codes used to identify road user groups in HES data (Tables 1, 4 & 6).

Road user	ICD-10 coding	Comments
Pedestrians	V01.1, V01.9, V02.1, V02.9, V03.1, V03.9, V04.1, V04.9, V06.1, V06.9, V09.2, V09.3, V09.9	Pedestrians injured in traffic accidents (Vxx1) or accident unspecified as to whether traffic/non-traffic (Vxx9). Includes pedestrians injured in other unspecified "transport accident" (Vx99).
Pedal cyclists	V18.3, V18.4, V18.5, V18.9, V17.3, V17.4, V17.5, V17.9, V10.3, V10.4, V10.5, V10.9, V11.3, V11.4, V11.5, V11.9, V12.3, V12.4, V12.5, V12.9, V13.3, V13.4, V13.5, V13.9, V14.3, V14.4, V14.5, V14.9, V16.3, V16.4, V16.5, V16.9, V19.4, V19.5, V19.6, V19.9, V19.8	Cyclists injured in traffic accidents. Includes those injured in other specified "transport accident" (V198) and unspecified traffic accident. Includes those alighting and boarding (V1x3) a cycle.
TWMV users	V20.5, V20.9, V21.3, V21.4, V21.5, V21.9, V22.3, V22.4, V22.5, V22.9, V23.3, V23.4, V23.5, V23.9, V24.3, V24.4, V24.5, V24.9, V26.3, V26.4, V26.5, V27.3, V27.4, V27.5, V27.9, V28.3, V28.4, V28.5, V28.9, V20.3, V20.4, V26.9, V29.4, V29.5, V29.6, V29.9, V29.8	TWMV users injured in traffic accidents. Includes those injured in other specified "transport accident" (V298) and unspecified traffic accidents. Includes those alighting and boarding (V2x3) a TWMV.
Car occupant	V30.4, V30.5, V30.6, V30.7, V30.9, V31.4, V31.5, V31.6, V31.7, V31.9, V32.4, V32.5, V32.6, V32.7, V32.9, V33.4, V33.5, V33.6, V33.7, V33.9, V34.4, V34.5, V34.6, V34.7, V34.9, V36.4, V36.5, V36.6, V36.7, V36.9, V37.4, V37.4, V37.5, V37.6, V37.7, V37.9, V38.4, V38.5, V38.6, V38.7, V38.9, V39.4, V39.5, V39.6, V39.9, V39.8, V40.4, V40.5, V40.6, V40.7, V40.9, V41.4, V41.5, V41.6, V41.7, V41.9, V42.4, V42.5, V42.6, V42.7, V42.9, V43.4, V43.5, V43.6, V43.7, V43.9, V44.4, V44.5, V44.6, V44.7, V44.9, V46.4, V46.5, V46.6, V46.7, V46.9, V47.4, V47.5, V47.6, V47.7, V47.9, V48.4, V48.5, V48.6, V48.7, V48.9, V49.4, V49.5, V49.6, V49.8, V49.9	Car occupants (including minibuses) and three-wheeled motor-vehicle user injured in "traffic accident". Includes those injured in "other unspecified transport accident" (V398, V498). Includes those alighting and boarding vehicle.
Bus and coach occupant	V70.4, V70.5, V70.6, V70.7, V70.9, V71.4, V71.5, V71.6, V71.7, V71.9, V72.4, V72.5, V72.6, V72.7, V72.9, V73.4, V73.5, V73.6, V73.7, V73.9, V74.4, V74.5, V74.6, V74.7, V74.9, V76.4, V76.5, V76.6, V76.7, V76.9, V77.4, V77.5, V77.6, V77.7, V77.9, V78.4, V78.5, V78.6, V78.7, V78.9, V79.4, V79.5, V79.6, V79.8, V79.9	Occupant of Bus or Coach injured in "traffic accident". Includes those injured in "other unspecified transport accident" (V798). Includes those alighting and boarding vehicle.
Light goods vehicle occupant	V50.4, V50.5, V50.6, V50.7, V50.9, V51.4, V51.5, V51.6, V51.7, V51.9, V52.4, V52.5, V52.6, V52.7, V52.9, V53.4, V53.5, V53.6, V53.7, V53.9, V54.4, V54.5, V54.6, V54.7, V54.9, V56.4, V56.5, V56.6, V56.7, V56.9, V57.4, V57.5, V57.6, V57.7, V57.9, V58.4, V58.5, V58.6, V58.7, V58.9, V59.4, V59.5, V59.6, V59.8, V59.9	Occupant of pick-up or van injured in "traffic accident". Includes those injured in "other unspecified transport accident" (V598). Includes those alighting and boarding vehicle.
Heavy goods vehicle occupant	V60.4, V60.5, V60.6, V60.7, V60.9, V61.4, V61.5, V61.6, V61.7, V61.9, V62.4, V62.5, V62.6, V62.7, V62.9, V63.4, V63.5, V63.6, V63.7, V63.9, V64.4, V64.5, V64.6, V64.7, V64.9, V66.4, V66.5, V66.6, V66.7, V66.9, V67.4, V67.5, V67.6, V67.7, V67.9, V68.4, V68.5, V68.6, V68.7, V68.9, V69.4, V69.5, V69.6, V69.8, V69.9	Occupant of Heavy Goods Vehicle injured in "traffic accident". Includes those injured in "other unspecified transport accident" (V698). Includes those alighting and boarding vehicle.
Unknown	V87.0, V87.1, V87.2, V87.3, V87.4, V87.5, V87.6, V87.7, V87.8, V87.9, V89.2, V89.3, V89.9	Injured in road traffic or unspecified accident, where the patient's mode of transport is unknown.

Table A2.2: ICD-10 codes used to define pedestrian casualties from different types of accident

Pedestrian accident type	ICD-10 codes
Collision with pedal cycle	V01.1, V01.9
Collision with TWMV	V02.1, V02.9
Collision with Car or LGV	V03.1, V03.9
Collision with Bus or HGV	V04.1, V04.9
All vehicle collisions	All other collision accidents and V06.1, V06.9, V09.2
Not specified	V09.3, V09.9
Total	V01.1, V01.9, V02.1, V02.9, V03.1, V03.9, V04.1, V04.9, V06.1, V06.9, V09.2, V09.3, V09.9

Table A2.3: ICD-10 codes used to define pedal cycle casualties from different types of accident

Cycle accident type	ICD-10 codes
No other vehicle	V18.3, V18.4, V18.5, V18.9, V17.3, V17.4, V17.5, V17.9, V10.3, V10.4, V10.5, V10.9
Collision with pedal cycle	V11.3, V11.4, V11.5, V11.9
Collision with TWMV	V12.3, V12.4, V12.5, V12.9
Collision with Car or LGV	V13.3, V13.4, V13.5, V13.9
Collision with Bus or HGV	V14.3, V14.4, V14.5, V14.9
All vehicle collisions	All other vehicle collisions and V16.3, V16.4, V16.5, V16.9, V19.4, V19.5, V19.6
Not specified	V19.9, V19.8
Total	V18.3, V18.4, V18.5, V18.9, V17.3, V17.4, V17.5, V17.9, V10.3, V10.4, V10.5, V10.9, V11.3, V11.4, V11.5, V11.9, V12.3, V12.4, V12.5, V12.9, V13.3, V13.4, V13.5, V13.9, V14.3, V14.4, V14.5, V14.9, V16.3, V16.4, V16.5, V16.9, V19.4, V19.5, V19.6, V19.9, V19.8

Table A2.4: ICD-10 codes used to define TWMV user casualties from different types of accident

TWMV accident type	ICD-10 codes
No other vehicle	V28.3, V28.4, V28.5, V28.9, V27.3, V27.4, V27.5, V27.9, V20.3, V20.4, V20.5, V20.9
Collision with pedal cycle	V21.3, V21.4, V21.5, V21.9
Collision with TWMV	V22.3, V22.4, V22.5, V22.9
Collision with Car or LGV	V23.3, V23.4, V23.5, V23.9
Collision with Bus or HGV	V24.3, V24.4, V24.5, V24.9
All vehicle collisions	All other vehicle collisions and V26.3, V26.4, V26.5, V26.9, V29.4, V29.5, V29.6
Not specified	V29.9, V29.8
Total	V28.3, V28.4, V28.5, V28.9, V27.3, V27.4, V27.5, V27.9, V20.3, V20.4, V20.5, V20.9, V21.3, V21.4, V21.5, V21.9, V22.3, V22.4, V22.5, V22.9, V23.3, V23.4, V23.5, V23.9, V24.3, V24.4, V24.5, V24.9, V26.3, V26.4, V26.5, V26.9, V29.4, V29.5, V29.6, V29.9, V29.8

Table A2.5: ICD-10 codes used to define car occupant casualties from different types of accident

Car accident type	ICD-10 codes
No other vehicle	V48.4, V48.5, V48.6, V48.7, V48.9, V47.4, V47.5, V47.6, V47.7, V47.9, V40.4, V40.5, V40.6, V40.7, V40.9, V38.4, V38.5, V38.6, V38.7, V38.9, V37.4, V37.4, V37.5, V37.6, V37.7, V37.9, V30.4, V30.5, V30.6, V30.7, V30.9
Collision with pedal cycle	V41.4, V41.5, V41.6, V41.7, V41.9, V31.4, V31.5, V31.6, V31.7, V31.9
Collision with TWMV	V42.4, V42.5, V42.6, V42.7, V42.9, V32.4, V32.5, V32.6, V32.7, V32.9
Collision with Car or LGV	V43.4, V43.5, V43.6, V43.7, V43.9, V33.4, V33.5, V33.6, V33.7, V33.9
Collision with Bus or HGV	V44.4, V44.5, V44.6, V44.7, V44.9, V34.4, V34.5, V34.6, V34.7, V34.9
All vehicle collisions	All other vehicle collisions and V46.4, V46.5, V46.6, V46.7, V46.9, V49.4, V49.5, V49.6, V36.4, V36.5, V36.6, V36.7, V36.9, V39.4, V39.5, V39.6
Not specified	V49.9, V49.8, V39.9, V39.8
Total	V48.4, V48.5, V48.6, V48.7, V48.9, V47.4, V47.5, V47.6, V47.7, V47.9, V40.4, V40.5, V40.6, V40.7, V40.9, V38.4, V38.5, V38.6, V38.7, V38.9, V37.4, V37.4, V37.5, V37.6, V37.7, V37.9, V30.4, V30.5, V30.6, V30.7, V30.9, V41.4, V41.5, V41.6, V41.7, V41.9, V31.4, V31.5, V31.6, V31.7, V31.9, V42.4, V42.5, V42.6, V42.7, V42.9, V32.4, V32.5, V32.6, V32.7, V32.9, V43.4, V43.5, V43.6, V43.7, V43.9, V33.4, V33.5, V33.6, V33.7, V33.9, V44.4, V44.5, V44.6, V44.7, V44.9, V34.4, V34.5, V34.6, V34.7, V34.9, V46.4, V46.5, V46.6, V46.7, V46.9, V49.4, V49.5, V49.6, V36.4, V36.5, V36.6, V36.7, V36.9, V39.4, V39.5, V39.6, V49.9, V49.8, V39.9, V39.8

Annex 3: Significance of ambiguous ICD-10 codes

Certain ICD-10 codes do not explicitly define whether a casualty was injured in a traffic or non-traffic accident. Pedestrian casualties included the highest number of such "ambiguous" codes and these therefore were analysed to determine the significance of non-specific codes.

Table A3.1: Pedestrian casualties of unspecified traffic/non-traffic accidents as a percentage of all pedestrian casualties[1] by accident type: HES finished emergency admissions

	Pedestrian hit by:					Not specified	Total
	Cyclist	TWMV	Car or LGV	HGV or Bus	Non-motor vehicle		
1995-96	45%	14%	10%	18%	44%	62%	15%
1996-97	46%	14%	9%	15%	50%	68%	13%
1997-98	38%	11%	8%	15%	63%	71%	12%
1998-99	35%	13%	8%	14%	63%	73%	13%
1999-00	43%	13%	9%	14%	62%	77%	13%
2000-01	37%	12%	8%	12%	46%	70%	12%
2001-02	44%	6%	8%	13%	68%	65%	12%
2002-03	39%	11%	8%	10%	43%	63%	12%

[1] As defined by codes given in A2.2

A3.1 shows that the proportion of pedestrians, where it is not known if they were injured in a traffic or non-traffic accident, was highest among accidents involving collisions with cyclists and non-motor vehicles. These vehicles are the most likely to be involved in non-traffic accidents and therefore it is not surprising that they have the highest proportion of ambiguously coded cases. Overall, the percentage of such casualties is relatively small and remains fairly constant between years (with the exception of perhaps the first year of ICD-10 adoption, 1995-96).

Ambiguous coding in terms of traffic or non-traffic accidents is less prevalent among other major road user groups. Even when codes for passengers "boarding or alighting" a vehicle are included in this definition, only 2 to 3 per cent of cycle and TWMV users, and 4 to 6 per cent of car occupant cases were ambiguously coded. If one restricts HES cases to only those codes that explicitly state that a casualty was injured in a "traffic" accident, absolute numbers are reduced, but there is little effect on trends from the baseline[10].

There is no over-riding reason to assume that ambiguous codes are predominantly non-traffic accidents under STATS19 definitions. For example, while some accidents in which people are injured while boarding or alighting from a vehicle may occur on

[10] Restricting cases to those explicitly coded as injured in a "traffic" accident, gives changes from the baseline of -13%, +42% and -4% for cyclist, TWMV users and car occupants respectively. This compares with changes of -12%, +41% and -2% when "ambiguous" codes are included (using finished emergency admissions, deaths *not* excluded).

private roads or car parks, many will also occur on the public highway. Indeed, ICD notes specify that " *a vehicle accident is assumed to have occurred on the public highway unless another place is specified*…".

As a further test of the coherence of HES coding, the coding of bus occupant casualties injured in different types of accidents was studied. One would expect a higher proportion of bus occupant casualties to be injured while boarding or alighting from the vehicle compared with other road user groups. Table A3.2A3.2 shows that this is indeed the case and also shows that the number of such casualties has increased more than other bus occupant casualties.

Table A3.2: HES finished emergency admissions[1] of bus occupants injured by accident type and year, and percentage of all occupants injured boarding or alighting in HES and STATS19 data

Year	Type of accident causing injury in HES data:				% boarding or alighting	
	Boarding or alighting	Unspecified	Traffic	All	HES	STATS19
1996-97	184	77	215	476	55%	28%
1997-98	212	105	212	529	60%	27%
1998-99	255	93	189	537	65%	24%
1999-00	254	128	243	625	61%	23%
2000-01	296	104	231	631	63%	25%
2001-02	298	82	231	611	62%	28%
2002-03	318	95	270	683	60%	22%
Percentage change from 1996-1998 baseline:	61%	4%	26%	36%		

[1] reported deaths have *not* been subtracted

It is also possible to determine the number of such casualties in STATS19 (using the C15 variable). Table A3.2A3.2 shows that the proportion of casualties injured when boarding or alighting is lower in STATS19 than HES data. Such accidents are perhaps less likely to be reported to the police than other types of accident in which bus occupants are injured.

Annex 4: Summary of factors influencing HES and STATS19 comparisons

Table A4.1: Factors affecting HES and STATS19 matching.

Factor	HES numbers relative to STATS19	Magnitude of effect & comments
Counting of hospital admissions		
HES data factors		
i. STATS19 does not exclude seriously injured casualties who die 30 days after the accident.	Decrease	Negligible - no limit has been placed on HES deaths excluded. Less than 0.1% of emergency admissions die in hospital after 30 days or more.
ii. Only in-hospital deaths are subtracted from emergency admissions	Increase	Once mortality data is linked to HES, it will be possible to exclude all patients dying within 30 days from emergency admission counts.
iii. Not all discharge episodes contain the cause code on admission.	Increase	Minor - see annex 3. Failure to record cause code in discharge episodes would result in underestimating the number of deaths.
iv. Restriction of count to emergency admissions may exclude some seriously injured casualty admissions.	Decrease	Negligible - most cases classified as seriously injured in STATS19 will either be treated in A&E and not admitted, see (vii) below, or admitted as an emergency.
Hospital practice factors		
v. Admission of only the most seriously injured casualties leading to fewer admissions but more multiple episodes.	Decrease	Minor but possibly growing tendency over recent years (see annex 3). Two effects: a. Reduce the proportion of deaths that can be excluded, as cause code is not always carried across multi-episode spells in hospital. Negligible. b. Increase the proportion of cases treated in A&E rather than admitted (increasing the significance of (vii) below). If a growing effect then would expect HES numbers to fall relative to STATS19 - the opposite of what is observed.
Coding & identification of casualties		
vi. Misclassification or failure to record external cause of injury in HES data.	Decrease	Unknown significance. Variation in the accuracy of coding external cause of injury could influence trends as well as absolute numbers. Clinical coders of Trusts are trained and supervised and Trusts with poor coding across the board can be identified to rectify problems before the year-end.
vii. Inclusion of non-traffic accidents within unknown and unspecified ICD-10 transport accident codes.	Increase	Significant - "ambiguous" codes comprise 8-9% of all finished emergency admissions. However, overall trends are similar when these cases are excluded (see Annex 3)
Interpretation of comparisons		
viii. STATS19 definition of "seriously injured" is not restricted to hospital admissions (includes all casualties suffering burns, fractures and concussion).	Decrease	Significant but difficult to estimate except by 1:1 matching or in-hospital studies of treatment / admission practices. Simpson (1996) estimated that 49% of seriously injured casualties were admitted.
ix. Misclassification of injury severity in STATS19	Variable	Significant - Simpson (1996) suggests that the police under or overestimated the severity of injury in 24% of cases. One-to-one matching of casualties in HES and STATS19 allows the estimation of these factors.