

Re-valuation of home accidents

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by LK Walter (TRL)

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1 Introduction

In 1994, TRL carried out research commissioned by Shropshire Child Accident Prevention Group to value home accidents using the costs associated with road accidents (Hopkin and Simpson, 1996). This research included a review of the methodology of the valuation of road accidents and the implications for costing home accidents using this methodology. In 2009, RoSPA commissioned TRL to use the most recent data on home accident casualties to update the figures presented in Hopkin and Simpson (1996).

Nationally almost 4,000 deaths (RoSPA, 2010) and 2.7 million attendees at hospital each year are the result of a home accident. In total 5.6 million home and leisure accident casualties attend hospital each year. In comparison, around 230,000 road casualties (DfT, 2009) were reported in 2008. The financial benefits of introducing safety measures aimed at reducing the number of home accidents are required in order to justify the resources required to input these schemes.

The research described in this report updates the distributions of home accidents in terms of injury severity, injury type and casualty age with the latest available Home and Leisure Accident Surveillance Systems data (2002) and re-estimates the cost of accidents in the home, presenting estimates in 2009 values.

The method and assumptions for updating the costs are summarised in Section 2. Section 3 contains updated tables of injury distributions for the latest available HASS/LASS data, followed by the description and results of the costing of home accidents in Section 4.

2 Method

2.1 Approach

The Department for Transport values road accident casualties by calculating the benefits to society arising from the prevention of casualties. The method involves estimating the human costs and the direct economic costs. The values include an amount to reflect the pain, grief and suffering, lost output, emergency services and medical costs. These road accident costs are used to estimate the value of home accidents by comparing the distributions of injuries recorded for casualties in road and home accidents.

The approach was to use the most recent data available to update each of the tables presented in the report of the 1994 study, and then use these results to estimate the cost of casualties in home accidents in 2009.

2.2 Data

2.2.1 Home accident data

HASS, the Home Accident Surveillance System, and LASS, the Leisure Accident Surveillance System form a database held by RoSPA containing information on injured casualties who attend hospital having been involved in a home or leisure accident. No fatalities are included in the database. Data are available up to 2002.

The distributions reported in this report are taken directly from the HASS/LASS database rather than published tables.

Casualties in the latest available year of the HASS/LASS database were classified into the Department for Transport injury groups (serious and slight) using information about the injuries and length of stay in hospital.

Casualties were defined as incurring a serious injury if one or more of the following criteria were met:

- Length of stay > 0 nights
- Injury type:
 - Concussion
 - Crushing
 - Cut/laceration >5cm
 - Fracture (including suspected fracture)
 - Multiple injuries
 - Other internal injuries
- Outcome:
 - Inpatient (not including inpatient for less than 1 day)
 - Admitted to specialist, long stay or other hospital
 - Transferred to specialist, long stay or other hospital.

All other injuries were classified as slight, unless the injury type and outcome were unknown; in these cases the injury severity was classified as unknown and excluded from the analysis.

To reflect the wide range of injuries (with differing cost implications) within the 'serious' category, serious injuries were further separated into three distinct groups defined by the likely recovery time: recovery in less than one year, recovery in one to three years and never recover (including severe head injuries and paralysis). There is no information about recovery time in the HASS/LASS database, so injuries were classified using injury type, outcome and length of stay in hospital. These groups are used to inform the length of time that a casualty may be off work which is used in calculating lost output.

2.2.2 Road accident data

Road accident data presented in this report has been derived from STATS19 information. STATS19 data is collected by the police at personal injury road accidents. The Department for Transport publishes figures for the cost of road accident casualties each year which are based on STATS19 data and valuations referred to in Hopkin and Simpson (1996), updated to take account of inflation and a further survey of the value of preventing a fatality.

2.3 Data analysis

The distributions of home and leisure accident casualties by injury severity, injury type and age were estimated for 2002. It was not possible to reassess the distributions of length of stay or attendance by ambulance as the later HASS/LASS data did not allow this. It has been assumed therefore, for updating these tables, that the relative difference in distributions between road and home accidents did not change between 1992 and 2002.

The distributions of home and road accidents have been compared to inform the home accident costing. Differences between the distributions of road and home accidents affect the estimates of the costs of home accidents. A detailed methodology can be found in Hopkin and Simpson (1996).

2.4 Home accident costing

The overall estimated cost of a casualty is the sum of three components: the value of saving a casualty, lost contribution to the economy (lost output) and the cost of medical, Social Security and other support services.

2.4.1 Lost output

Loss of future production during the period of recovery (or permanently for fatalities) has been estimated for different severities of road casualties (Hopkin and O'Reilly, 1993), taking into account age, sex, average earnings, activity and mortality rates.

2.4.2 Value of avoidance of injury

The value of avoidance of injury costs is estimated using the 'willingness-to-pay' approach. This is the amount that the community would be prepared to pay to avoid the chance of an injury occurring. The value of saving a fatality was estimated to be £0.5m in 1987 from consultation and research findings. The values of saving a non-fatal injury were estimated in relation to this amount from the results of an extensive survey (Jones-Lee et al, 1993), and vary by recovery period and injury state group.

For road accidents, the value of avoidance of a fatality has been estimated using extensive surveys, and value of avoidance of non-fatal casualties is linked with this using a similar approach. Values are derived for a range of injuries with different levels of severity and then weighted to produce overall average values for serious casualties. The most recent research estimating the value of saving a fatal road casualty was in 1997 (Chilton et al, 1998), which concluded that the value estimated in 1987 was still within the range expected and values for fatalities and casualties have been updated to current prices since then.

2.4.3 Medical & support costs

Medical and support costs include hospital treatment, attendance at Accident and Emergency departments, use of ambulances, district nurses, medical appliances and Social Security benefits.

2.4.4 Costs not included

The overall estimate of costs per casualty is necessarily an under-estimate. Costs that are not included in the total are GP treatment, personal costs, medication and cost of long term care, due to the difficulty in estimating these values. Road accident costing also takes account of costs related to the accident in addition to casualty costs. These costs include police time, damage to vehicles and property, and insurance administration. As these costs are not applicable to most home accidents they have not been included in the home accident cost estimates.

2.5 Limitations

Some limitations were identified in the data. It was necessary to make certain assumptions to address these; the assumptions made match those made in the previous report (Hopkin and Simpson, 1996).

1. It is assumed that there is an inaccuracy in the database for the variable length of stay in hospital. Over 90% of the casualties are recorded as staying in hospital for more than 31 days. It is assumed that all of these casualties should be classified as length of stay = 0 nights. The length of stay is not reported for casualties who were transferred to other hospitals.
2. Within the HASS/LASS database, the number of slight accidents is underreported, as it does not include any casualties that did not attend hospital.

3 Results

The 2002 HASS/LASS data were interrogated to update the injury distributions used to compare home and road accidents. The following tables contain the updated HASS/LASS distributions (Home) and the STATS19 distributions (Road) from Hopkin and Simpson (1996), and update the tables presented in Section 2 of the previous report. Results which have not been updated are marked in italics.

Table 1 shows the number of casualties contained in the HASS/LASS database for 2002. All tables that follow are based on these numbers.

Table 1: Number of casualties in HASS/LASS data in 2002 by severity and age group

Age group	0-4	5-14	15+	All
Severity				
Serious	6,246	16,922	45,192	68,438
Slight	29,272	75,185	196,418	301,168
All casualties	35,518	92,107	241,610	369,606

Table 2 shows the distributions of injury severity (serious and slightly injured) by the Department for Transport definitions for road accidents (described in Section 2.2.1). For younger casualties (0-14 years) a higher proportion of home accident casualties are slightly injured than in road accidents. For older casualties (15+ years) the severity distribution is similar for road and home accidents with around one quarter being seriously injured.

Table 2: Severity distribution: non fatal casualties

Accident	Severity	0-4	5-14	15+	All
Home	Serious	20%	23%	24%	23%
	Slight	80%	77%	76%	77%
Road	Serious	30%	30%	24%	25%
	Slight	70%	70%	76%	75%

Serious injuries range from cuts of 5cm in length to serious head injuries resulting in serious and long term disability. Some serious injuries involve a short recovery period and little cost, while others require long term medical support and the casualty never returns to work. Table 3 shows the distributions of seriously injured casualties by estimated recovery period. The majority (83% of home accident casualties) of casualties were classified as recovering in less than a year, and around a fifth were classified as recovering in one to three years. The distribution of recovery periods for road accident casualties is different, with two thirds of the seriously injured casualties estimated to recover within one to three years.

Table 3: Severity distribution: serious casualties

Accident	Recovery period	0-4	5-14	15+	All
Home	Less than 1 year	92%	90%	79%	83%
	1-3 years	8%	10%	20%	17%
	Never	<1%	<1%	<1%	<1%
Road	Less than 1 year				32%
	1-3 years				66%
	Never				2%

Contained in the HASS/LASS database are some casualties injured in road accidents (RTC). The distribution of the age groups of these casualties has been compared to STATS19 data and casualties recorded in the HASS/LASS data that are not involved in a road accident in Table 4. For seriously and slightly injured casualties there is a higher proportion of young casualties recorded in home accidents than road accidents.

Table 4: Percentage of casualties in each age group by injury severity

Severity	Age	Home (non RTC ¹)	Home (RTC)	Road
Fatal	0-4	3%	-	2%
	5-14	2%	-	6%
	15+	95%	-	92%
Serious	0-4	9%	3%	2%
	5-14	24%	21%	13%
	15+	67%	76%	85%
Slight	0-4	12%	4%	2%
	5-14	24%	24%	12%
	15+	64%	72%	86%
All non fatal	0-4	11%	4%	2%
	5-14	24%	23%	12%
	15+	65%	73%	86%

The average number of injuries sustained by casualties is difficult to estimate in the home accident data because as the injuries get more serious, slight injuries such as cuts and bruises are not recorded. From the information that is available, it is estimated that on average, overall, 0.4 fewer injuries are sustained by casualties involved in home accidents than road accidents (Table 5).

Table 5: Average number of injuries per casualty

Age	Home	Road
0-4	1.22	1.32
5-14	1.21	1.75
15+	1.25	1.64
All	1.24	1.64

¹ Road traffic collision

Table 6: Distribution of injury type by age group

Age	Injury type	Home	Road
0-4	bruise/contusion	13%	22%
	graze/splinter	5%	20%
	cut/other open wound	24%	15%
	other soft tissue injury	16%	19%
	burn/scald	5%	<1%
	dislocation/sprain	4%	2%
	fracture	7%	5%
	concussion	10%	6%
	poisoning/chemical injury	4%	0%
	internal injury/suffocation	<1%	<1%
	other injury	11%	5%
unknown	3%	6%	
5-14	bruise/contusion	14%	19%
	graze/splinter	5%	22%
	cut/other open wound	15%	12%
	other soft tissue injury	25%	25%
	burn/scald	1%	0%
	dislocation/sprain	11%	4%
	fracture	17%	9%
	concussion	4%	4%
	poisoning/chemical injury	1%	0%
	internal injury/suffocation	<1%	<1%
	other injury	5%	3%
unknown	2%	3%	
15+	bruise/contusion	12%	15%
	graze/splinter	5%	11%
	cut/other open wound	17%	10%
	other soft tissue injury	25%	31%
	burn/scald	2%	<1%
	dislocation/sprain	12%	13%
	fracture	16%	8%
	concussion	2%	2%
	poisoning/chemical injury	1%	<1%
	internal injury/suffocation	<1%	<1%
	other injury	5%	5%
unknown	3%	4%	
All ages	bruise/contusion	13%	15%
	graze/splinter	5%	13%
	cut/other open wound	17%	10%
	other soft tissue injury	24%	29%
	burn/scald	2%	<1%
	dislocation/sprain	11%	12%
	fracture	16%	8%
	concussion	3%	2%
	poisoning/chemical injury	1%	<1%
	internal injury/suffocation	<1%	<1%
	other injury	6%	5%
unknown	3%	4%	

Table 6 shows the distributions of injury types for home and road accidents. Overall, and for all age groups separately, there are proportionately considerably more home accident casualties attending hospital with fractures and open wounds than road accident casualties, and proportionately fewer attending with grazes and splinters and other soft tissue injuries.

The HASS/LASS database no longer contains information about whether the casualty was brought in by ambulance. It was therefore not possible to update this table, so Table 7 presents the figures from the original report. The proportion of home accident casualties brought in by ambulance is proportionately much smaller than for road accident casualties.

Table 7: Percentage of casualties brought in by ambulance by injury severity and age (from Hopkin and Simpson, 1996)

Severity	Age	Home	Road
Serious	0-4	7%	55%
	5-14	6%	62%
	15+	21%	70%
	All age	16%	68%
Slight	0-4	3%	40%
	5-14	2%	38%
	15+	7%	36%
	All age	5%	37%
All non fatal	0-4	4%	45%
	5-14	3%	45%
	15+	11%	44%
	All age	8%	44%

There was insufficient information in the HASS/LASS 2002 data to update the length of stay distributions. The distributions estimated in Hopkin and Simpson (1996) are shown in Table 8. Length of stay for casualties transferred or referred to other hospitals is not recorded, so certain assumptions apply. It was assumed that casualties transferred to other general hospitals had similar lengths of stay to those where the length of stay is known. Casualties who were admitted to specialist hospitals were assumed to stay longer, with a range of estimates ranging from that similar to other hospitals to the longest length of stay (31 or more nights), to reflect the uncertainty surrounding the estimates.

Home accident casualties who were admitted to hospital were estimated to stay in hospital for similar lengths of time to those involved in road accidents.

Table 8: Distribution of length of stay in hospital (in-patients) (from Hopkin and Simpson, 1996)

Accident	Age	Length of stay (nights) (%)			
		0-1	2-7	8-30	31+
Home	0-4	36-41	49-55	3	1-13
	5-14	27-31	55-63	4	1-14
	15+	10-11	34-39	31-36	15-25
	All ages	18-21	40-45	22-24	10-21
Road	0-4	51-54	32-33	12-13	0-5
	5-14	40-42	37-39	13-14	5-10
	15+	28-29	40-41	24-25	5-8
	All ages	30-32	39-41	22-23	5-9

4 Costing home accidents

The distributions presented in Section 3 have been used to update the cost of home accidents by comparing them to road accident distributions and then relating them back to current road accident costs (Table 9). These figures are lower than the published figures for 2007 (Department for Transport, 2010) due to a decrease in GDP over the period June 2007 to June 2009.

Table 9: Summary of costs per road accident casualty: June 2009 prices

Injury severity	Lost output	Value of avoidance of injury	Medical & support	Total
Fatal	£551,880	£1,071,490	£960	£1,624,330
Serious	£21,640	£148,890	£13,120	£183,650
Slight	£2,290	£10,900	£970	£14,160
Average	£11,100	£38,960	£2,330	£52,390

4.1 Assumptions

4.1.1 Fatal costs

The best estimate of the cost of a home accident fatality is the same as that of a road accident fatality. This is the assumption that was made in the original study and was based on evidence that willingness to pay to avoid fatalities is the same in the home as on the road.

4.1.2 Lost output

The serious injuries have been classified into recovery periods (Table 3) using information on injury type, length of stay and outcome. The distribution has been weighted by costs estimated for each recovery period (Hopkin and O'Reilly, 1993).

For slight injuries it is assumed that 95% of all slightly injured home casualties recover in less than one year, the remainder recover in one to three years. This is half the number that take more than one year to recover having been slightly injured in a road accident. This is the assumption that was made in the original study.

It has been assumed that young non-fatal casualties classified as recovering in less than three years do not contribute to lost output. Those that are permanently unable to work and all injured casualties over 14 years are included in the lost output estimate.

4.1.3 Value of avoidance of injury

The value of avoidance of injury for non fatal injuries is defined to be relative to the value of saving a fatality (Jones-Lee et al, 1993).

For serious injuries, the distribution of injury recovery periods (Table 3) has been used to weight these relative costs. For slight injuries it has been assumed that 90% of home casualties recover in less than a year and the remainder recover between one and three years.

4.1.4 Medical and support costs

The medical and support costs have not been updated as it was not possible to update the distribution of ambulance use and length of stay. These values are based on the estimates in Hopkin and Simpson (1996).

4.1.5 GP treated casualties

It is assumed that slightly injured home accident casualties treated by GPs do not incur any lost output or medical costs. The value of avoidance of injury is assumed to be equivalent to the value associated with cuts and bruises after a road accident (as in the original study).

4.1.6 Upated costs

Many of the cost estimates are based on costs defined in 1990. These estimates have been upated to 2009 costs using nominal GDP per capita (data from the Office of National Statistics). This is the method recommended in the Department for Transport's guidance on appraisal of transport schemes (Department for Transport, 2010).

4.2 Home accident costs

Table 10 contains the estimated costs per home accident casualty based on the method described in Section 2.4 and assumptions discussed in Section 4.1, and upated to June 2009 costs.

The estimated home accident casualty costs were estimated to be £45,600 for a serious casualty (around a quarter of that for road casualties) and £8,300 for a slight injury (around half that of a road casualty). The average cost of non fatally injured home accident casualty who attended hospital is estimated to be £16,900 (around one third that of road casualties).

Table 10: Estimated cost per home accident casualty: June 2009 prices

Severity	Lost output	Value of avoidance of injury	Medical & support	Total
Fatal	£547,500	£1,063,000	£1,000	£1,611,400
Serious	£6,700	£35,100	£3,800	£45,600
Slight (hospital treated)	£3,200	£4,200	£900	£8,300
Slight (GP treated)	£0	£200	£0	£200
Average non fatal (hospital treated)	£4,000	£11,300	£1,600	£16,900
Average non fatal	£3,000	£8,400	£1,200	£12,600
Average	£3,800	£10,000	£1,200	£15,000

Values rounded to the nearest £100

Separated into different age groups, Table 11 shows that the cost of a seriously injured casualty in a home accident is estimated to be similar for 0-4 and 5-14 year olds and considerably higher for older casualties (15+) due mainly to the lost output contribution of adults in the calculation.

**Table 11: Estimated cost per home accident casualty by age group:
June 2009 prices**

Age group	Serious	Average non fatal (hospital treated)
0-4	£33,200	£10,600
5-14	£35,300	£11,900
15+	£51,300	£19,800

Values rounded to the nearest £100

4.3 Overall home and leisure accident costs

In the latest available information (DTI, 2003) it was estimated that 5.6 million home and leisure accident casualties attended hospital in one year of which 2.7 million were the result of a home accident.

Using the estimate of the cost of the average non fatal hospital treated casualty from Table 10 of £16,900 and assuming that this applies equally across home and leisure accidents, estimates of the overall annual costs have been made and are shown in Table 12.

It is estimated that the overall annual cost of home accidents (not including deaths and GP treated casualties) is £45,600m.

In total the estimated cost of home and leisure accidents (not including deaths and GP treated casualties) is estimated at £94,600m per annum.

**Table 12: Estimated overall annual cost of home and leisure accidents
June 2009 prices**

Accident type	A&E attendances	Overall cost
Home	2.7m	£45,600m
Leisure	2.9m	£49,000m
All	5.6m	£94,600m

5 Conclusions

This report is an update of Hopkin and Simpson (1996). Where possible, the distributions of home accident casualties have been recalculated using the latest available HASS/LASS data (2002). Using these updated distributions, the cost of home accidents has been estimated by comparing the distributions with road accident casualties.

It is estimated that the cost of a seriously injured home accident casualty is £45,600, and a slightly injured casualty who attends hospital is around £8,300. Overall, it is estimated that home accidents where the casualty attends hospital (not including deaths) cost £45,600m annually. In total, the estimated overall cost to the nation of seriously and slightly injured home and leisure accident casualties who attend hospital is £94,600 million per annum.

The report has shown that the analysis was subject to a number of limitations and required several assumptions to be made. The resulting estimates provide a more reliable basis for estimating the value of home accident injury than simply updating the estimates from the previous study for inflation, but are still far from ideal. There is considerable scope for improving the valuation of casualties in home accidents if resources could be found for collecting up-to-date information on home accident injuries and their consequences.

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In 1994, TRL carried out research commissioned by Shropshire Child Accident Prevention Group to value home accidents using the costs associated with road accidents (Hopkin and Simpson, 1996). This research included a review of the methodology of the valuation of road accidents and the implications for costing home accidents using this methodology. The research described in this report updates the distributions of home accidents in terms of injury severity, injury type and casualty age with the latest available Home and Leisure Accident Surveillance Systems data (2002) and re-estimates the cost of accidents in the home, presenting estimates in 2009 values.

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