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SOME STATISTICS OF FIRE IN ROAD VEHICLES

by

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SUMMARY

A study has been made of the statistics of fire in road vehicles during 1971. It is shown that the vehicle fire frequency depends on the number of vehicle-miles travelled, although the constant of proportionality varies with the type of vehicle considered.

It is estimated that the risk to the individual of fire death or injury, for each hour exposed to the danger, is rather higher in road vehicles than in most building occupancies but that the fire risk forms only a very small part of the total risk of road transport to the user.

KEY WORDS: Fire statistics, vehicles, casualties, cause.

Department of the Environment and Fire Offices' Committee
Joint Fire Research Organization

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INTRODUCTION

Constant attempts are made by various bodies to maintain or improve the level of safety of road vehicles. Although the major effort is directed to reducing the impact of road traffic accidents, the fire aspects are not neglected and statistical information on vehicle fires is often requested. Several previous notes[1,2,3] have been published on this topic and the present report is designed to bring the information more up to date and particularly to separate the information for the various types of vehicle.

DATA

Most of the data in this note refer to those fires in vehicles not inside buildings which were reported to the United Kingdom fire brigades during 1971, although data from other years (particularly 1972) have been introduced where necessary. In some cases, where comparison with other statistics is required, only fires in Great Britain (ie England, Wales and Scotland) are considered. For ease of comparison, most of the tables give break-downs in terms of percentages of all fires in that vehicle type but the approximate raw numbers can be obtained by applying the total figures listed in Table 1.

Some of the information has been obtained from a detailed study of a 200-fire random sample of fires in cars during 1971. Where this sub-set of the main data has been used, the fact is clearly stated.

FIRE FREQUENCY AND RATE

The number of fires in road vehicles has been increasing fairly steadily since at least 1950 (Fig.1). Obviously, the number of vehicles at risk has also increased over this period and Fig.2 shows the relationship between the number of current vehicle licences[4] (which is an approximation to the number of vehicles on the road) and the frequency of vehicle fires. The correlation is statistically highly significant and implies a rate of about 1 fire per thousand vehicles per year. Although statistically a straight line correlation is adequate, it is clear that, since about 1960, the results follow a curve. A better fit is given by the estimated annual volume of road traffic[4] and this is plotted in Fig.3 against the number of vehicle fires. Although they are related to the number of licences, these traffic figures correlate more closely with vehicle fires and indicate, as would be expected,

that vehicle usage largely determines the fire frequency. The slope of the regression line indicates that, for the period 1960 to 1972, one vehicle fire occurs about every 8 million vehicle-miles travelled.

The estimated monthly volume of traffic is also available[5] for various types of vehicle and the period from January 1970 to December 1971 was studied. Regression lines were fitted to the fire and traffic data for those types of vehicle which could be separated in both sets of data and the correlations found to be very highly significant in every case except 'other goods vehicles'. This may be a genuine difference or may arise from differences in classification. For the significant correlations, the slopes of the regression lines gave:

all road vehicles:	95	fires/thousand million vehicle-miles
cars and taxis :	130	"
light vans :	210	"
motor-cycles,etc :	445	"
buses and coaches:	450	"

AGE OF VEHICLE

The age distribution of vehicles involved in fire is shown in Table.2. Table 3 shows the risk of fire occurring in vehicles of different age, relative to both the number of vehicles surviving from that year[5] and the mean fire risk (taken as 1.00) for vehicles of all ages within the type. The other vehicle types are not defined consistently in both fire and vehicle statistics. Motor-cycles, etc show the risk increasing with age but the trends for cars and buses are less clear. Both show the peak risk at about 5 years old, with the risk decreasing for older vehicles. It is possible that older vehicles are used less or in a different way, and this emphasizes the fact that the higher risks with increasing age elsewhere are not necessarily caused by the vehicles' age but may reflect differences in usage.

LOCATION OF VEHICLES INVOLVED IN FIRE

Only vehicle fires which occurred outside buildings are considered in this note and Table 4 shows the location of vehicles when they were involved in such fires. The most obvious feature is that some 80 per cent of vehicle fires occur on or alongside roads other than motorways and only 3.5 per cent on motorways, ie there are about 23 times as many fires on non-motorway roads as on motorways, although the mileage of non-motorway roads is about 260 times the mileage of motorways in Great Britain[4]. That is, in round figures, there are 10 times as many fires per mile of

motorway as per mile of other roads. However, the vehicle-miles travelled on non-motorway roads are about 20 times the equivalent figure for motorways[5] so that the fire frequency is again seen to be proportional to the vehicle usage. The ratio of motorway to non-motorway fires is much higher for lorries than for cars; this may well reflect differing patterns of usage between the types[2].

It is unfortunate that most fire reports make no mention of whether the vehicle was being driven, was parked, was being started, etc and the location in which the fire occurred is rarely of help in establishing this. It may well be that some of these 'operations' are more hazardous than others but we have no means of ascertaining this.

TEMPORAL VARIATIONS IN VEHICLE FIRE FREQUENCY

The vehicle fire frequencies for the months of the year are given in Table 5. The most striking feature is the smallness of the monthly variation for most types of vehicle. Only motor-cycles have a marked summer peak, related to increased usage at this season. There is a trend for the fire frequency to increase fairly steadily through the year, which is partly a function of the year by year increase but is not entirely due to this.

The time of day at which the fire brigades received calls to vehicle fires is listed in Table 6. The distribution is much as would be expected from vehicle usage, with the early morning low and the evening high but the 'rush hours' do not seem to affect the frequencies very much.

Possibly, the slower average speed at these times produces a lowering of the fire rate which compensates for the increased traffic.

The frequencies for lorries and tankers are greater during working hours and vans, etc also tend to follow this pattern.

SOURCE OF IGNITION AND MATERIAL FIRST IGNITED

The distribution of ignition sources with type of vehicle is shown in Table 7. It can be seen that wire and cable and exhaust systems are generally the most important sources but, for heavy vehicles, mechanical heat and sparks are also frequent, being the most important source of ignition in road tanker fires. Fires ignited by other sources are much less common and tend to vary with the type of vehicle. Fires following crashes are fairly important for motor-cycles and cars, and ashes and soot are a more common source in lorry fires. Malicious ignition accounts for 7 per cent of fires in buses but this is almost entirely due to fires in Northern Ireland. For Great Britain alone, only about 1 per cent of bus fires are known to have been started maliciously.

The distribution of materials first ignited is shown for the various types of vehicle in Table 8. Fuel and electrical insulation are the most common materials, although the proportions of these fires vary greatly with the vehicle type.

Table 9 shows the distribution of materials first ignited with respect to the source of ignition, each entry representing the percentage contribution of that cell to all road vehicle fires. Seventy per cent of fires starting in wire and cable are most probably confined to electrical insulation and almost 80 per cent of the exhaust system fires ignite petrol or oil, but it is difficult to summarize such a large table satisfactorily and it is best used for reference only.

SITE OF IGNITION, FIRE SPREAD AND DAMAGE IN CAR FIRES

Table 10 shows the area of the car in which ignition occurred for a random sample of car fires during 1971. The term 'dashboard' normally means 'behind the fascia panel' and some fires recorded as starting in the interior of the car may, in fact, have been dashboard or steering column fires. 'Exterior' means that the fire did not start inside the car body but was dependent on the presence of the car, eg ignition of petrol on road below car from a ruptured fuel tank; while 'external' means that the car happened to be involved in a fire otherwise unconnected with a vehicle, eg ignited by radiated heat from a burning building. The extent of spread in car fires, expressed in necessarily broad terms, is shown in Table 11 and the overall damage to the vehicle in Table 12.

It can be seen from these three tables that the bulk of car fires start in the engine compartment (65 per cent of those fires known not to be 'external' to the car), that most do not spread beyond the compartment of origin (only 25 per cent spread beyond the original compartment) but that 21 per cent of fires severely damaged most or all of the car.

Table 13 shows the degree of fire spread in car fires starting from different ignition sources. With the small number in the sample, it is difficult to detect significant differences between the sources, but a higher proportion of malicious fires, and possibly of fires following crashes, seem to spread beyond the compartment of origin. The amount of fire damage to the cars is shown in Table 14 for each of the main sources of ignition. Generally about 30 to 40 per cent of the fires cause only minor damage but, for fires starting in wire and cable or from smokers' materials, the proportion with minor damage is about 50 to 60 per cent, while no malicious fires caused only minor damage.

CASUALTIES

The number of casualties from fire or smoke in each of the various types of vehicle is shown in Table 15. Besides the number of casualty fires and casualties, the proportions of vehicle fires in which casualties occur are shown. The probability (p_F) of a vehicle fire causing death is about the same as for all outdoor fires but the probability (p_C) of a vehicle fire causing non-fatal injury is less than one-half of the equivalent probability for all outdoor fires. Although a road vehicle might be considered a small, mobile building, the probabilities of

TABLE 15

Casualties by vehicle type

	Type of vehicle							
	all	car	van, etc.	motor-cycle	lorry	tanker	bus, etc.	other
1971								
Total casualties	241	131	35	23	16	10	10	16
Number killed	54	41	7	2	2	2	–	–
Fatal fires	36	25	5	2	2	2	–	–
Proportion of fires causing death (p_F)	2.0×10^{-3}	2.5×10^{-3}	2.1×10^{-3}	1.8×10^{-3}	0.6×10^{-3}	10.8×10^{-3}	–	–
Number injured	187	90	28	21	14	8	10	16
Injury fires	142	71	20	18	14	7	4	8
Proportion of fires causing injury (p_C)	7.9×10^{-3}	7.0×10^{-3}	8.2×10^{-3}	16.5×10^{-3}	4.5×10^{-3}	37.6×10^{-3}	6.1×10^{-3}	18.5×10^{-3}
1972								
Total casualties	289	186	39	12	19	12	2	19
Number killed	73	62	7	2	–	2	–	–
Fatal fires	53	44	6	2	–	1	–	–
Proportion of fires causing death (p_F)	2.6×10^{-3}	3.6×10^{-3}	2.2×10^{-3}	2.1×10^{-3}	–	5.1×10^{-3}	–	–
Number injured	216	124	32	10	19	10	2	19
Injury fires	180	102	27	8	15	7	2	19
Proportion of fires causing injury (p_C)	8.8×10^{-3}	8.5×10^{-3}	10.0×10^{-3}	8.3×10^{-3}	4.7×10^{3}	35.7×10^{-3}	2.8×10^{-3}	39.1×10^{3}

TABLE 16

Nature of fire and such injuries 1971-1972

Nature of injury	Persons injured in vehicle fires		Persons injured in all fires	
	Number	percentage	Number	percentage
TOTAL	530	100.0	12754	100.0
Fatal				
burns & scalds	88	16.6	741	5.8
overcome by gas or smoke	22	4.2	817	6.4
other & undefined	17	3.2	216	1.7
Non-fatal				
burns & scalds	317	59.8	5942	46.6
overcome by gas or smoke	3	0.6	1694	13.3
bruises, cuts, abrasions	24	4.5	1003	7.9
dislocations, sprains fractures	5	0.9	164	1.3
More than one of above	13	2.5	323	2.5
shock only	17	3.2	1272	10.0
Other & undefined	24	4.5	582	4.6

building fires causing death or injury are much higher than the figures for vehicles (except road tankers). By making the assumptions that the average vehicle is occupied by 1.1 people (lorries and motor-cycles), 1.5 people (cars and 'all vehicles') or 20 people (buses and coaches) and that its average speed is 30 mile/h, and knowing the estimated distance travelled by various types of vehicle in a year[4], it is possible to calculate estimates of the death or injury (non-fatal) risk to the individual, relative to the time exposed to risk. We obtain the following estimates for Great Britain in 1971 and 1972 respectively:

Vehicle type	Fire deaths/10^8 person-hours		Fire injuries/10^8 person-hours	
	1971	1972	1971	1972
Car	0.67	0.86	1.5	2.1
Lorry and tanker	0.90	0.45	4.7	6.5
Motor-cycle	2.3	2.5	23	13
Bus and coach	0.0	0.0	0.60	0.07
All vehicles	0.70	0.84	2.6	2.9

The accuracy of the assumptions is not known but the fact that motor-cycles are much more dangerous than lorries, buses or cars (from a fire point of view) is clear-cut. These risks may also be compared with those for various building occupancies[6], which show that, for each hour exposed, the individual is more at risk from fire in a road vehicle than he is in most buildings. However, figures quoted by Baldwin[7] for fatal accident rates from all causes are (in units of deaths/10^8 person-hours):

staying at home: 3
travelling by car: 57
motor-cycling: 660

This indicates that the fire risk is a very minor component of the total risk of travel.

The nature of the injuries in vehicle fires are compared with those in all fires in Table 16. Vehicle fires have a higher proportion of fatal injuries (24 per cent) and over three-quarters of all vehicle casualties are caused by burns or scalds . The proportion overcome by gas or smoke is lower for vehicle casualties, as is the proportion suffering shock alone.

The age distribution of those people suffering death or injury in road vehicle fires is given in Table 17. It is a very different distribution from that for all fire deaths[8], where the young and old are the chief victims. For vehicle fires, it is the young adult who suffers, with 44 per cent of deaths and 48 per cent of injuries occurring between the ages of 15 and 30 years. This distribution is more typical of that for road traffic accidents and the reason for this may be

seen in Table 18, where the source of ignition is shown for fatality fire . Over 70 per cent of the deaths occurred in fires following a crash and this is increased to 80 per cent if fires in Northern Ireland are excluded. This exclusion mainly affects malicious ignition, which drops from 14 per cent to 4 per cent of all deaths in vehicle fires.

This combination of age distribution and source of ignition could lead to problems when calculating the economics of fatal fires in road vehicles, eg to measure the cost-effectiveness of increased safety precautions. Some methods of life-valuation depend on the earning potential of the victim and this will lead to a high value for the young men mainly killed by vehicle fires. However, the fact that they were mainly involved in road accidents may mean that they suffered injuries from this and could have died even if there was no fire. Insufficient information is available in the fire reports to test this possibility but it must be borne in mind.

Table 19 shows the number of casualties in vehicle fires and the number of fires leading to both death and injury. Only 6 per cent of casualty fires involve both fatal and non-fatal injuries.

CONCLUSIONS

It is estimated that the risk of death or injury by fire, for unit exposed time, is greater in road vehicles than in most buildings. For instance, in the manufacturing industries, the fire fatality rate is estimated[6] to be about 0.1 to 0.2 deaths/10^8 person-hours exposure, while the equivalent figure for fires in road vehicles is about 0.7 to 0.8. However, it must be remembered that fire accounts for only a small proportion of the fatal accidents in vehicles and the fire part of the total life risk in vehicles is probably relatively less important than it is in buildings. The risk of death or injury by fire is much higher for motor-cycles than for cars,buses or lorries but, again, this risk is a very small component of the total life risk.

The age distribution of fatal casualties in vehicle fires is different from that in all fires[8], with the bulk of them being young adults. The death most often follows a fire subsequent to a crash or collision.

The frequency of fire in road vehicles is largely dependent on the vehicle usage, ie the number of vehicle-miles travelled. For the period 1960 to 1972 there were about 130 fires for every thousand million vehicle-miles travelled, or one fire for about every 8 million vehicle-miles. For 1970-71, the fire rates for some classes of vehicle varied with vehicle usage as follows (in units of fires/ thousand million vehicle-miles):

all road vehicles	: 95
cars and taxis	:130
light vans	:210
motor-cycles,etc	:445
buses & coaches	:450

The effect of vehicle age on fire risk is not very clear, since vehicle usage may be different for different ages, but there is some indication (Table 3) that the fire risk may be greater in older cars and motor-cycles.

Wire and cable and exhaust systems are generally the most common sources of ignition in road vehicle fires but, for heavy vehicles, mechanical heat and sparks are also important. The materials commonly first ignited are electrical insulation and fuel.

Study of a sample of car fires indicated that the bulk of these fires start in the engine compartment (65 per cent) and that most car fires are confined to the original compartment (75 per cent). However, about 20 per cent of these fires caused severe damage to most or all of the car. There was some indication from the sample that the probability of fire spread was higher for fires started maliciously or following an accident. Generally about 30 to 40 per cent of car fires in the sample caused only minor damage but, for fires starting in wire and cable or from smokers' materials, the proportion with only minor damage was 50 to 60 per cent. No fires started maliciously caused only minor damage.

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TABLE 1

TYPES OF ROAD VEHICLES INVOLVED IN FIRE, 1971

Type of vehicle	Fire frequency (not in buildings)		Percentage of all road vehicle fires	
TOTAL		18 082		100.0
Cars		10 149		56.1
four-wheeled	9742		53.9	
three-wheeled	407		2.3	
Vans, etc		2 436		13.5
vans	2239		12.4	
shooting brakes, landrovers,etc	197		1.1	
Motor-cycles,motor scooters,mopeds		1 090		6.0
Lorries		3 133		17.3
Tankers -		186		1.0
petrol,paraffin, diesel oil	100		0.6	
chemicals,other flammable liquids	38		0.2	
other & unspecified	48		0.3	
Buses & coaches		655		3.6
Other		433		2.4
invalid carriages	9		0.0	
self-propelled caravans	26		0.1	
mobile shop,canteen	168		0.9	
other i-c vehicles	103		0.6	
electric vehicles	88		0.5	
other road vehicles	39		0.2	

TABLE 2

AGE OF VEHICLES INVOLVED IN FIRE, 1971
(percentages)

Year of registration	Type of vehicle							
	all	car	van,etc	motor-cycle	lorry	tanker	bus,etc	other
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1900-1949	0.3	0.3	0.1	0.8	0.1	-	0.5	0.7
1950-1954	0.9	0.8	0.3	3.7	0.2	-	1.7	1.6
1955-1959	4.0	4.7	2.6	10.2	0.8	1.6	4.0	4.6
1960	3.8	4.3	2.9	6.7	1.8	2.2	3.4	5.5
1961	3.6	4.5	3.0	5.0	1.2	0.5	3.4	3.2
1962	4.4	5.5	3.7	5.2	1.9	4.3	3.2	2.8
1963	4.8	5.9	4.0	5.6	2.2	2.2	2.7	2.5
1964	7.8	9.3	7.1	6.2	5.2	4.9	5.0	3.0
1965	9.7	9.7	11.7	6.4	9.7	8.2	9.5	8.5
1966	9.8	9.7	13.0	5.0	10.5	7.6	8.9	4.8
1967	6.7	6.4	8.6	3.5	6.6	9.2	7.5	7.6
1968	8.1	7.1	9.4	4.1	11.3	12.0	9.6	7.4
1969	7.6	6.8	7.3	2.7	12.1	6.5	8.4	4.6
1970	7.2	5.9	8.0	3.4	12.5	9.2	6.4	5.3
1971	4.5	3.9	3.8	4.0	7.7	4.9	2.4	3.2
Unknown	16.8	15.0	14.3	27.3	16.3	26.6	23.5	34.4

TABLE 3
RELATIVE FIRE RISK OF VEHICLES OF
DIFFERENT AGES, 1971

Year of registration	Type of vehicle		
	car	bus,etc	motor-cycle
All	1.00	1.00	1.00
pre-1961	0.81	0.39	1.47
1961-1962	1.07	0.70	1.31
1963-1964	0.93	0.57	0.83
1965-1966	1.07	1.17	0.71
1967-1968	0.73	1.14	0.39
1969-1970	0.76	0.99	0.35

TABLE 4
Location of vehicles involved in fire, 1971
(percentages)

Location of	Type of vehicle							
	all	car	van, etc.	motor-cycle	lorry	tanker	bus, etc.	other
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Road or verge	79.7	81.7	82.4	76.3	71.7	67.4	88.5	75.1
Motorway	3.5	1.7	2.2	0.7	10.5	15.2	4.7	1.4
Field, open land	4.9	4.6	3.9	6.5	6.4	4.9	0.5	6.2
Car park	3.5	4.3	3.3	2.3	2.2	0.5	1.8	3.2
Garden	2.6	3.1	1.8	9.0	0.1	0.5	-	0.5
Garage forecourt	2.1	2.6	2.3	2.4	0.7	0.5	1.2	1.4
Yard (misc)	3.3	1.6	3.4	2.1	7.9	9.2	3.2	10.4
Other(specified)	0.4	0.2	0.5	0.6	0.5	1.6	-	1.8
Unknown	0.0	0.0	0.1	-	-	-	-	-

TABLE 5

Monthly fire frequency for vehicles, 1971
(percentages)

Month	Type of vehicle							
	all	car	van, etc.	motor-cycle	lorry	tanker	bus, etc.	other
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
January	6.0	6.2	5.5	5.2	5.5	9.2	6.6	6.0
February	7.0	6.7	7.0	7.1	7.6	12.5	5.3	7.9
March	7.7	7.7	7.7	6.0	8.1	8.2	8.1	8.1
First quarter	20.6	20.6	20.2	18.3	21.2	29.9	20.0	21.9
April	7.6	7.7	7.0	7.9	8.0	4.9	6.6	8.3
May	9.1	8.8	8.9	10.6	9.5	6.5	7.6	12.2
June	7.3	7.3	6.7	8.8	7.6	7.6	6.1	6.7
Secondquarter	24.0	23.8	22.6	27.2	25.0	19.0	20.3	27.3
First half-year	44.6	44.5	42.9	45.5	46.2	48.9	40.3	49.2
July	10.5	10.4	10.8	10.5	10.8	13.0	10.7	9.7
August	8.7	8.6	8.9	9.1	8.6	8.2	9.9	9.0
September	9.3	8.8	9.3	10.8	10.2	6.5	10.4	9.7
Third-quarter	28.5	27.7	29.1	30.4	29.5	27.7	31.0	28.4
October	9.4	9.5	9.0	10.4	8.7	10.3	12.1	8.1
November	8.7	8.8	10.2	6.6	8.6	6.0	8.1	6.9
December	8.7	9.5	8.9	7.2	7.1	7.1	8.5	7.4
Fourth quarter	26.9	27.8	28.1	24.1	24.3	23.4	28.7	22.4
Second half-year	55.4	55.5	57.1	54.5	53.8	51.1	59.7	50.8

TABLE 6

Time of call to fires in road vehicles, 1971
(percentages)

Time of call	Type of vehicle							
	all	car	van,etc.	motor-cycle	lorry	tanker	bus,etc.	other
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
00.00 - 00.59	3.8	4.1	4.1	3.8	3.3	2.2	1.5	1.2
01.00 - 01.59	2.4	2.6	2.4	2.3	2.3	2.2	1.8	2.3
02.00 - 02.59	1.8	2.0	1.6	1.0	1.4	2.2	1.1	2.3
03.00 - 03.59	1.4	1.4	1.4	0.8	1.3	2.2	1.4	2.5
04.00 - 04.59	0.8	0.8	0.8	0.4	1.2	2.2	0.3	1.6
05.00 - 05.59	0.9	0.7	1.0	0.5	1.6	2.2	0.6	1.8
06.00 - 06.59	1.2	0.7	1.4	0.8	2.6	1.1	1.5	1.6
07.00 - 07.59	2.7	2.1	3.0	2.0	4.0	3.8	3.1	5.3
08.00 - 08.59	4.1	3.6	4.4	2.0	5.9	4.3	5.8	3.2
09.00 - 09.59	4.2	3.3	5.0	1.7	6.7	8.7	3.8	6.9
10.00 - 10.59	4.4	3.6	5.1	2.0	6.6	9.2	5.5	5.1
11.00 - 11.59	4.6	4.0	5.5	2.4	6.7	8.2	4.1	3.2
12.00 - 12.59	5.3	5.1	5.0	4.2	6.9	7.1	3.1	4.8
13.00 - 13.59	4.7	4.5	4.8	4.2	5.5	4.9	3.8	5.5
14.00 - 14.59	5.2	4.8	5.6	3.9	6.4	4.9	6.1	5.3
15.00 - 15.59	5.7	5.5	6.0	4.9	6.4	1.1	6.9	3.7
16.00 - 16.59	6.2	5.9	7.2	5.6	6.0	4.9	7.8	6.5
17.00 - 17.59	6.4	6.5	6.7	8.2	5.1	4.9	7.8	5.1
18.00 - 18.59	5.8	6.3	5.7	7.2	3.7	4.9	8.2	5.1
19.00 - 19.59	6.1	6.9	4.7	8.8	3.6	5.4	6.7	6.0
20.00 - 20.59	5.9	6.6	4.6	9.4	3.4	2.2	6.0	6.2
21.00 - 21.59	5.8	6.7	4.5	9.1	3.4	4.9	2.9	5.1
22.00 - 22.59	5.1	5.8	4.6	7.3	2.8	3.8	5.0	5.1
23.00 - 23.59	5.4	6.4	4.6	7.2	2.9	2.7	5.2	4.2
Unknown	0.1	0.1	0.0	0.3	0.2	-	-	0.2

TABLE 7

Source of ignition, vehicle fires, 1971
(percentages)

Source of ignition	Type of vehicle							
	all	car	van, etc.	motor-cycle	lorry	tanker	bus, etc.	other
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Wire and cable	31.1	36.9	33.0	13.4	19.0	16.8	27.5	29.6
Exhaust manifold and pipe	24.8	25.3	26.5	42.9	16.0	21.7	29.3	14.5
Mechanical heat and sparks	4.8	1.3	1.1	0.6	16.9	39.1	14.5	2.3
Crash or collision	4.3	5.8	2.1	9.1	0.9	1.6	0.2	1.6
Smokers' material	4.1	3.5	5.1	1.7	6.7	1.1	2.4	3.7
Ignition, starter, spark plug	2.5	2.5	3.3	5.9	1.3	1.1	1.8	1.8
Malicious	2.4	2.1	2.5	2.6	1.9	2.2	7.0*	2.8
Children with fire	2.1	1.7	2.0	1.7	3.5	0.5	1.1	3.9
Battery	1.4	1.3	2.3	0.8	1.3	-	0.8	1.6
Ashes and soot	1.3	0.0	0.0	-	7.4	-	0.2	-
Matches, naked lights	0.7	0.7	0.7	0.4	1.1	1.1	0.5	1.4
Rubbish burning	0.5	0.1	0.6	0.3	1.8	0.5	-	0.5
Spontaneous combustion	0.3	-	-	-	1.7	0.5	-	0.2
Dynamo	0.3	0.3	0.3	0.3	0.3	0.5	0.2	0.5
Other	5.8	5.1	6.3	4.6	6.5	6.0	2.6	21.7
Unknown	13.5	13.3	14.0	15.8	13.6	7.1	12.1	13.9

*Mostly in Northern Ireland

TABLE 8

Material first ignited, vehicle fires, 1971
(percentages)

Material first ignited	Type of vehicle							
	all	car	van, etc.	motor-cycle	lorry	tanker	bus, etc.	other
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Liquids	34.7	37.5	37.0	70.6	14.9	25.5	34.2	15.0
petrol, lighter fuel	29.6	36.0	32.8	69.5	2.6	3.3	3.1	9.9
diesel, fuel oil	1.6	0.1	1.3	0.3	5.1	7.1	11.8	1.6
other oil	3.3	1.4	2.9	0.7	6.9	13.6	19.2	3.5
other	0.1	0.1	0.0	–	0.3	1.6	0.2	–
Textiles	1.9	1.7	2.9	0.3	2.6	6.0	1.2	0.7
rags	1.5	1.4	2.0	0.1	1.9	6.0	1.2	0.5
other	0.4	0.3	0.9	0.2	0.8	–	–	0.2
Furniture & furnishings	4.8	6.1	5.2	1.5	2.3	1.1	5.2	1.6
upholstery	3.8	4.7	4.2	1.5	2.1	1.1	5.0	1.2
floor covering	0.9	1.4	0.6	–	0.1	–	0.2	–
other	0.1	0.1	0.3	–	0.1	–	–	0.5
Miscellaneous	41.0	38.3	36.5	9.1	61.9	50.5	41.8	55.7
insulation-confined to or material to which fire first spread unknown	24.9	29.1	26.7	6.1	17.4	14.1	20.6	29.8
rubber, tyres	2.3	0.4	0.7	0.3	9.6	17.4	3.7	1.4
insulation, lagging	1.5	2.0	0.9	–	0.8	1.1	1.7	1.6
packing, wrapping	1.3	0.2	0.8	0.2	5.7	–	0.2	2.5
lubricant	0.6	0.1	0.1	–	2.3	5.4	1.8	0.5
paper, cardboard	0.6	0.5	0.8	–	1.1	–	0.3	0.2
unspecified waste	3.1	0.7	2.0	0.4	13.0	0.5	0.8	4.4
other	8.3	5.6	6.0	2.1	16.3	20.7	14.1	26.5
Unknown	16.0	16.1	17.0	18.5	14.1	8.2	16.3	15.7

TABLE 9

SOURCE OF IGNITION BY MATERIAL FIRST IGNITED, VEHICLE FIRES, 1971 (PERCENTAGES)

Material first ignited	TOTAL	SOURCE OF IGNITION																	
		Wire & cable	Exhaust system	Mechanical heat & sparks	Crash or collision			Smokers' materials	Ignition etc	Malicious	Children with fire	Battery	Ashes & soot	Matches, naked lights	Rubbish burning	Spontaneous combustion	Dynamo	Other	Unknown
					Electrical fault	Engine fault	Other & unknown fault												
TOTAL	100.00	31.14	24.79	4.85	1.32	1.34	1.63	4.11	2.54	2.36	2.06	1.42	1.31	0.74	0.49	0.31	0.29	5.80	13.51
Liquids	34.73	6.04	19.44	1.19	0.44	1.24	1.31	0.33	1.79	0.17	0.15	0.52	0.01	0.21	0.03	0.03	0.12	0.95	0.76
petrol, lighter fuel	29.64	5.28	16.73	0.19	0.43	1.18	1.27	0.32	1.69	0.14	0.14	0.46	–	0.19	0.02	–	0.11	0.76	0.73
diesel, fuel oil	1.64	0.16	1.34	0.02	0.01	0.01	0.01	–	0.01	0.01	–	0.01	0.01	0.01	0.01	–	0.01	0.04	0.02
other oil	3.33	0.59	1.34	0.97	0.01	0.05	0.03	0.01	0.09	0.02	0.01	0.04	–	0.01	0.01	0.01	0.01	0.14	00.01
other	0.11	0.01	0.03	–	–	0.01	0.01	–	–	0.01	–	0.01	–	–	–	0.03	–	0.01	0.01
Textiles	1.94	0.13	0.96	–	0.01	–	–	0.44	–	0.04	0.06	0.08	–	0.05	–	0.01	–	0.09	0.07
rags	1.50	0.13	0.93	–	–	–	–	0.20	–	0.04	0.03	0.05	–	0.02	–	0.01	–	0.06	0.04
other	0.44	–	0.03	–	0.01	–	–	0.24	–	–	0.03	0.03	–	0.03	–	0.01	–	0.04	0.02
Furniture & furnishings	4.84	0.70	0.14	0.03	0.04	–	–	1.66	0.01	0.29	0.65	0.20	–	0.17	–	–	–	0.49	0.46
upholstery	3.85	0.55	0.05	–	0.02	–	–	1.14	0.01	0.28	0.62	0.20	–	0.14	–	–	–	0.42	0.41
floor covering	0.88	0.14	0.09	0.02	0.02	–	–	0.46	0.01	0.01	0.02	–	–	0.03	–	–	–	0.06	0.03
other	0.11	0.01	–	0.01	–	–	–	0.06	–	–	0.01	–	–	0.01	–	–	–	0.01	0.02
Miscellaneous	41.04	24.10	3.59	3.51	0.81	0.06	0.09	1.46	0.72	0.72	1.00	0.55	1.28	0.27	0.40	0.05	0.18	1.77	1.05
insulation – confined to or material to which fire first spread unknown	24.91	21.95	0.63	0.02	0.76	0.02	0.01	–	0.65	0.01	–	0.40	–	–	–	–	0.15	0.19	0.12
rubber, tyres	2.34	0.04	0.04	1.83	–	–	0.02	–	–	0.06	0.03	–	0.01	–	0.11	–	–	0.10	0.10
insulation, lagging	1.50	0.32	0.98	0.01	0.01	–	–	0.03	0.02	0.01	0.01	0.03	–	0.01	–	–	–	0.07	0.01
packing, wrapping	1.29	0.01	0.24	0.03	–	–	–	0.43	–	0.06	0.15	–	–	0.04	0.01	–	–	0.19	0.13
lubricant	0.60	0.01	0.04	0.55	–	–	–	–	–	–	–	–	–	–	–	–	–	0.01	–
paper, cardboard	0.58	0.02	0.12	0.01	–	–	–	0.17	–	0.03	0.12	–	0.01	0.03	0.01	0.01	–	0.02	0.04
unspecified waste	3.08	0.03	0.14	0.01	0.01	–	–	0.49	–	0.09	0.50	0.01	1.25	0.09	0.10	0.01	–	0.10	0.28
other	8.22	1.86	1.61	1.08	0.06	0.05	0.08	0.47	0.06	0.50	0.23	0.14	0.02	0.09	0.22	0.25	0.03	1.10	0.38
Unknown	15.96	0.05	0.44	0.10	0.01	0.03	0.22	0.10	0.01	1.10	0.14	0.03	0.02	0.04	0.01	–	–	2.50	11.17

TABLE 10

Site of ignition, car fire sample, 1971

Site of ignition	No. of fires in sample
TOTAL	200
Engine compartment	112
Interior	28
Dashboard, steering column	18
Boot	7
Exterior	7
External	5
Unknown	23

TABLE 11

Spread of fire, car fire sample, 1971

Spread of fire	No. of fires in sample
TOTAL	200
Confined to item of origin	50
Confined to compartment of origin	89
Spread to one other compartment	17
Whole vehicle involved	29
Spread to vehicle from outside	4
Unknown	11

TABLE 12

Fire damage, car fire sample, 1971

Fire damage	No. of fires in sample
TOTAL	200
Confined to wiring insulation	41
Other minor damage	32
Engine or associated equipment:	
damaged	32
severely damaged or destroyed	16
Interior:	
damaged	9
severely damaged or destroyed	8
Boot damaged	3
More than one compartment damaged or destroyed	15
Exterior damaged	2
Most of car severely damaged or destroyed	3
Whole car severely damaged or destroyed	37
Unknown	2

TABLE 13

Spread of fire by source of ignition
car fire sample, 1971

Source of Ignition		Spread of fire					
	TOTAL	Confined to item of origin	Confined to compartment of origin	Spread to one other compartment	Whole vehicle involved	Spread to vehicle from outside	Unknown
TOTAL	200	50	89	17	29	4	11
Wire and cable	79	37	27	7	5	-	3
Exhaust system	44	7	29	5	3	-	-
Heat and sparks	3	2	-	-	1	-	-
Crash or collision - electrical fault	5	3	2	-	-	-	-
engine fault	6	-	3	-	3	-	-
other or unknown fault	4	-	1	-	1	1	1
Smokers' material	6	1	3	-	-	2	-
Ignition system, starter	5	-	4	1	-	-	-
Malicious	10	-	5	-	5	-	-
Children with fire	3	-	2	-	-	-	1
Battery	1	-	1	-	-	-	-
Unknown	34	-	12	4	11	1	6

TABLE 14

Fire damage by source of ignition, car fire sample 1971

Source of ignition		Fire damage						
	TOTAL	Minor damage	original damaged	compartment-: severely damaged or destroyed	More than one compartment damaged or destroyed	exterior damaged	Whole or most of car damaged or destroyed	Unknown
TOTAL	200	73	44	24	15	2	40	2
Wire and cable	79	42	16	7	5	-	9	-
Exhaust system	44	15	16	5	5	-	3	-
Crash or collision	15	5	3	1	1	-	5	-
Smokers' materials	6	3	1	-	-	1	1	-
Ignition system, starter	5	2	1	1	1	-	-	-
Malicious	10	-	2	3	-	-	5	-
Other	7	3	-	2	-	-	2	-
Unknown	34	3	5	5	3	1	15	2

TABLE 17

Age of casualties, vehicle fires, 1971-1972

Age Group	Deaths		Injuries	
	number	percentage	number	percentage
TOTAL	127	100.0	403	100.0
0 - 4	2	1.6	6	1.5
5 - 9	3	2.4	13	3.2
10 - 14	2	1.6	10	2.5
15 - 19	20	15.7	52	12.9
20 - 24	16	12.6	73	18.1
25 - 29	17	13.4	55	13.6
30 - 34	10	7.9	37	9.2
35 - 39	13	10.2	36	8.9
40 - 44	10	7.9	29	7.2
45 - 49	2	1.6	23	5.7
50 - 54	10	7.9	18	4.5
55 - 59	6	4.7	10	2.5
60 - 64	2	1.6	11	2.7
65 - 74	7	5.5	5	1.2
75 and over	-	-	-	-
Unknown	7	5.5	25	6.2

TABLE 18

Fatality fires by source of ignition, 1971-72

Source of ignition	No. of fires	No. of deaths
TOTAL	89	127
Wire and cable	3	4
Mechanical heat & sparks	1	1
Crash or collision-subsequent fire caused by:		
electrical fault	5	11
engine fault	8	12
other & unknown	48	68
Smokers' materials	1	1
Malicious	12	18
Children with fire	2	2
Other	2	2
Unknown	7	8

TABLE 19

Number of vehicle fires with given number of deaths/injuries, 1971-1972

Number of injuries		Number of deaths						
	TOTAL	0	1	2	3	4	5	6
TOTAL	38440	38351	65	15	6	2	-	1
0	38119	38053	52	10	3	1	-	-
1	270	256	7	3	3	-	-	1
2	36	29	5	1	--	1	--	-
3	5	5	-	-	-	-	-	-
4	7	5	1	1	-	-	-	-
5	2	2	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-
7	1	1	-	-	-	-	-	-

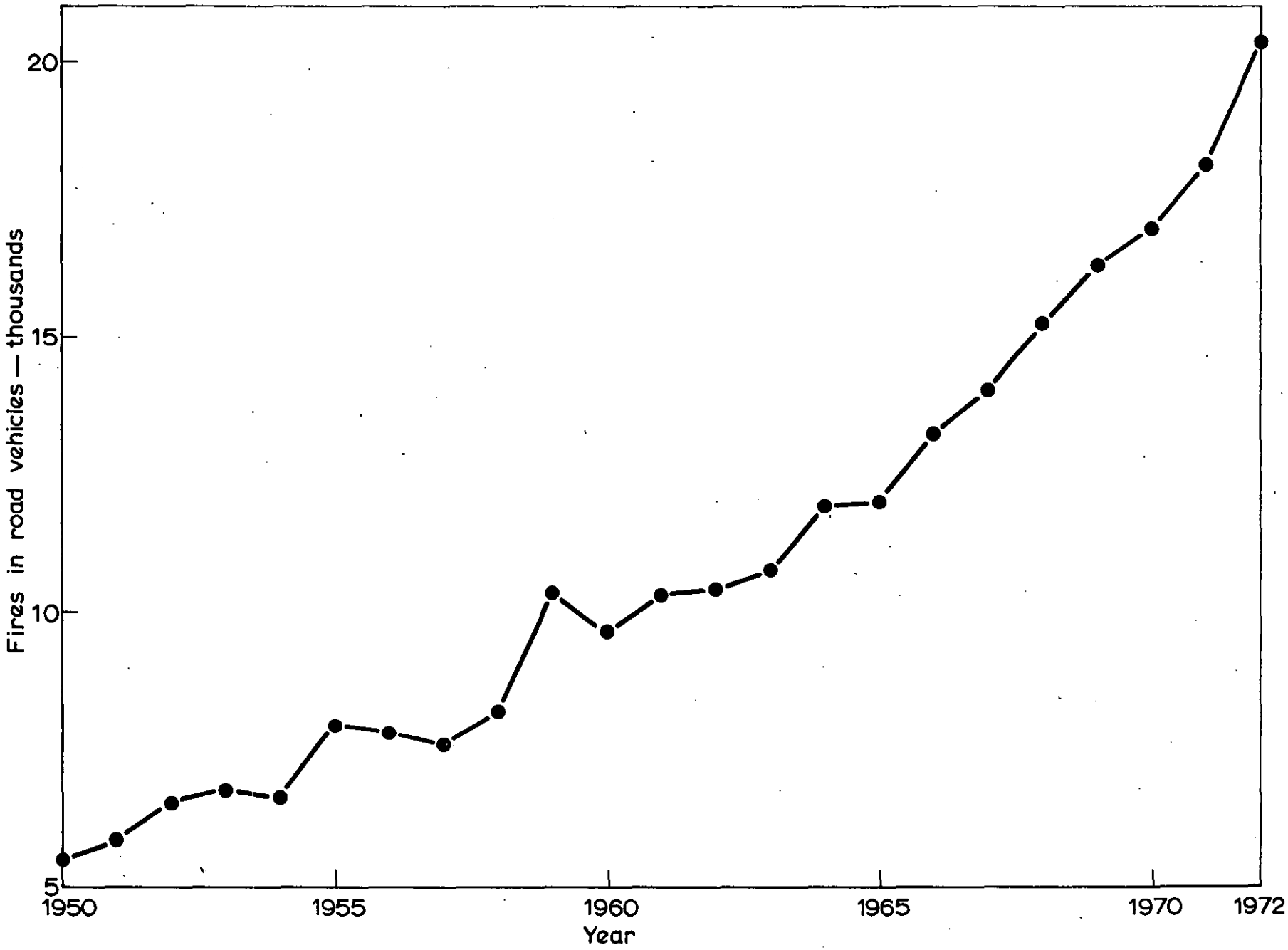

Figure 1 Annual incidence of fire in road vehicles, United Kingdom

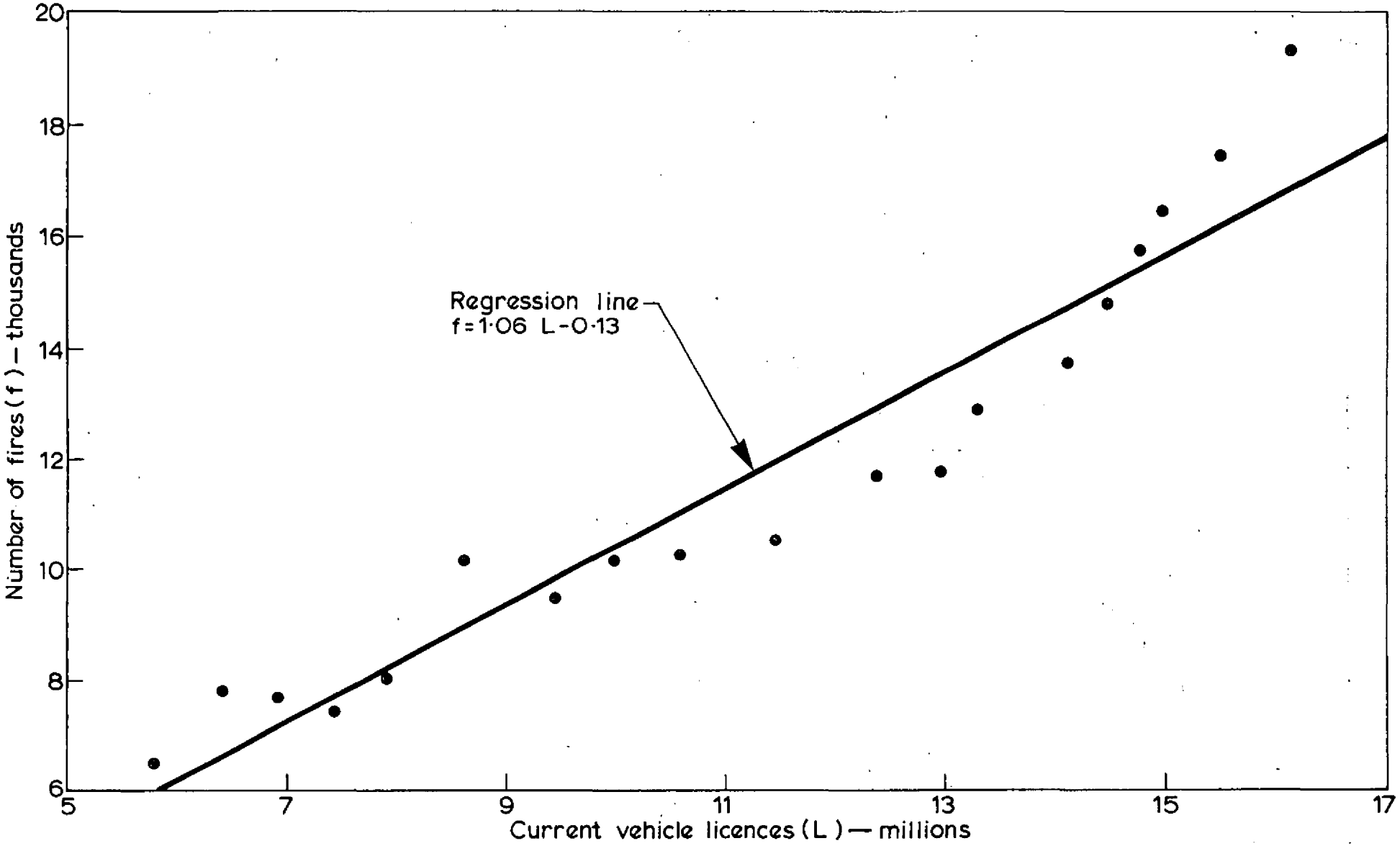

Figure 2 Fires in road vehicles and vehicle licences, Great Britain, 1954-1972

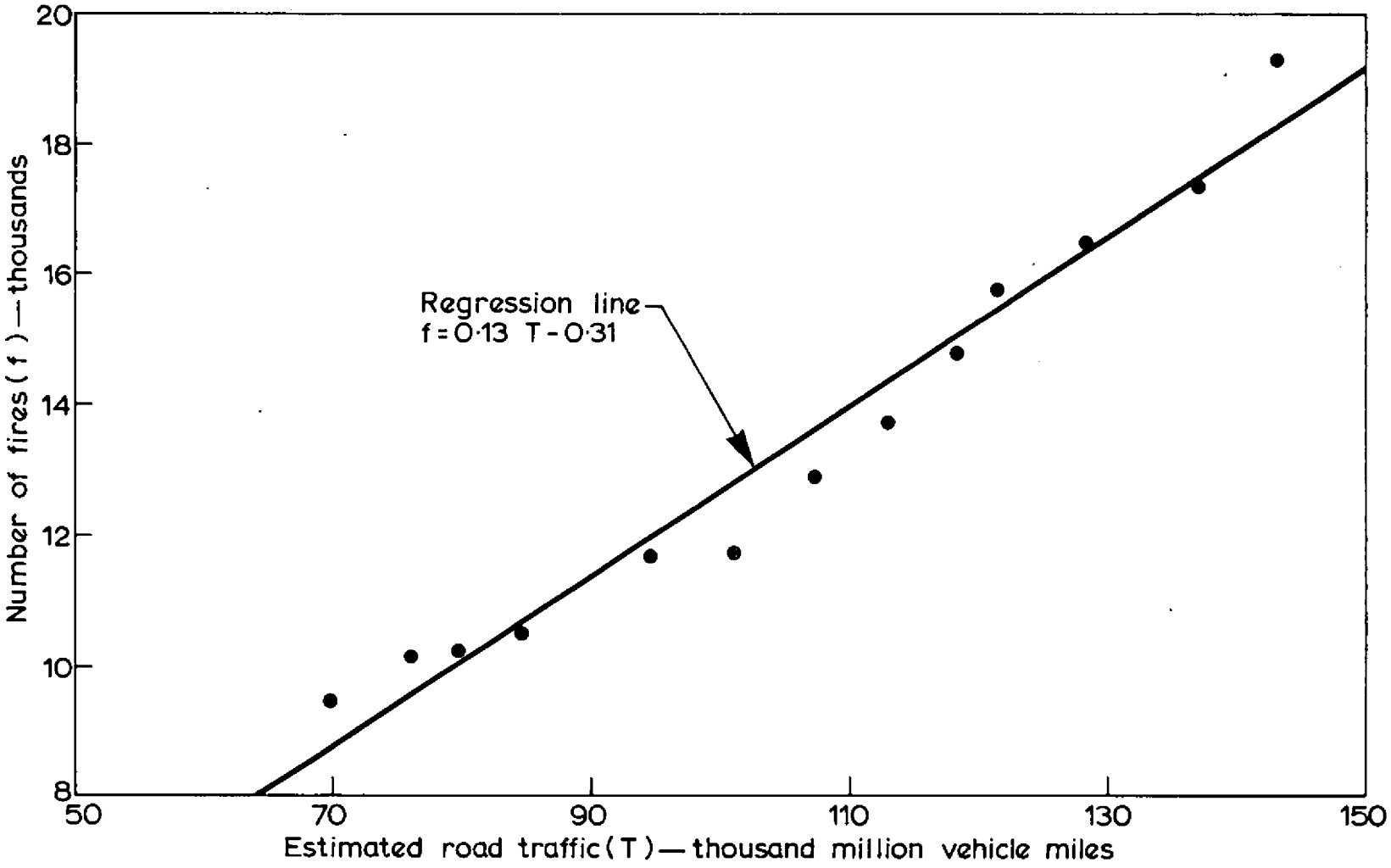

Figure 3 Fires in road vehicles and road traffic, Great Britain, 1960-1972

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