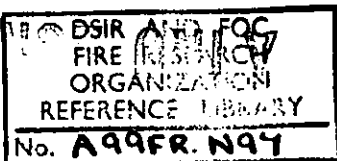


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FIRES IN SCHOOLS. AN ANALYSIS OF REPORTS OF INCIDENTS ATTENDED BY FIRE BRIGADES IN ENGLAND AND WALES DURING 1952

by

J. E. L. HINTON

Summary

An analysis has been made of the reports of fires in schools included in a random one-in-four sample of all reports of fires attended by Fire Brigades in England and Wales during 1952. There were 129 incidents in the sample, giving a total frequency of 516\*79. Thirty incidents in the sample (23.3 per cent) were due to heating and cooking apparatus, 13 incidents (10 per cent) to radiated heat and sparks from flues, and 13 incidents to blowlamps used by workmen.

In the sample of reports examined there were 33 incidents in which the cost of reinstatement was over £10. In seven incidents losses of over £1,000 were sustained and one of these resulted in the total loss of a school and contents valued at £100,000. The total loss in all the 33 incidents amounted to about £134,000.

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# FIRES IN SCHOOLS. AN ANALYSIS OF REPORTS OF INCIDENTS ATTENDED BY FIRE BRIGADES IN ENGLAND AND WALES DURING 1952

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J. E. L. Hinton

## INTRODUCTION

An analysis has been made of the reports of fires in schools included in a random one-in-four sample of reports of all fires attended by the Fire Brigades during 1952. The information collected relates to the type of school, the supposed causes of fire, the location of the outbreaks, the damage caused by the incidents and the casualties resulting from them.

## TYPES OF SCHOOL

The types of school in which the incidents occurred are shown in Table 1. The frequencies obtained from the one-in-four sample have been multiplied by four to give an estimate of the actual number of incidents (Fig.1). An estimate of the number of primary and secondary non-residential schools (local authority) has been obtained from the Ministry of Education and the rate of incidence in these was found to be about 130 fires per 10,000 schools at risk per year.

## CAUSE OF FIRE AND LOCATION OF OUTBREAK

An analysis of the supposed causes of fire is given in Table 2. Thirty incidents in the sample of reports examined (23.3 per cent of the total) were caused by heating and cooking apparatus, 13 incidents (10 per cent of the total) were due to radiated heat and sparks from flue pipes, and a further 13 incidents were due to the ignition of structural materials by blowlamps used by workmen.

In Table 3 the supposed causes of fire have been analysed in relation to the location of the outbreak and the nature of the materials first ignited. Fourteen incidents occurred in the kitchen, 11 of which were due to gas and electric apparatus igniting contents. Sixteen incidents occurred in classrooms and in 11 of these the contents of the room were ignited first; 2 of them were due to gas apparatus and 4 to matches and children playing with matches. There were 19 outbreaks in the roof or roof void, 7 of which were due to workmen's blowlamps and 6 to radiated heat and sparks from flues igniting constructional materials.

In the sample there were 50 incidents in which constructional materials were ignited first. Eleven of these incidents were due to blowlamps; in seven of them the roof was ignited first and in three the blowlamp ignited other wooden fittings. Fires in grates caused 5 of the incidents in which constructional materials were ignited first, and in four of these the material ignited was the timber under the hearth. Radiated heat and sparks from flues was the cause of 6 incidents in roofs, and slow combustion stoves caused 4 outbreaks in walls or wall linings.

In Table 5 the locations of the outbreaks are analysed in relation to the types of school. In primary and secondary non-residential schools, 15 incidents occurred in classrooms. In secondary schools there were 7 outbreaks in huts and pavilions, structures divorced from the main building. Ten of the incidents occurring in the roof or roof void were in secondary non-residential schools.

In all, 12.4 per cent of the total incidents in the sample occurred in classrooms, 10.9 per cent in kitchens and 14.7 per cent in roofs or roof voids.

In Table 6 an attempt has been made to relate the extent of fire and the area damaged to the location of the outbreak, 87 incidents (67.4 per cent of the total) were confined to the room of origin with less than 50 square feet of damage, 13 of these originated in the kitchens and 14 in classrooms.

## TIME OF OCCURRENCE

The distribution of fires in schools throughout the day is shown in Fig.2. Sixty-eight incidents in the sample (53 per cent) occurred between 8.30 a.m. and 4.30 p.m., that is probably during school hours.

## COST OF FIRES

It has been possible to obtain an estimate of the monetary loss involved in some of these fires (Fig.3). There were 33 fires in the sample of reports examined in which the cost of reinstatement was over £10, one of these incidents resulted in the total loss of a building and contents and this fire alone is estimated to have cost £100,000.

There were six other incidents in which the monetary loss was over £1,000 and these together were repaired at a cost of about £28,000. In all, the cost of the 33 fires in which there was damage of over £10 amounted to about £134,000. The seven incidents (5.4 per cent of the total) in which there was damage of over £1,000 accounted for about 96 per cent of the total cost. Five of the incidents in which there was over £1,000 worth of damage (3 in non-residential schools and 2 in residential schools) occurred outside normal school hours. Seven out of the 11 incidents involving £500 or more damage occurred in buildings of traditional construction.

## CASUALTIES

There were eight incidents in the one-in-four sample of reports examined in which casualties occurred, these resulted in 12 non-fatal casualties, of which 9 were Fire Brigade personnel and 2 were children. All the injuries recorded were slight.

## DISCUSSION OF RESULTS

To obtain an estimate of the actual number of incidents, the frequencies in the sample have been multiplied by four giving a figure of 516 fires in educational establishments in 1952. This figure may be subject to a sampling error. It is possible to calculate this error in terms of probability, and there is one chance in 20 that the true number of fires lies outside the limits 437 and 595.

In the sample of reports examined about one-third of the fires were extinguished before the arrival of the Fire Brigades and there were 15 late calls to Brigades. This seems to indicate that in some cases the Brigades were called because of the nature of the premises or because of routine instruction.

Although the incidence of fires in schools appears to be high in 83 per cent of the incidents the area of building damaged was less than 50 square feet. The casualty rate is low and the injuries received slight, only 2 children being involved as casualties despite the fact that over half the incidents took place in school hours.

As in the previous analyses there is no single cause to account for a large number of the incidents and the hazards are in the main those common to domestic dwellings.

TABLE I

The frequency of fires in schools estimated from a 1 in 4 sample of all reports from Fire Brigades in 1952

Type of school	No. of fires
Primary non-residential ... ..	172
Primary residential ... ..	16
Secondary non-residential ... ..	192
Secondary residential ... ..	44
Universities non-residential ... ..	8
Universities residential ... ..	12
Polytechnics ... ..	8
Further education other than above (non-residential)	20
Further education other than above (residential)...	4
Special schools ... ..	12
Homes and orphanages ... ..	16
Nursery schools ... ..	8
Other educational establishments ... ..	4
TOTAL ... ..	516

TABLE 2

The frequency of fires in schools related to the supposed cause - fires included in a 1 in 4 sample of all reports from Fire Brigades 1952

Supposed cause	No. of fires	Per cent.
Ashes, hot	3	2.3
Blowlamp	13	10.1
Electric cooker	3	2.3
fire	3	2.3
iron	1	0.8
refrigerator	3	2.3
wireless	1	0.8
lamp	1	0.8
wire and cable	4	3.1
other	2	1.6
Fire in grate	6	4.7
Flue	13	10.1
Gas cooker	3	2.3
fire	1	0.8
geyser	1	0.8
other	8	6.2
Kitchener stove	1	0.8
Lightning	1	0.8
Matches	4	3.1
Matches (children playing with)	10	7.8
Naked light	2	1.6
Oil stove	1	0.8
Slow combustion stove	12	9.3
Smoking materials	12	9.3
Miscellaneous	12	9.3
Unknown	8	6.2
TOTAL	129	100.0

TABLE 3

The location of outbreak related to the supposed cause and the materials first ignited in fires in schools;  
fires included in a 1 in 4 sample of all reports from Fire Brigades 1952

Location of outbreak	Kitchen		Canteen		Stokehole or Boilerhouse		Laboratory		Workshops		Cloakroom		Store		Classroom		Rooms undefined		Huts, Sheds, Pavilions		Roof or Roof void		Location undefined		TOTAL	
	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials
Ashes, hot ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Blowlamp ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Electric cooker ... ..	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
apparatus other than cooker ... ..	3	1	1	1	1	1	2	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	10
wire and cable ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fire in grate ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Flue ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gas cooker ... ..	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
apparatus other than cooker ... ..	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Matches ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	4
Matches, children playing with ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9
Slow combustion stove ... ..	1	1	1	1	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	7
Smoking materials ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	11
Miscellaneous ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	10
Unknown ... ..	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
TOTAL ... ..	12	2	1	1	7	2	2	2	1	1	4	1	5	2	11	5	13	11	6	4	3	16	14	6	79	50

TABLE 4

The cause and the nature of the constructional materials first ignited in fires in educational establishments - fires included in a 1 in 4 sample of all reports from Fire Brigades 1952

Material first ignited Cause	Roof	Ceiling	Walls	Floor	Timber under hearth	Timber set in chimney	Other wooden fittings	Insulation of electric wiring	Other	TOTAL
Ashes, hot ... ..	-	-	-	2	-	-	-	-	-	2
Blowlamp ... ..	7	-	1	-	-	-	3	-	-	11
Electric wire and cable	-	-	-	-	-	-	-	3	-	3
Electric other apparatus	-	-	-	-	-	-	-	1	-	1
Gas fire ... ..	-	-	-	-	-	-	1	-	-	1
Gas, other apparatus	-	-	-	-	-	-	1	-	-	1
Fire in grate ... ..	-	-	-	1	4	-	-	-	-	5
Flue ... ..	6	1	2	1	-	1	1	-	-	12
Slow combustion stove	-	-	4	-	-	1	-	-	-	5
Smoking materials ...	-	-	-	-	-	-	1	-	-	1
Matches ... ..	-	-	-	-	-	-	-	-	-	-
Matches, children playing with	-	-	1	-	-	-	-	-	-	1
Other causes ... ..	3	-	-	-	-	-	3	-	1	7
TOTAL ... ..	16	1	8	4	4	2	10	4	1	50

TABLE 5

The location of the outbreaks of fires in schools in relation to the type of school -  
fires included in a 1 in 4 sample of all reports from Fire Brigades 1952

Type of school \ Location	Kitchen	Canteen	Stokehole or Boilerhouse	Laboratory	Workshops	Cloakroom	Store	Classroom	Room undefined	Huts, sheds, pavilions	Roof or roof void	Location undefined	TOTAL
Primary non-residential ... ..	4	-	4	-	-	1	4	10	7	-	6	7	43
Primary residential ... ..	-	-	-	-	-	-	-	-	1	2	-	1	4
Secondary non-residential ... ..	4	1	2	2	1	2	3	5	6	7	10	5	48
Secondary residential ... ..	4	-	-	1	-	-	-	-	3	-	2	-	11
Universities non-residential ... ..	-	-	-	1	-	1	-	-	-	-	-	-	2
Universities residential ... ..	1	-	-	-	-	-	-	-	1	-	-	1	3
Polytechnics ... ..	-	-	1	-	-	-	-	-	1	-	-	-	2
Further education other than above (non-residential) ... ..	-	-	-	-	-	-	-	-	1	-	-	4	5
Further education other than above (residential) ... ..	-	-	-	-	-	-	-	-	-	-	-	1	1
Special schools ... ..	-	-	1	-	-	-	-	-	-	1	-	1	3
Homes and orphanages ... ..	-	-	-	-	-	-	-	1	2	-	1	-	4
Nursery schools ... ..	1	-	-	-	-	-	-	-	1	-	-	-	2
Other ... ..	-	-	-	-	-	-	-	-	1	-	-	-	1
TOTAL ... ..	14	1	9	4	1	4	7	16	24	10	19	20	129



TABLE 6

The extent of fire related to the area of damage and the location of the outbreak of fires in schools, fires included in a 1 in 4 sample of all reports from Fire Brigades 1952

LOCATION	Damage < 50 sq.ft.			Damage 50-100 sq.ft.			Damage 100-500 sq.ft.			Damage 500-1,000 sq.ft.			Damage 1,000-2,000 sq.ft.			Damage 2,000-3,000 sq.ft.			Damage 4,000-5,000 sq.ft.			Damage 75,000 sq.ft. or over			TOTAL
	Confined to room of origin	Confined to roof space	Confined to building	Confined to room of origin	Confined to roof space	Confined to building	Confined to room of origin	Confined to roof space	Confined to building	Confined to room of origin	Confined to roof space	Confined to building	Confined to room of origin	Confined to roof space	Confined to building	Confined to room of origin	Confined to roof space	Confined to building	Confined to room of origin	Confined to roof space	Confined to building	Confined to room of origin	Confined to roof space	Confined to building	
Kitchen ... ..	13	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	
Canteen ... ..	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Stokehole or boilerhouse	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	
Laboratory ... ..	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	
Workshops ... ..	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Cloakroom ... ..	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	
Store ... ..	3	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7	
Classroom ... ..	14	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	16	
Rooms undefined ...	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	
Huts, sheds, etc. ...	2	-	6	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	10	
Roof or roof void ...	-	12	-	-	2	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	19	
Location undefined ...	12	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	15	
TOTAL ...	87	12	8	4	2	3	-	1	-	-	-	-	-	2	-	-	1	-	1	-	-	2	2	125	

There were 4 incidents all confined to building of origin in which it was impossible to estimate the damage by area.

FIG. 1.

THE FREQUENCY OF FIRES IN SCHOOLS

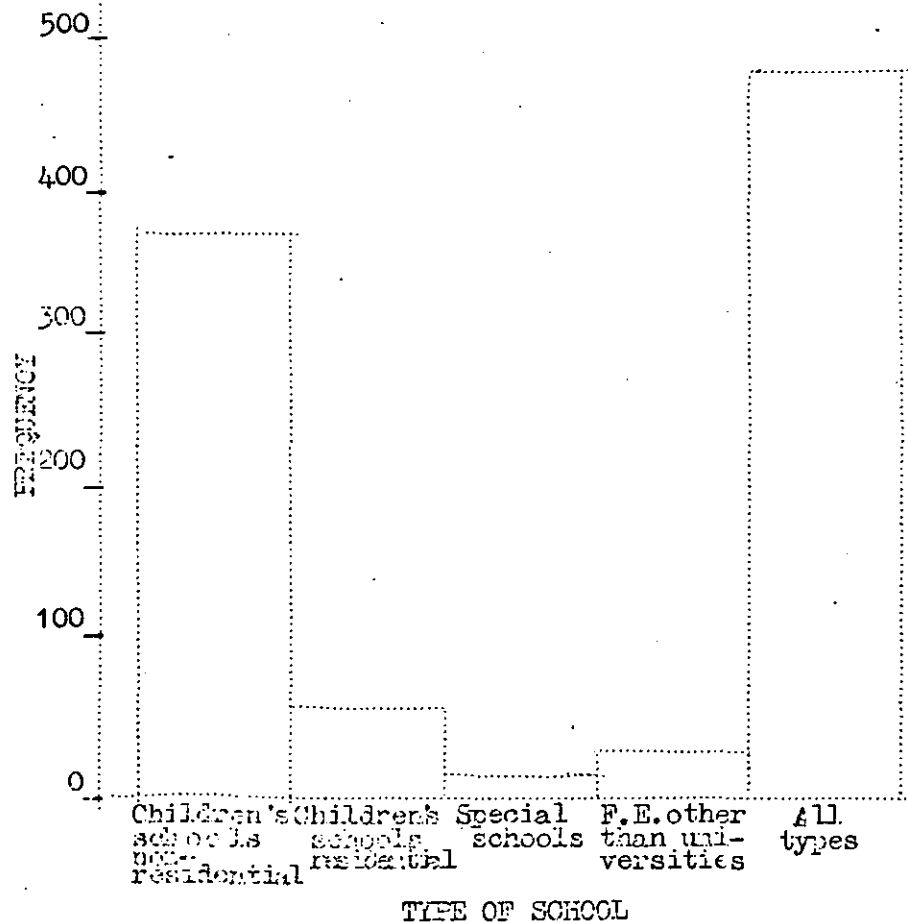


FIG. 3.

MONETARY LOSS INVOLVED IN FIRES IN SCHOOLS

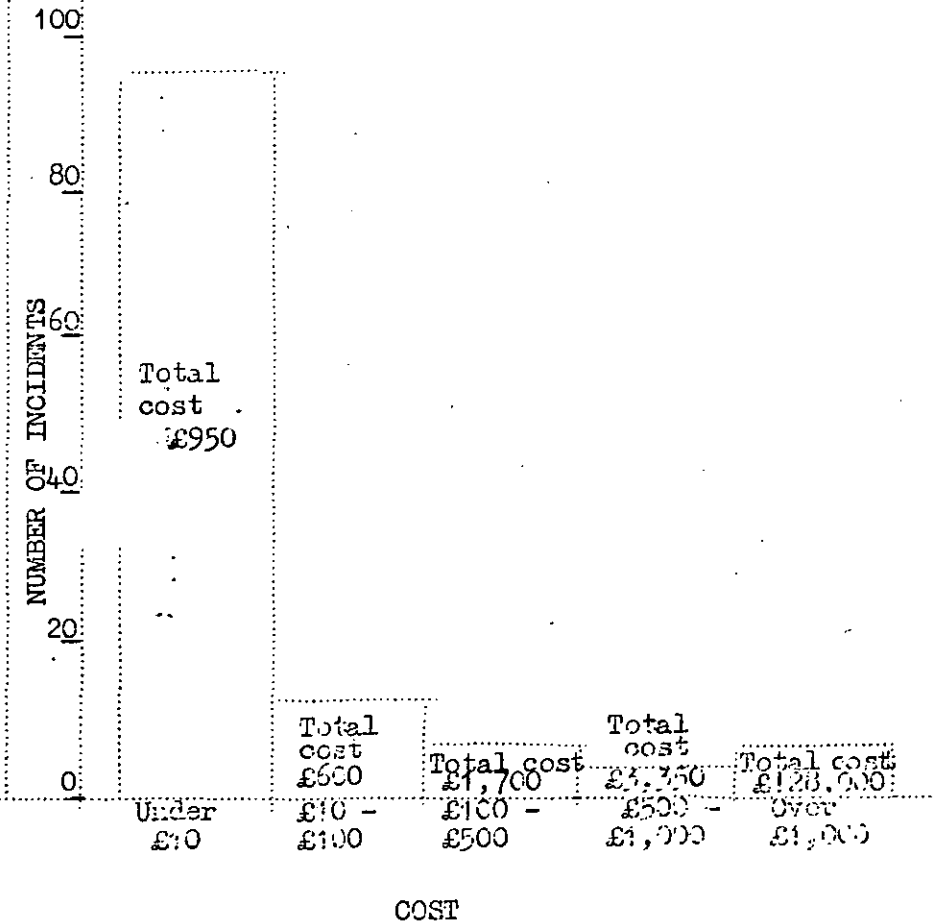


FIG. 2.

THE TIME OF OCCURRENCE OF FIRES IN SCHOOLS

