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FIRES IN SCHOOLS. AN ANALYSIS OF INCIDENTS ATTENDED BY FIRE BRIGADES IN ENGLAND AND WALES DURING 1951

by

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Summary

An analysis has been made of the reports of fires in schools in a 1 in 2 sample of reports of fires in England and Wales during 1951. The total rate of incidence in all types of schools appears to have been 148 per 10,000 schools at risk (262 fires in the sample examined). About 24 per cent of the fires were attributed to causes connected with open grates, furnaces and slow combustion stoves, 16 per cent to causes associated with the use of electricity and 10 per cent to causes connected with the use of gas. In the sample of reports there were 11 fires in which casualties occurred and these resulted in 21 casualties, none of which was fatal.

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Introduction

At the request of the Ministry of Education an analysis has been made of the reports of fires in schools included in a 1 in 2 sample of the reports of fires attended by Fire Brigades in England and Wales during 1951. The data collected relate to the types of schools, the types of construction of the buildings involved, the supposed causes of fires, the extent of the fires and the casualties resulting from them.

Types of schools

To enable a calculation to be made of rates of incidence, estimates of the numbers of schools of various types at risk have been obtained from the Ministry of Education. These have been grouped into the four broad classes described below:-

(i) Children's schools, non-residential and undefined; this class includes grant-aided nursery schools, direct grant schools, special schools (day), independent day schools and independent schools undefined.

(ii) Children's schools, residential; this class includes direct-grant schools, special schools (boarding, hospital schools and independent recognised boarding schools (inclusive of public schools).

(iii) Training colleges, polytechnics, further education (major establishments) and art establishments.

(iv) Other schools (i.e. those not falling into class (i),(ii) or (iii) or not identifiable).

It is realised that these groupings are not always completely definable and that some buildings may be used for purposes in more than one category. For example, there are about 10,700 evening institutes in England and Wales, but it is known that most of these occupy buildings which have a day-time use as primary or secondary schools, and no addition has been made to the numbers of schools at risk in respect of them. It must also be realised that the numbers at risk in each category refer to the organizations concerned and not to actual buildings they occupy.

Frequencies and rates of incidence of fire

The numbers of fires in schools of each of the four groups described are given in Table I, together with rates of incidence calculated from the estimated numbers at risk.

The lowest rate of incidence (114.5 per 10,000 schools at risk) appears to have been in children's schools, non-residential, and the highest (346.5 per 10,000 schools at risk) in children's schools, residential. Difficulties of classification result in considerable uncertainty about the accuracy of the rates calculated for the separate groups, but the total rate of incidence, 147.7 per 10,000 schools at risk, is undoubtedly very high; it is, in fact, about nine times the rate for domestic dwellings. A partial explanation of this high rate may be found in the more frequent reporting of fires in schools since it is known that, in at least some areas, all fires in local authority premises, however small, are reported to the Fire Brigade as a matter of routine. It has not been possible to assess

the effect of this factor on the rates given in this report.

In Table II the frequencies of fires in schools are given for various types of construction and numbers of storeys. Forty-three per cent of the fires occurred in single storey buildings, and 71 per cent of all of the buildings involved were of traditional construction. No comparison between the fire hazards of the various types of construction is possible from the frequencies, since numbers at risk are not known.

Table III shows the frequencies in relation to the extent of fire. In most of the incidents (69 per cent) the fire was confined to the room in which it originated, and in only 1 per cent did it spread beyond the building in which the outbreak occurred.

Cause and location of outbreaks

The supposed causes of the fires in schools are given in Table IV, from which it will be seen that no single cause accounts for any strikingly large number of fires. If, however, similar or associated causes are grouped together some general indications of the main sources of danger emerge. Fires associated with the use of gas for various purposes form 10.3 per cent of the total number; those connected with the use of electricity account for 16 per cent; and 24 per cent of the fires were, in one way or another, due to solid fuel appliances such as open grates, furnaces and slow combustion stoves. These three groups of causes were together responsible for 50.3 per cent of the outbreaks.

The locations of outbreaks due to the various causes are shown in Tables V (a), (b) and (c) for children's schools (non-residential and undefined), children's schools (residential), and training colleges and polytechnics respectively. Ten per cent of the fires in children's schools originated in the kitchens, and 17 per cent of those in training colleges and polytechnics originated in laboratories.

Casualties

The frequencies of the casualties recorded in the sample of reports examined are given in Table VI. There were no fatal casualties, but there were 11 fires in which casualties occurred, the total number of casualties in the sample being 21. The largest number of casualties in a single incident was 5.

Conclusions

The apparent rate of incidence of fires in schools during 1951 was disturbingly high, but this may be partly due to the inclusion of reports on fires of minor character which, if they had occurred elsewhere, would not normally be attended by Fire Brigades. No single cause gave rise to a large number of fires; but groups of causes associated with the use of electricity, gas and solid fuel appliances between them accounted for over half the fires. The majority of causes were those common to domestic dwellings and there is no indication of any special hazard peculiar to educational establishments.

TABLE I

The frequency of fires in schools in relation to the type of school

Analysis of a 1 in 2 sample of reports of fires attended by Fire Brigades in England and Wales during 1951

Type of school	No. of incidents in sample x 2	Estimated No. of schools at risk	No. of incidents per 10,000 schools at risk
Children's schools non-residential and undefined	380	33,157	114.5
Children's schools residential	92	1,423	646.5
Training colleges, polytechnics	46	884	520.3
Other schools	6		
Total	524	35,464	147.7

TABLE II

Analysis of a 1 in 2 sample of reports of fires attended by Fire Brigades in England and Wales during 1951

The frequency of fires in schools according to the type of construction and number of storeys involved (sample frequencies x 2)

Type of building construction	Number of storeys									
	1 Storey	2 Storeys	3 Storeys	4 Storeys	5 Storeys	6 or more Storeys	Partly single and partly multi-storey	Multi-storey with varying No. of floors	Not stated	Total
Not stated	16	6	4	-	-	-	-	6	6	38
Timber framed walls without internal columns	70	-	-	-	-	-	-	-	-	70
Timber framed walls with unprotected internal columns	-	-	-	-	-	-	-	-	-	-
Timber framed walls with protected internal columns	-	-	-	-	-	-	-	-	-	-
Load bearing walls without internal columns	116	98	92	20	2	-	28	12	4	372
Load bearing walls with unprotected internal columns	4	-	2	-	2	-	-	-	-	8
Load bearing walls with protected internal columns	2	4	4	-	2	-	-	-	-	12
Framed unloaded walls without internal columns	12	2	-	-	-	-	-	-	-	14
Framed unloaded walls with unprotected internal columns	2	-	-	-	-	-	-	-	-	2
Framed unloaded walls with protected internal columns	-	2	2	2	-	2	-	-	-	8
TOTAL	222	112	104	22	6	2	28	18	10	524

TABLE III

The frequency of fires in schools in relation to the extent of fire

Analysis of a 1 in 2 sample of reports of fires attended by Fire Brigades in England and Wales during 1951 (sample frequencies x 2)

Extent of fire		No. of fires
Confined to	Room of origin	362
	Floor of origin	32
	Building of origin	100
	Roof or roof space	22
Extended to	Adjoining buildings	2
	Adjoining buildings and other hazards	2
	Adjoining and separate buildings and other hazards	2
	Other hazards	2
		524

TABLE IV.

The frequency and supposed cause of fires reported in schools

Analysis of a 1 in 2 sample of reports of fires attended by Fire Brigades in England and Wales during 1951 (sample frequencies x 2)

Supposed cause	No.	Per cent.
Ashes, hot	4	0.8
Candle	4	0.8
Chimney, sparks from, outside building	6	1.1
Electric cooker	20	3.8
fire, heater, radiator	12	2.3
iron	2	0.4
refrigerator	6	1.1
wire and cable	16	3.0
wireless	2	0.4
other apparatus	26	4.9
Explosives, fireworks	4	0.8
Fire in grate igniting furniture and furnishings	6	1.1
structural timber under hearth	6	1.1
other materials	18	3.4
Flue	38	7.3
Boiler (coal or coke)	22	4.2
Gas (coal) burner, jet, ring	14	2.7
cooker	24	4.6
fire, heater, radiator	6	1.1
other apparatus	10	1.9
Incendiarism	2	0.4
Incubator brooder (all fuels)	6	1.1
Matches	16	3.0
Matches, children playing with	22	4.2
Metal, hot	2	0.4
Oil blowlamp	42	8.0
engine (including petrol)	4	0.8
lamp, stove	2	0.4
Oxyacetylene cutting and welding apparatus	4	0.8
Rubbish burning	2	0.4
Slow combustion stove igniting structural woodwork	14	2.7
other materials	24	4.6
Smokers materials	20	3.8
Spontaneous combustion	8	1.5
Taper, lighted paper or sticks	2	0.4
Miscellaneous and undefined	40	7.6
Unknown	68	12.9
TOTAL	524	100.0

TABLE Va

Cause of fire in relation to sub-occupancy and material first ignited

Children's schools non-residential and undefined (frequencies in sample x 2)

Location of fire	Kitchen Cookhouse Dom.Sci.Room		Canteen		Boiler house, Stokehole		Cloakroom		Store		Laboratory		Fuel stores		Rest room		Other		Location unstated		TOTAL
Material first ignited / Cause of fire	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	
Electric cooker	-	10	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	20
Electric wire and cable	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	14
Electric other apparatus	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	2	2	6	8	22
Gas cooker	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	18
Gas ring	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	4	8
Gas other apparatus	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	6	6	16
Slow combustion stove	-	-	-	-	-	2	-	-	4	-	-	-	-	2	-	-	-	-	8	18	34
Boiler (coal or coke)	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	8	2	14
Smokers materials	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	14
Matches	-	-	-	-	-	2	-	6	-	-	-	-	-	-	-	-	-	2	2	14	24
Fire in grate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	10	8	20
Flue	-	2	-	-	-	-	2	-	4	-	-	-	-	-	-	-	-	-	16	6	30
Blowlamp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	14	34
Miscellaneous cause	2	8	-	4	-	-	-	-	-	2	2	6	-	2	-	2	-	6	14	16	64
Unknown cause	-		2		-		2		8		-		-		2		6		28		48
TOTAL	40		12		10		14		22		10		4		4		18		246		380

TABLE Vb

Cause of fire in relation to sub-occupancy and material first ignited

Children's schools residential (frequencies in sample x 2)

Location of fire	Kitchen Cookhouse Domestic Science Room		Boiler house, Stokehole		Store		Laboratory		Other		Location unstated		TOTAL
Material first ignited / Cause of fire	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	
Electric cooker	-	-	-	-	-	-	-	-	-	-	-	-	-
Electric wire and cable	-	-	-	-	-	-	-	-	-	-	-	-	-
Electric other apparatus	2	-	-	-	-	-	-	-	-	-	2	16	20
Gas cooker	-	4	-	-	-	-	-	-	-	-	-	-	4
Gas ring	-	2	-	-	-	-	-	-	-	-	-	-	2
Gas other apparatus	-	2	-	-	-	-	-	-	-	-	-	-	2
Slow combustion stove	-	-	-	-	-	-	-	-	-	-	2	-	2
Boiler (coal or coke)	-	-	-	2	-	-	-	-	-	-	-	-	2
Smokers materials	-	-	-	-	-	-	-	-	-	-	-	2	2
Matches	-	-	-	-	-	4	-	-	-	-	-	6	10
Fire in grate	-	-	-	-	-	-	-	-	-	-	6	2	8
Flue	2	-	2	-	-	-	-	-	-	-	-	-	4
Blowlamp	-	-	-	-	-	-	-	-	-	-	4	-	4
Miscellaneous cause	-	-	-	2	-	-	-	2	-	4	2	10	20
Unknown cause	-		-		-		-		-		12		12
TOTAL	12		6		4		2		4		64		92

TABLE Vc

Cause of fire in relation to sub-occupancy and material first ignited

Training colleges and Polytechnics (frequencies in sample x 2)

Location of fire	Kitchens Cookhouse Domestic Science Room		Boiler house, Stokehole		Laboratory		Other		Location unstated		TOTAL
Material first ignited / Source of ignition	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	Constr. Materials	Contents	
Electric cooker	-	-	-	-	-	-	-	-	-	-	-
Electric wire and cable	-	-	-	-	-	-	-	-	-	2	2
Electric other apparatus	-	-	-	-	2	-	-	-	2	2	6
Gas cooker	-	-	-	-	-	-	-	-	-	-	-
Gas ring	-	-	-	-	-	-	-	-	-	-	-
Gas other apparatus	-	-	-	-	-	2	-	-	-	-	2
Boiler (coal or coke)	-	-	-	2	2	-	-	-	-	-	4
Smokers materials	-	-	-	-	-	-	-	-	-	4	4
Matches	-	-	-	-	-	-	-	-	-	4	4
Fire in grate	-	-	-	-	-	-	-	-	2	-	2
Flue	-	-	-	-	-	-	2	-	2	-	4
Blowlamp	-	-	-	-	-	-	-	-	4	-	4
Miscellaneous cause	-	-	-	-	-	-	-	4	-	2	6
Unknown cause	-		-		2		-		6		8
TOTAL	-		2		8		6		30		46

TABLE VI

Frequencies of casualties occurring in fires in schools.

Analysis of a 1 in 2 sample of reports of fires attended by Fire Brigades in England and Wales in 1951.

No. of non-fatal casualties per fire (x)	No. of reports of fires with x casualties	No. of non-fatal casualties
1	5	5
2	4	8
3	1	3
4	0	0
5	1	5
Total	11	21

There were no fatal casualties mentioned in the sample of reports examined.