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**Fire Research Note
No 981**

THE RISK OF DYING BY FIRE

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August, 1973.

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SUMMARY

The fire death statistics for Great Britain have been examined to estimate the risk to the individual. It is found that region and sex slightly affected the risk but that age is a more important factor. It is shown that fire deaths form a significant proportion of fatal accidents to the young.

KEY WORDS : Fire statistics, fatalities.

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INTRODUCTION

The object of this note is to provide quantitative estimates of the risk of death by fire, and to examine some of the factors which affect the magnitude of the risk. It is well known (for example see reference 1) that the young and old form a significant proportion of fire fatalities but, in deciding what measures should be taken to reduce this risk, it is necessary to know the magnitude of the risk and the way in which it varies with age. It is also relevant to question whether the risk varies with sex, or whether there is any variation from one part of the country to another.

The measure of risk which will be adopted here is the fire fatality rate, which is the number of deaths per unit exposed time, and takes into account the number of deaths, the size of the population at risk and the number of hours for which it is exposed. Of course, in considering the population of an area, the exposed time is 24 hours per day and the fire fatality rate is proportional to the annual probability of dying. However, if the risks derived in this note are to be compared with other risks to the individual arising from activities, which may only occupy a small fraction of their time, then the amount of time exposed to the hazard is relevant. For example, the fatality rate has been used as a quantitative method of hazard analysis in the chemical industry², and has also been used for the purposes of comparing the relative risk of hotels and dwellings³.

ANALYSIS

The numbers of deaths used in this report are those supplied by the Registrar Generals of England and Wales⁴ and of Scotland⁵ for the year 1969; the ICD group E89 (accidents with fire and flames) being the relevant part. These figures are given in Table 1. The population figures are taken from the same sources and represent the estimated 'home' population, i.e., the population

actually in the region considered.

Figure 1 illustrates the variation of the fire fatality rate (FFR) with age for Great Britain and shows a U-shaped curve. The average value of the FFR is 0.19 deaths/person/ 10^8 exposed hours but there is considerable variation with age. Below the age of 5 years, the fatality rate is double the average and above 84 years old, ten times the average, while, for the ages 10 to 44 years, the rate is less than one-third of the mean. While people over 69 years old comprise only 8 per cent of the population of Great Britain, they account for 43 per cent of the fire deaths. Both the very young and the elderly can be considered as less able to take 'avoiding action' in an emergency and so some other explanation is required to account for the difference in risk. The most probable one seems to be that a higher proportion of the elderly are alone in their house or room and so cannot be helped by a more active person. Old people are also more fragile than the young (except, perhaps, the very youngest) and may die from conditions which would only cause illness or injury in the young.

In Fig. 2, the risk is shown for both different ages and different regions of the country. The average FFR for Scotland (0.29 deaths/person/ 10^8 exposed hours) is higher than that for England and Wales (0.17 deaths/person/ 10^8 exposed hours) and this difference also applies to almost every age group. The most obvious explanation for such a systematic difference of data from two separate sources^{4,5} is a difference in the method of classification, but this seems unlikely from two closely-linked organisations using an international classification. Further, the fire deaths reported by the fire brigades⁶ show a similar effect, which indicates that any error must be a gross one in the population figures. A more likely explanation is that there exists a social difference (or differences) between the two regions. The difference in housing standards may be such a factor, or longer periods might be spent in the more hazardous occupancies. Another possible difference is climatic, with Scotland being, in general, rather colder and wetter than England and Wales, and probably using more artificial heating. Certainly, the number of fires per head is higher in Scotland (2.23 per thousand) than in England and Wales (1.57 per thousand) and so also is the proportion of fires leading to fatal casualties (6.6 : 5.8 per thousand fires respectively).

The data are further divided by sex as shown in Fig. 3. This gives rather small figures (especially for Scotland) and only the larger variations will be statistically significant. For England and Wales, the pattern of risk is similar for both sexes until the age of 70 years. Between 70 and 80 years old, females are more at risk than males but, over this age, the risk is greater for males.

The average risk for females is slightly higher than for males (Table 1). In Scotland, the pattern is less clear, with the average risk for males and females being practically identical. The only clear-cut differences are the greatly increased FFR for males of less than 5 years old (0.86 deaths/person/ 10^8 exposed hours) as compared to females (0.25 deaths/person/ 10^8 exposed hours), and the very high risk of the oldest men (3.43 deaths/person/ 10^8 exposed hours). No obvious explanation exists for these effects. Although the sub-divisions of the data have shown some interesting effects, the differences between the regions and the sexes are small compared to the age effect.

Although fire deaths have usually been studied on their own, their importance on a national scale can only be determined by comparing them with other causes of death. Fire deaths account for about 5 per cent of all accidental deaths in Great Britain and their distribution by age as a proportion of all accidental deaths is shown in Fig. 4. This shows that fire is relatively more important in the deaths of children between 1 and 4 years old, the proportions being twice those of any other age group and representing about 15 per cent of all accidental deaths.

In Fig. 5, fire deaths are compared with death from all causes for the various age groups. On average, fire deaths constitute only about 0.1 per cent of all deaths but again the proportion for children is much higher. For the ages 1 to 9 years old, the proportion is three to six times higher than any other group, peaking at 4.4 per cent for the 2 to 4 year age group.

CONCLUSIONS

1. The chance of dying by fire varies by region, age and sex, but the variation with age is predominant.
2. The risk to the elderly is more than an order of magnitude higher than that to the average individual. Below the age of 5 years, the risk is double the average.
3. The average risk in Scotland is 70 per cent higher than in England and Wales: both the number of fires per head of population and the average number of deaths per fire are higher.
4. There are real differences in risk between male and female, but these differences also vary with age and region.

5. Fire deaths account for 5 per cent of all accidental deaths in Great Britain. The fire risk to children aged 1 to 4 years old represents a significant proportion of accidental deaths at that age (15 per cent).
6. For the very young, the risk of fire death is a significant proportion of the risk of death from all causes.

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Table 1

Number of deaths in fire, 1969
(Registrar Generals' figures)

Age of victim (years)	Great Britain			England and Wales			Scotland		
	Persons	Male	Female	Persons	Male	Female	Persons	Male	Female
Under 1	31	19	12	26	15	11	5	4	1
1	36	19	17	30	14	16	6	5	1
2 - 4	77	44	33	65	35	30	12	9	3
5 - 9	34	16	18	32	15	17	2	1	1
10 - 14	9	2	7	6	1	5	3	1	2
15 - 19	9	7	2	7	5	2	2	2	0
20 - 24	12	10	2	10	8	2	2	2	0
25 - 29	19	14	5	17	13	4	2	1	1
30 - 34	16	5	11	13	4	9	3	1	2
35 - 39	15	9	6	11	6	5	4	3	1
40 - 44	18	14	4	13	10	3	5	4	1
45 - 49	31	20	11	26	19	7	5	1	4
50 - 54	39	17	22	30	14	16	9	3	6
55 - 59	39	17	22	27	11	16	12	6	6
60 - 64	54	24	30	45	19	26	9	5	4
65 - 69	59	22	37	47	16	31	12	6	6
70 - 74	98	28	70	86	25	61	12	3	9
75 - 79	107	22	85	96	19	77	11	3	8
80 - 84	94	33	61	84	30	54	10	3	7
85 and above	81	27	54	74	24	50	7	3	4
All ages	878	369	509	745	303	442	133	66	67
Mean FFR (deaths/person/ 10^8 exposed hours)	0.19	0.16	0.21	0.17	0.15	0.20	0.29	0.30	0.28

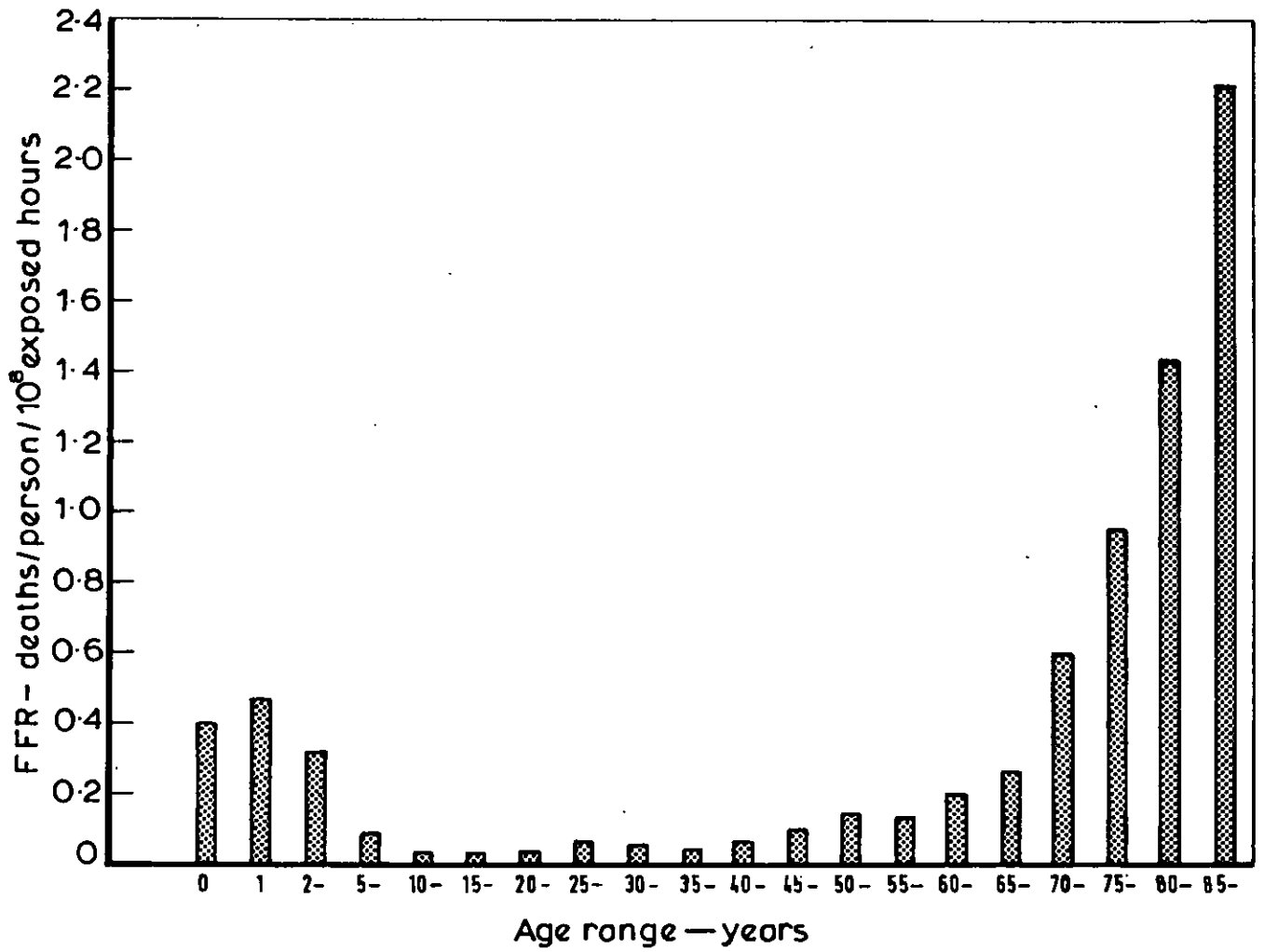


Figure 1 Fire fatality rate by age, Great Britain, 1969

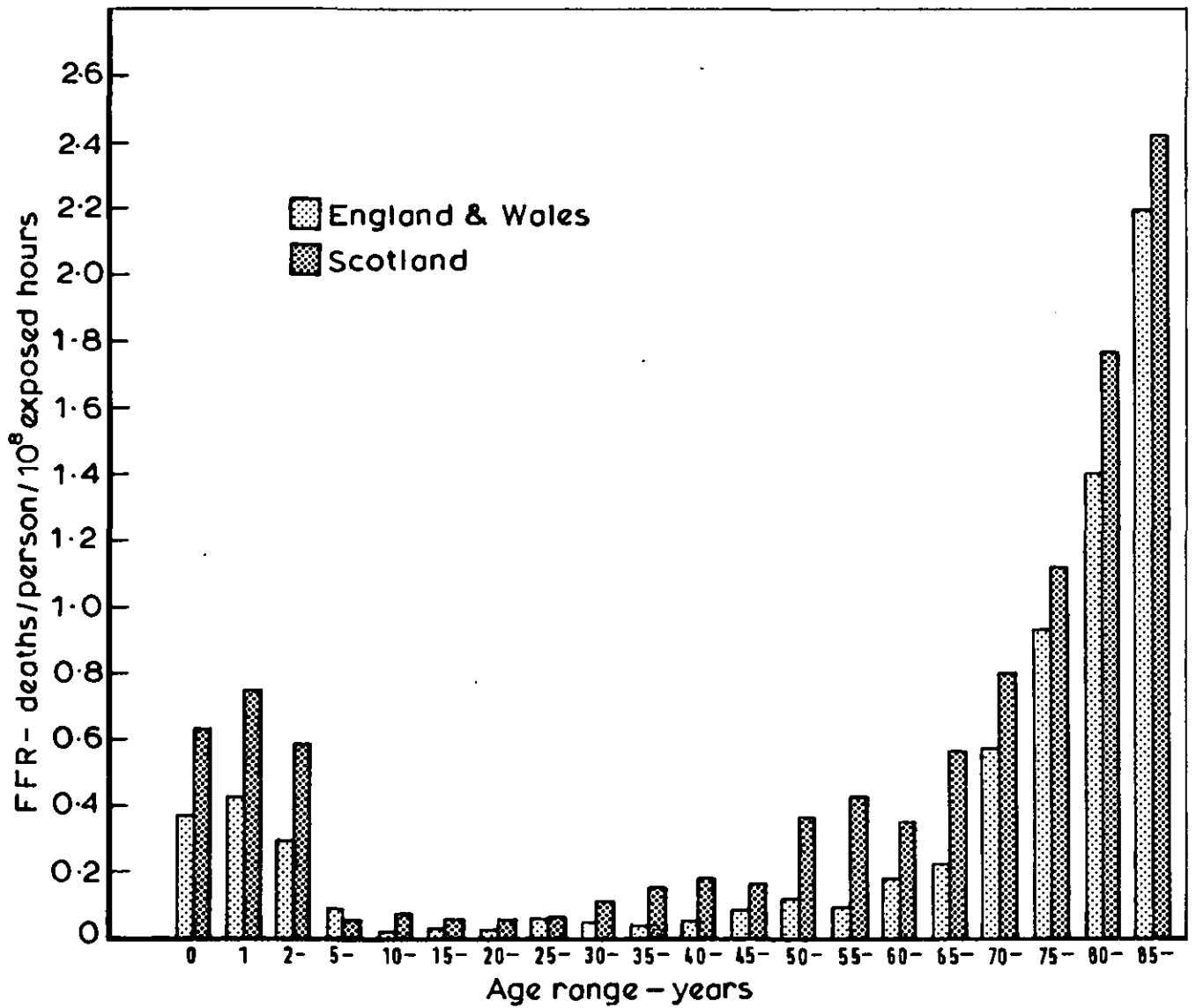


Figure 2 Fire fatality rate by age and region, 1969

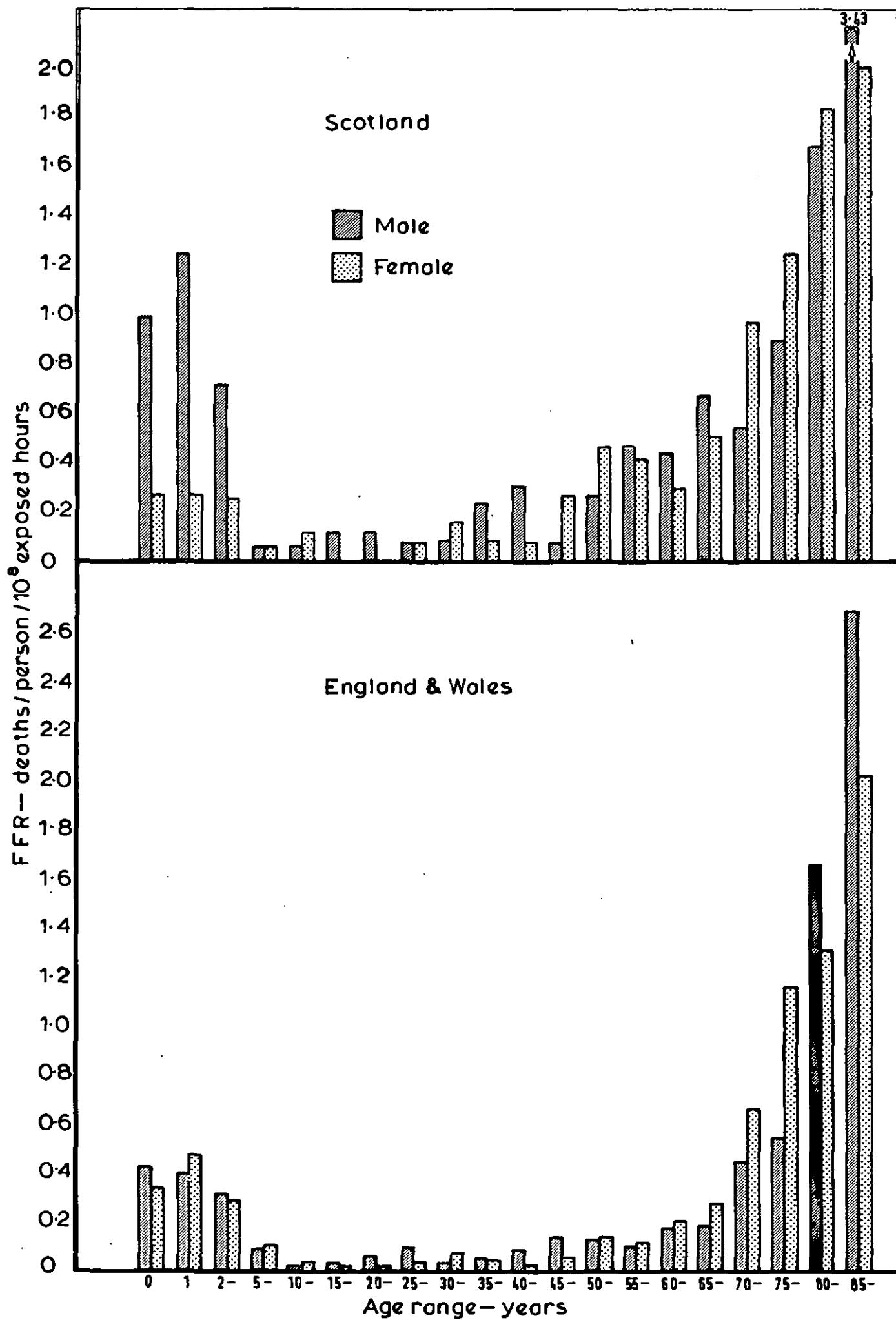


Figure 3 Fire fatality rate by age, region and sex, 1969

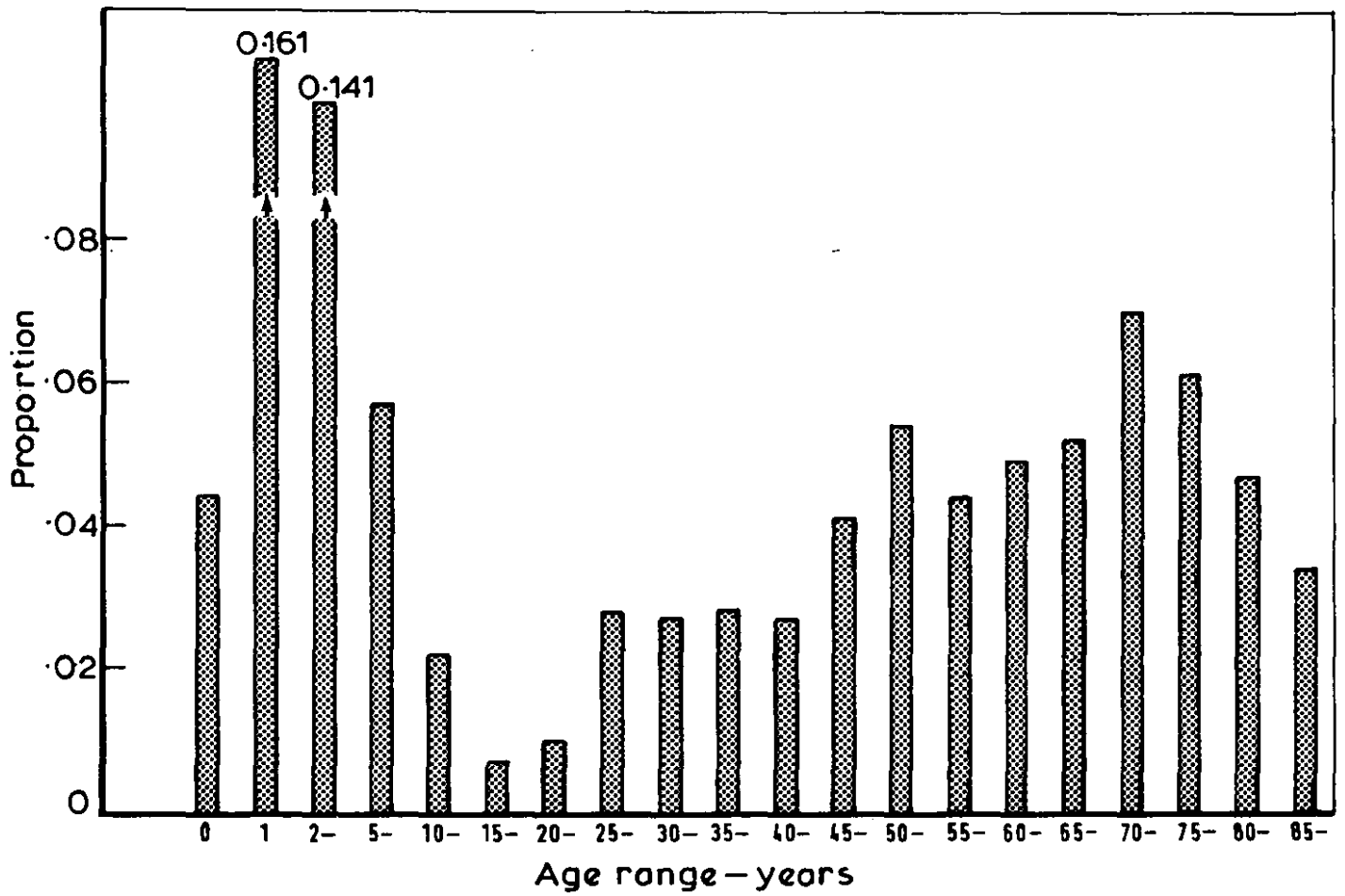


Figure 4 Fire deaths as a proportion of all accidental deaths

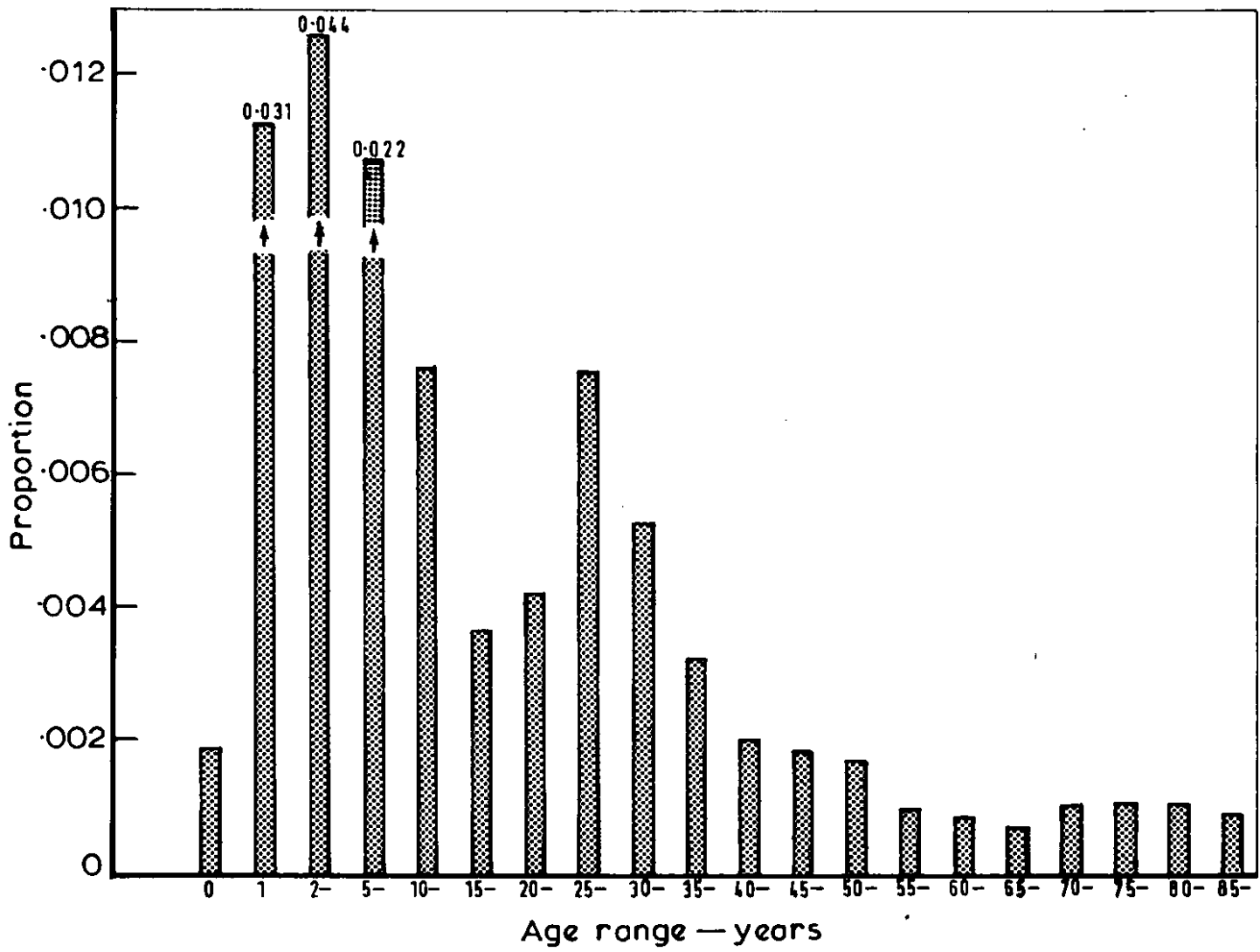


Figure 5 Fire deaths as a proportion of all deaths