

FIRE IN THE U.S. AND THE UNITED KINGDOM

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FIRE IN THE U.S. AND THE U.K., 2002

	U.S.	U.K.
Fire Incidents	1,687,500	519,400
Civilian Deaths	3,380	562
Civilian Injuries	18,425	16,595
Population (resident)	287,676,000	59,912,000
Area (square miles)	3,539,000	93,300

Note: Property loss figures are not available from the *Fire Statistics – United Kingdom* series.

Sources: *Fire Statistics – United Kingdom, 2002*, 15 April, 2004; Michael J. Karter, Jr., *Fire Loss in the United States During 2002*, NFPA, September 2003. U.S. and U.K. population and area statistics are taken from Table 1322 of the *Statistical Abstract of the United States 2003*, Washington: U.S. Bureau of the Census, 2003.

The U.S. has a population 4.8 times the size of the population of the United Kingdom (of England, Wales, Scotland, and Northern Ireland) in a country with 38 times as large an area. In 2002, the U.S. had 3.2 times as many reported fires. The U.S. had 6.0 times as many civilian deaths but only 1.1 times as many civilian injuries.

The difference in injury rates appears to be primarily due to differences in defining an injury. In 2002, 35% of U.K. civilian injuries involved only precautionary check-ups, a condition not recorded as an injury in the U.S. Another 7% involved shock, which accounts for roughly 1% of U.S. injuries and may be more liberally diagnosed (or more completely captured) in the U.K. If these two types of injuries are removed, the ratio of U.S. to U.K. civilian injuries rises to 1.9, somewhat closer to the ratio for fire incidents.

Causes of fires leading to deaths are quite similar in the two countries. In both, smoking constitutes by far the leading cause of fatal structure fires. Intentional fires rank second in the U.S. and the U.K., based on the estimated final results.

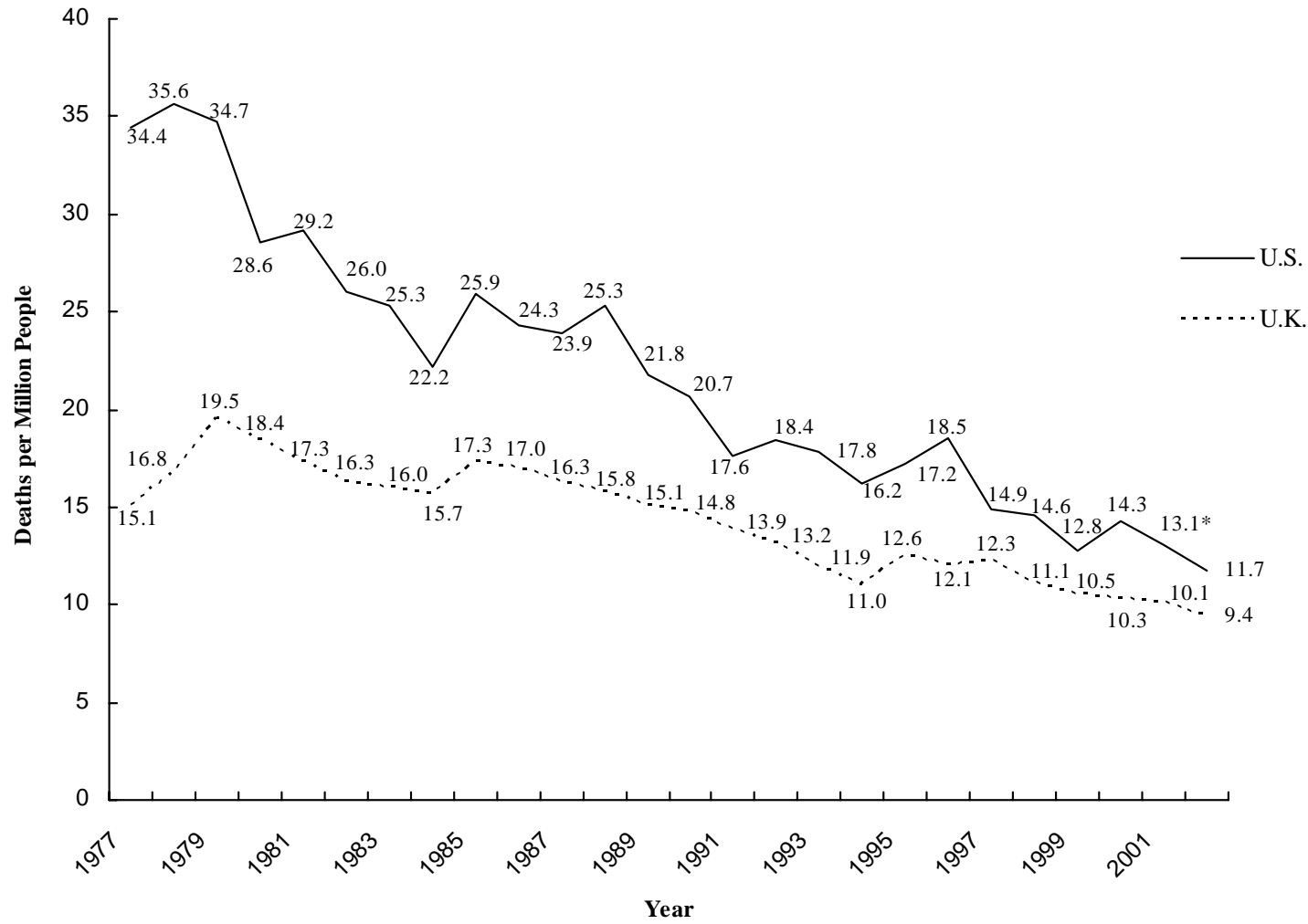
An important difference in causes of fatal fires involves cooking equipment fires. Cooking equipment ranks well ahead of heating equipment in the U.K. as cause of fatal home fires but well behind as a cause of fatal home fires in the U.S.

Both countries have begun raising the attention paid to candle fires. Both countries have noted that such fires have been increasing when most causes of fires have been decreasing.

In both countries, most heating equipment fires and associated deaths involved space heating and associated equipment (e.g., chimneys) rather than central heating and its associated equipment (e.g., hot water piping, hot air ducts).

Sources: *Fire Statistics – United Kingdom, 2002*, 15 April, 2004; Michael J. Karter, Jr., *Fire Loss in the United States During 2002*, NFPA, September 2003. U.S. and U.K. population and area statistics are taken from Table 1322 of the *Statistical Abstract of the United States 2003*, Washington: U.S. Bureau of the Census, 2003.

Civilian Fire Death Rates, U.S. and U.K.



Source: NFPA survey, U.K. annual reports.

*Excludes events of September 11; rate with them was 22.1.

Fire death rates have been declining in both the U.S. and the U.K., but the U.S. rate has generally declined faster.

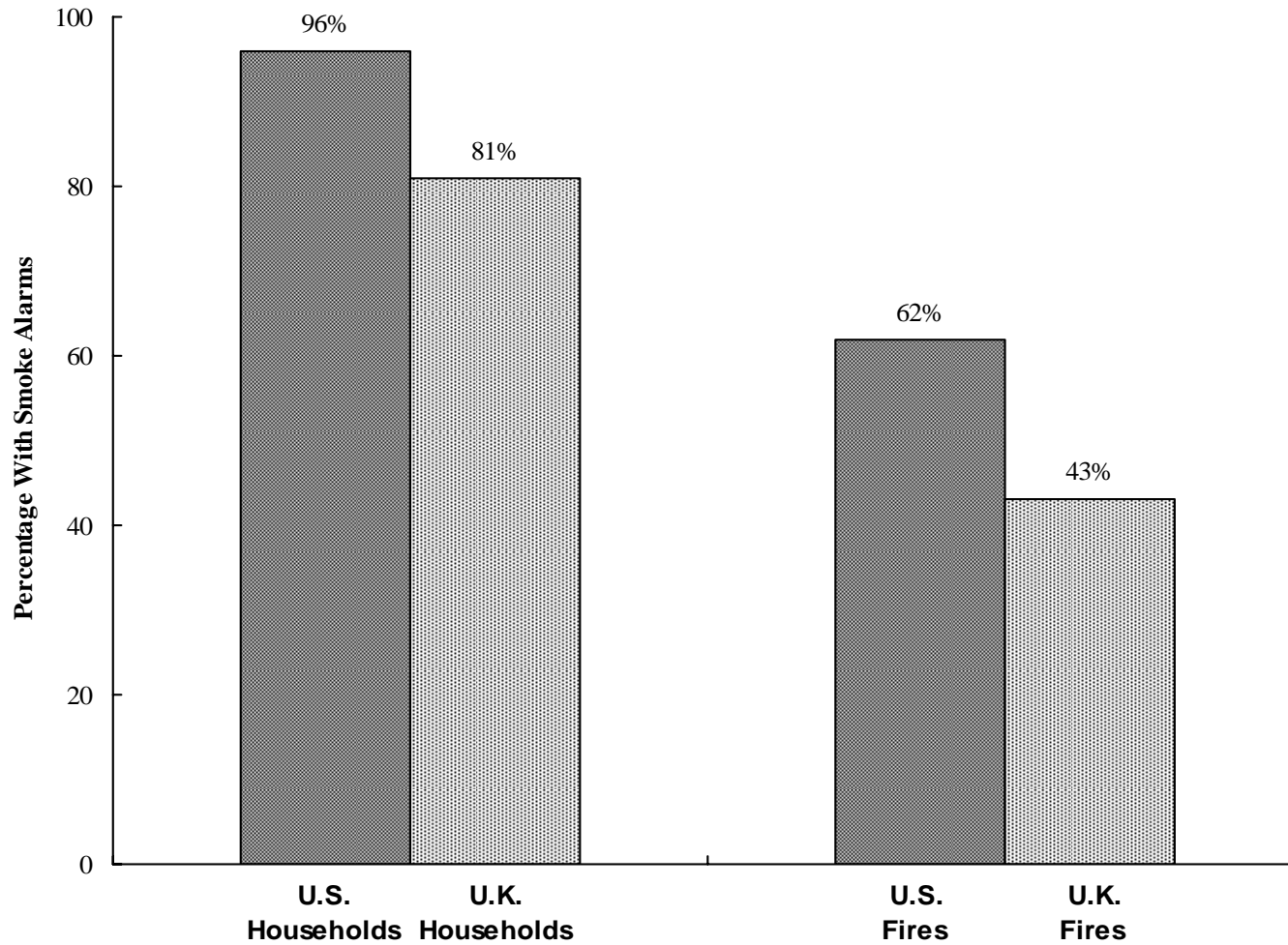
In 1977–1978, the U.S. rate was twice the rate in the U.K. From roughly 1981–1982 to 1988, the U.S. rate was about one-half higher than the U.K. rate. Since 1989, the U.S. rate has been less than one-half higher than the U.K. rate. Since 1997, the U.S. rate has been about one-fourth to one-third higher than the U.K. rate.

Both countries show their highest fire death rates, relative to population, in older age groups (at least 65 years old). In the U.S., preschool age group rates had been as high as the older-adult rates, until the mid-1990's, when the relative risk began declining. In the U.K., preschool children have not been a high-risk age group, except relative to other children.

Both countries show males with a fire death rate higher than the rate for females. In 1999-2002, male risk was higher by roughly 35-40% in the U.S. and 60–75% in the U.K.

Sources: *Fire Statistics – United Kingdom* series; *Fire Loss in the United States* series; foreign population statistics from *Statistical Abstract* series.

Home Smoke Alarm Usage, U.S. and U.K., 2002



Source: NFPA annual smoke alarm report; *Fire Statistics – United Kingdom* series.

The United Kingdom is roughly a decade and a half behind the U.S. in usage of home smoke alarms. The U.K.'s usage rate of 81% (for England and Wales only) in 2002 is roughly the level that applied to the U.S. in 1988. Since 1998, two surveys of U.K. usage have been available. The British Crime Survey has consistently showed usage levels of 76-77% but specifies a working smoke alarm in their survey. The National Community Fire Safety Centre's annual survey has consistently showed usage levels of 81-83% but did not provide a statistic in 2002. With usage stuck at the three-fourths to four-fifths level, the U.K. is falling further behind the U.S. in the usage of home smoke alarms.

Homes where people have reported fires are less likely to have smoke alarms, in both the U.K. and the U.S. In the U.K., only 43% of 2002 reported home fires showed smoke alarms present. When overall usage in the U.S. was still down at 81%, the percentage of reported home fires showing smoke alarms present was a similar 42-44%. In the U.S. 62% of 2002 reported home fires (coded directly in the new NFIRS Version 5.0 incident reporting format) showed smoke alarms present.

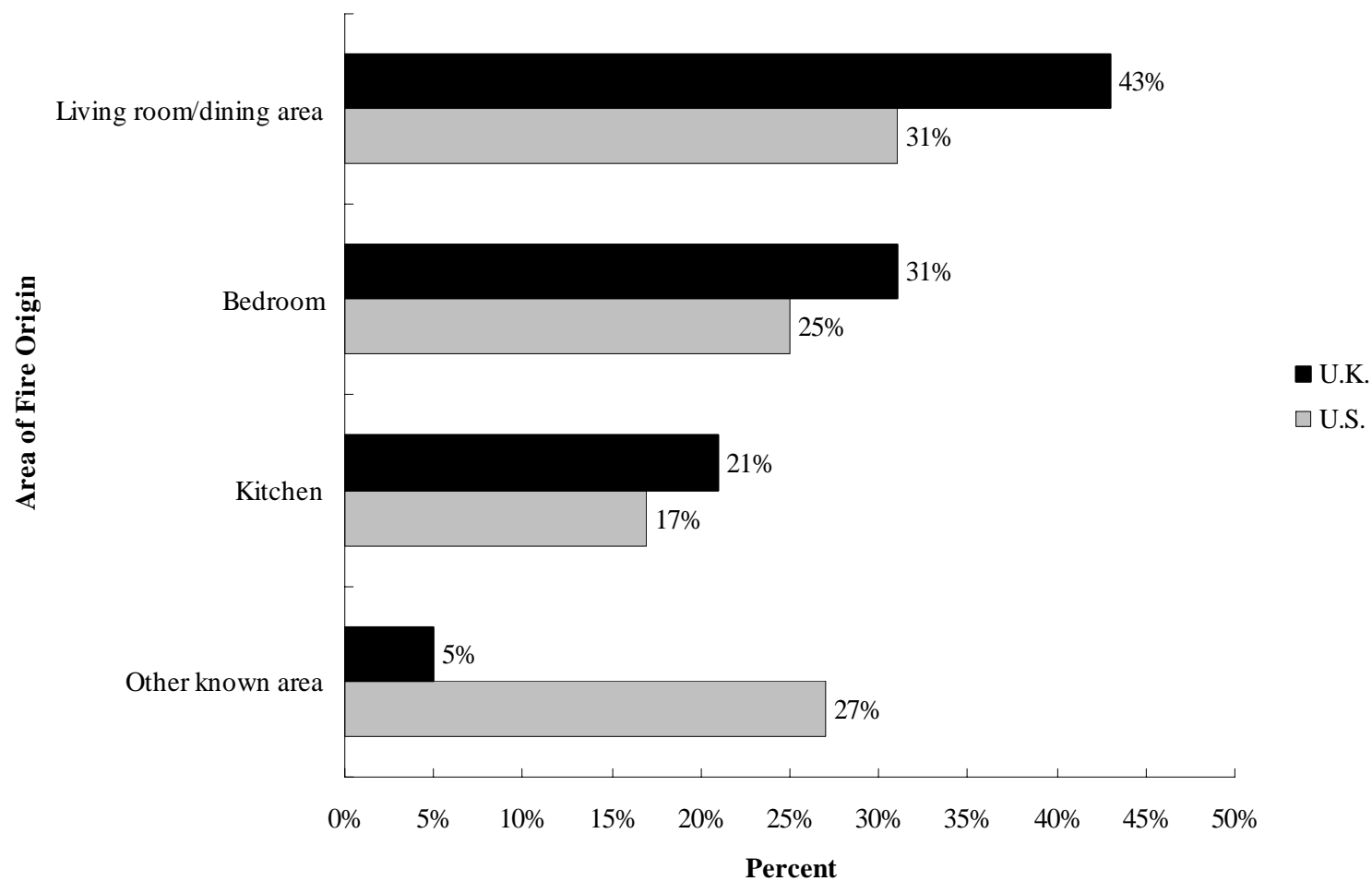
In 2002, the death rate per 100 fires for a U.S. household with smoke alarms that operated was 45% lower than the rate in homes with no smoke alarms present. This comparison excludes fires coded as too small to activate the smoke alarm but does not address whether the home has all the smoke alarms needed for code-compliance, properly located and installed. In the U.K. in 2002, the comparable reduction statistic was only 20%.

In 2002, in U.K. home fires with smoke alarms present, the smoke alarms provided the discovery and alarm in 63% of the fires, compared to 10% where alarms operated but only after fire was already discovered and 27% where the smoke alarms did not operate. This is consistent with the U.S. experience in 2002 where smoke alarms were estimated not to operate in 24% of the home fires where they are present and fire is large enough to activate them. Also in the U.K. in 2002, discovery was estimated to have occurred less than 5 minutes after ignition for 66% of home fires discovered by smoke alarms, compared to only 52% of home fires discovered by other means.

When home smoke alarms do not operate in the U.S. or the U.K. the reason in the majority of cases is dead or missing batteries. In the U.K. in 2002, smoke alarms failed to operate in 43% of fires where the units were battery-powered but only 12% of fires where the units were connected to main power. In 2002, the majority of U.K. smoke alarms (53%) reported in home fires were connected to main power. This is far different from the U.S., where in 2002 only one-third (33%) of home smoke alarms reported in fires and indicating whether main power was connected were plugged or hard-wired into main power.

Sources: *Fire Statistics – United Kingdom series; U.S. Experience with Smoke Alarms series.*

Unintentional Home Fire Deaths by Area of Origin U.K. and U.S., 1999-2002



Source: NFIRS, NFPA survey, U.K. annual government reports.

Note: Fires with unknown area of origin proportionally allocated.

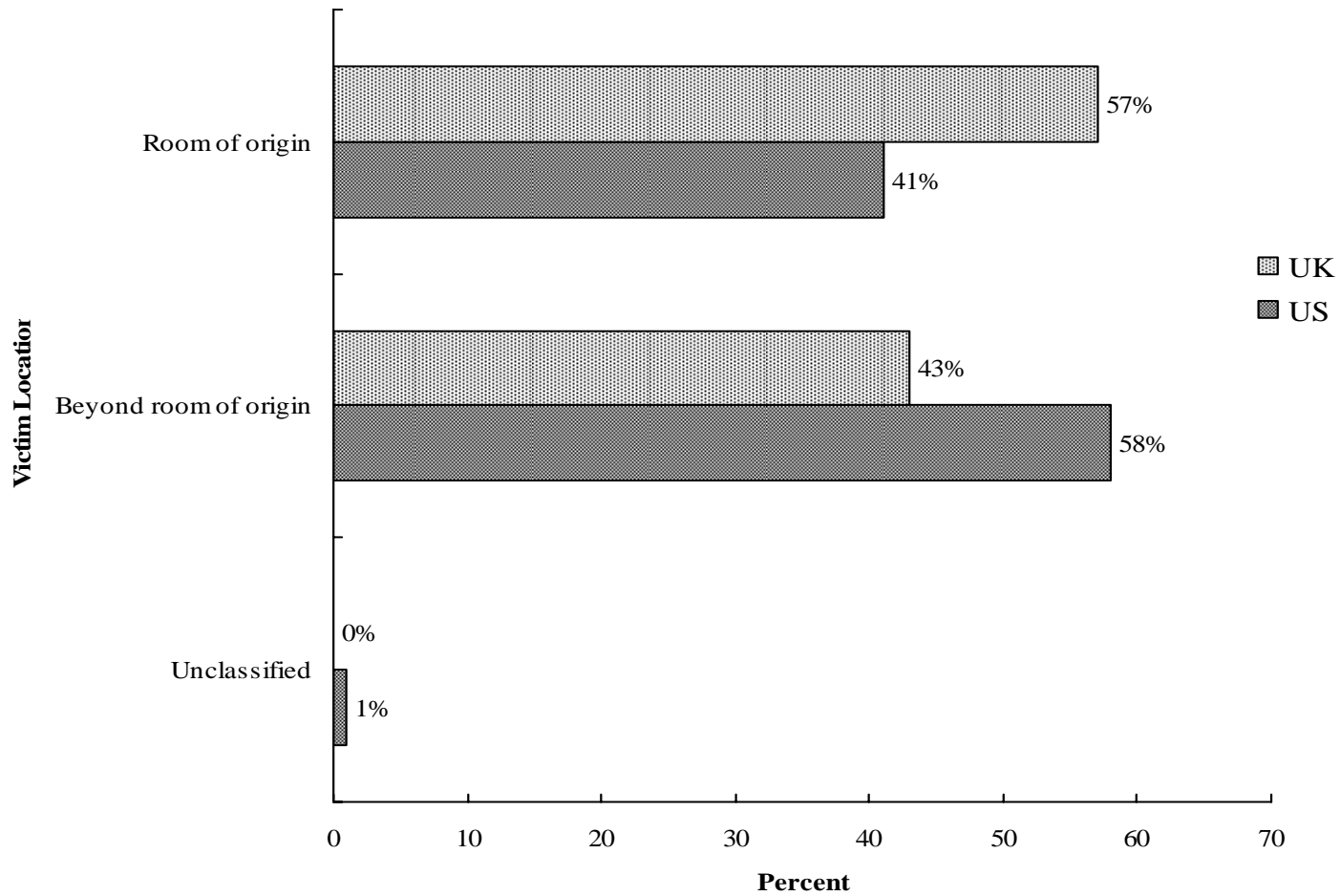
Unintentional home fatal fires are dominated by the same three room groups in the U.K. and the U.S., but the degree of domination is much greater in the U.K. Rooms other than the living room (includes family room and den) and dining room; bedroom; and kitchen accounted for only 5% of 1999-2002 U.K. unintentional home fire deaths but for 27% of 1999-2002 U.S. unintentional home fire deaths.

The U.S. has slightly larger shares of unintentional fatal home fires starting in bathrooms, storage areas, and means of egress. What is left to explain most of the difference is mostly concealed spaces, structural areas, and external areas. It is possible that concealed spaces in the U.K. are typically coded with the primary room they abut.

If the “other” rooms are set aside, the relative importance of the three primary room groups vs. each other is very similar in the two countries.

Sources: *Fire Statistics – United Kingdom* series, NFIRS, NFPA survey.

Fatal Unintentional Home Fire Victim Locations, U.K. and U.S., 1995-1998



Source: NFIRS, NFPA survey, U.K. annual government reports.
After 1998, U.S. data indicates only confined (or not) to area of origin, which U.K. data does not have.

Note: Victims with unknown location proportionally allocated.

One striking difference between the U.K. and the U.S. is the proximity of fatal victims to the starting point of the fires that killed them. In the U.K., a clear majority of fatal victims are in the room of origin. In the U.S., a clear majority of victims are outside the room of origin. The ratio is nearly 3:2 in room in the U.K. and nearly 3:2 out of room in the U.S.

This pattern helps to shed light on other differences and other patterns. In the U.S., deaths due to smoke inhalation are estimated to outnumber deaths due to burns by roughly two-to-one, according to analysis of death certificates, or by roughly four-to-one according to analysis of fire department records, which are closer to the U.K. data base. In the U.K., deaths due only to smoke inhalation were only 56% higher than deaths due only to burns in 1999-2002. This lower difference is in the direction one might expect, given that U.K. victims tend to be closer to the fire than U.S. victims.

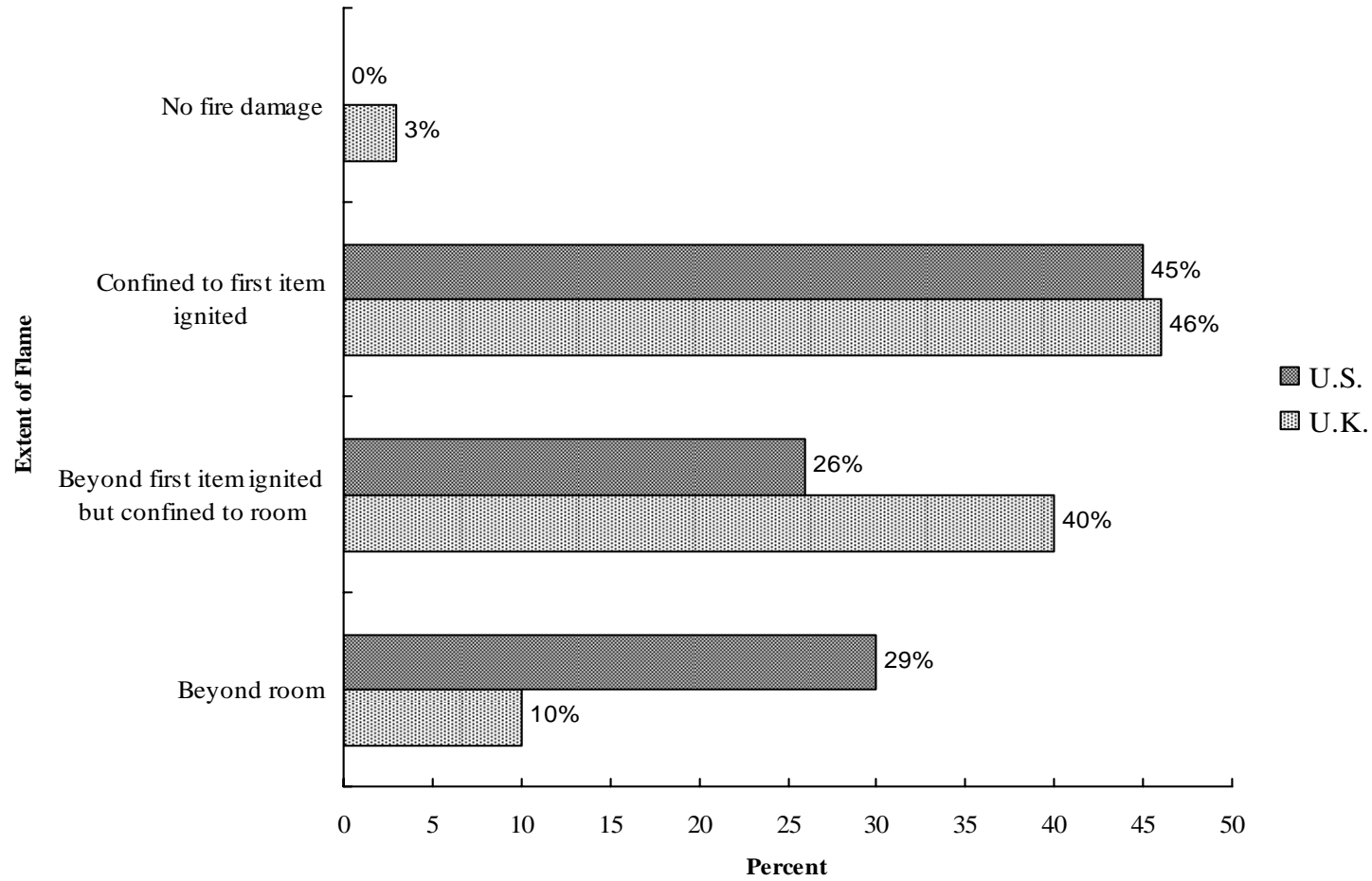
Overall, there is a 16 percentage point difference (57% vs. 41%) between the two countries in the 1995-1998 percent of fatal home fire victims located in the room of fire origin. A natural follow-up question is whether this overall difference is due more to differences in where fires start or in the ease with which fires can grow large enough to reach remotely located occupants. The previous section indicated that the relative importance of the principal locations was slight, but the U.S. has a much larger share of unintentional home fatal fires attributed to areas and spaces that are treated in the U.K. as “other” or are grouped with primary areas.

Another possibility is a difference in the definition of “room of origin.” As noted, the U.K. may group concealed space fires with adjacent rooms, which would mean a fire spreading out of a concealed space would not be as likely to be coded as spreading beyond the room of origin. There is also the possibility that home layouts where the kitchen, dining room, and living room are all one room are handled differently.

Looking at the four area groups, it may be seen that the percentage point difference between the two countries in percent of fatal home fire victims located in the room of fire origin is large for living rooms and dining rooms (17 percentage points, for 58% vs. 41%) but not so much for bedrooms (8 percentage points, for 70% vs. 62%), kitchens (6 percentage points, for 41% vs. 35%), or other rooms and areas (9 percentage points, for 35% vs. 26%). Therefore, the large difference is due partly to a smaller difference across the board (6-9 percentage points), partly to a larger difference for living room and dining rooms, and partly to the much larger share of U.S. unintentional fatal home fires beginning in other rooms, for which most victims in either country are remote victims.

Sources: *Fire Statistics – United Kingdom* series, NFIRS, NFPA survey, U.S. death certificates.

**Extent of Flame in Structure Fires,
U.K. Occupied Buildings and U.S. Structures, 1999-2002**



Source: NFIRS, NFPA survey, U.K. annual government reports.

Note: Fires with unknown extent of flame proportionally allocated.

Structure fires in the U.K. tend to be smaller than in the U.S. In 1999–2002, 90% of U.K. fires in occupied buildings had no flame damage or were confined to the room of origin, compared to 71% of U.S. structure fires.

"Structure fires" in the U.S. include chimney fires, fires in vacant and other unoccupied buildings, and fires in non-building structures, which the U.K.'s "occupied buildings" category does not include. Chimney fires are the dominant part of this group of fires the U.S. statistics capture and the U.K. statistics do not capture to the same degree. In the U.S., most reported chimney fires are confined to the chimney, so excluding them from the calculation would make the U.K. advantage in confining fires to the room of origin even larger.

Also, in 1994, the U.K. began adding some smaller incidents previously excluded from fire counts, involving only overheating or smoke, and they inflate the U.K. statistical advantage in keeping fires small, because these incidents are not coded as fires in the U.S.

The fact that U.K. fatal victims tend to be closer to the fire makes sense, given that their fatal fires tend to have a smaller zone with lethal effects. This also helps explain why overall U.K. fire death rates are lower than rates in the U.S. Smaller fires mean fewer potential victims and a much lower rate of death per fire. In the U.S. in 1999–2002, fires confined to the room of origin had a death rate of 0.09 per 100 fires. The death rate per 100 fires was nearly five times higher (0.43) for fires that spread beyond the room of origin but were confined to the room of origin. The death rate per 100 fires rose again, by roughly a factor of four (to 1.79), for fires that spread beyond the room of origin, and this is the point where the U.S. and U.K. differences in shares of fires are also greatest.

How is the U.K. achieving its higher rate of fires confined to the room of origin? One possibility, which could not be checked against readily available data, is differences in the design and construction of U.S. homes, such as a possible tendency toward more open layouts with fewer doors between rooms. Another possibility, raised by U.K. analysts, is greater use of products that burn slower or less intensely. And as noted, the difference may lie partly in reporting differences, with the U.K. capturing more of the smaller fires and possibly having fewer spaces defined as separate rooms per home.

Sources: *Fire Statistics - United Kingdom* series; NFPA analysis of data from NFIRS and NFPA survey.