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Residential Fire Scenario Analysis in Ontario 1995-2003

Research Report No. 173

Date: September 20, 2004

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Abstract

This report identifies some very important features of fatal fires in Ontario. It locates, for example, the victims' position in the houses and tentatively explains why the victims were unable to save themselves. It provides sufficient details to indicate research that can be undertaken to help make homes a safer place to live.

Based on the Ontario data for the period 1995-2003, residential fires occurred most frequently in the kitchen and cooking areas. However, fatal fires are more frequent in living rooms (45.1% of fatalities) and are in general caused by a smoker's materials such as cigarettes, cigars, matches, lighters, etc. used in conjunction with smoking (37.4% of fire deaths). When a deadly fire breaks out, most of the time, upholstered furniture is the first material to be ignited (26% of fire deaths). The most probable levels for fatal fires to occur in Ontario houses are on the ground floor (59 % of deaths), the second stories (17.3% of deaths), the basements (14.8% of deaths), and the third floors (3.9 % of deaths). Fire kills because, in part, the victims are either too young or too old to react quickly and effectively to a fire emergency.

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Residential Fire Scenario Analysis in Ontario 1995-2003

1 INTRODUCTION

This work was undertaken to develop a comprehensive fatal fire scenario analysis for residential houses in Canada over the period 1986 to 2003. It turns out that the information required to carry out such an analysis is not available. For the period 1986-2003, an average of 33.8% of fires in Canada occurred in Ontario [1]. This report focuses only on Ontario for which data suitable to fire scenario analysis has been provided for the period 1995-2003 [2 to 13]. It details, among other things, the areas of origin of most fatal residential fires, the source of ignition, the materials first ignited, the building level of origin, as well as the physical conditions of the fire fatalities at the time of the fire.

2 AREAS OF ORIGIN

Over the period 1995-2003, 6,739 fires and 717 deaths have been recorded in residential houses in Ontario. Most of these fires (28.6%) occurred in the kitchens & cooking areas, then followed by the living areas (12.6%), and the sleeping areas (11.3%). These three areas listed above are also the most fatal places for fire. The living areas constitute the most deadly places in Ontario homes. They account to occur for 45.1% of fire fatalities; they are followed by the sleeping areas (20.0%), and by the kitchen & cooking areas (16.9%). Figure 1 shows the average fire deaths by areas of origin.

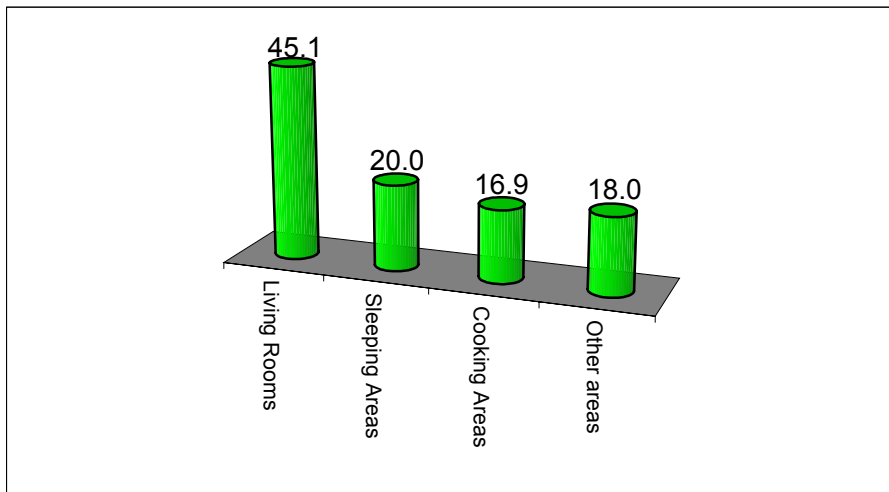


Figure 1: Residential fire deaths by Area of Origin in Ontario

3 SOURCES OF IGNITION

Four items constitute the most popular sources of ignition in Ontario. They are responsible on for only 47.3% of the fires but they cause more than 70% of fire deaths. These items are the smoker's materials used in conjunction with smoking-cigarettes, cigars, pipes, matches, lighters, etc. (37.4%), Top burner areas of stoves involving fire in pans (17.9%), smoker's materials not used in conjunction with smoking (10.3%), and candles & tapers (4.9%). See Figure 2 for the average distribution of deaths by sources of ignition over the period.

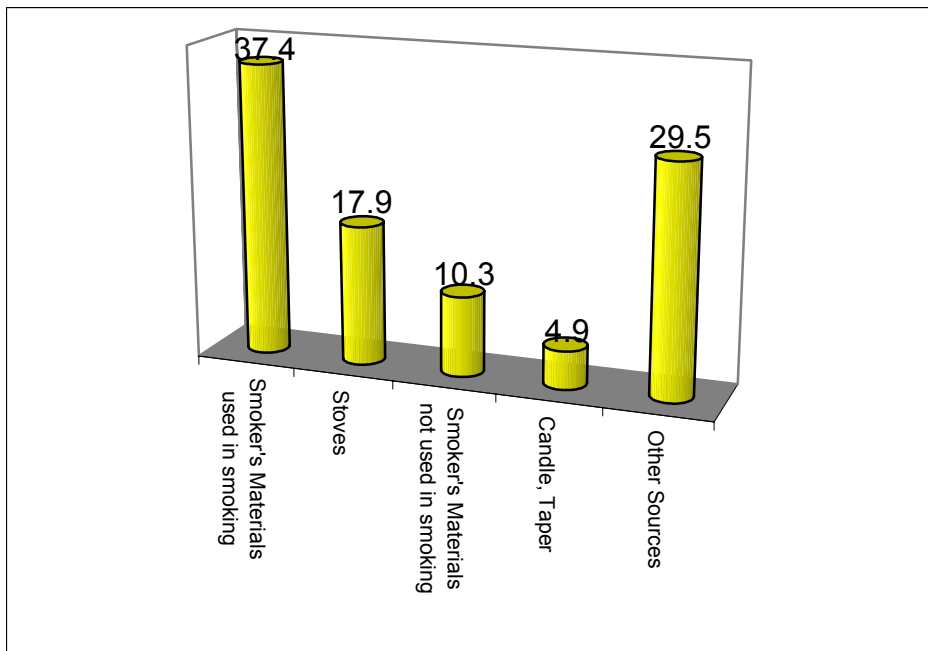


Figure 2: Distribution of fire deaths by Sources of Ignition in Ontario

4 MATERIAL FIRST IGNITED

Nine objects first ignited caused over 60% of the residential deaths in Ontario. However, these same materials appear in only 36.8% of the fires. The most fatal first ignited object is upholstered furniture with 26% of deaths and 4.4% of fires. The second most fatal material is bedding items. They account for 11.5% of deaths and 2.4% of fires in Ontario. Figure 3 gives the average distribution of fire deaths by the first object ignited.

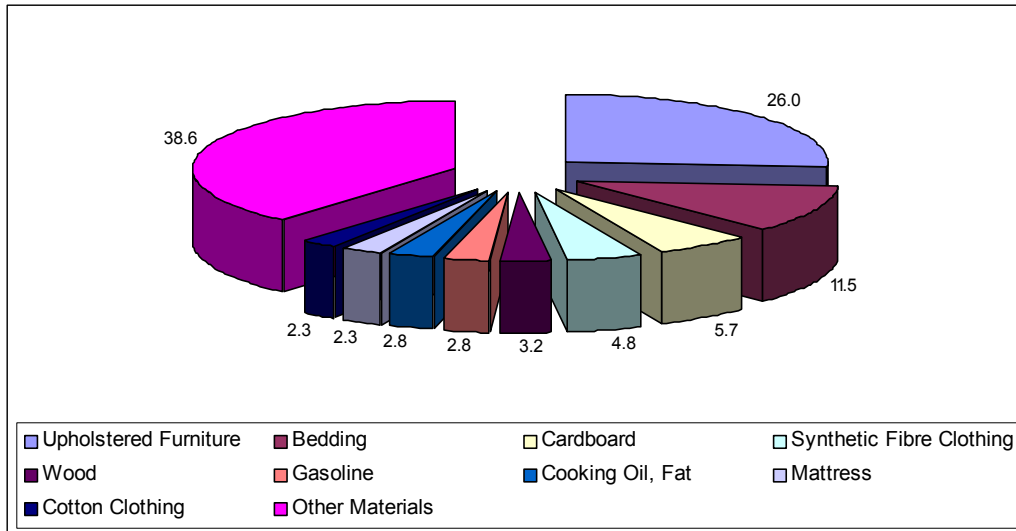


Figure 3: Distribution of fire deaths by Materials First Ignited

5 LEVEL OF ORIGIN AND TIME OF OCCURENCE

Almost all fires (88.4%) and the related deaths (96.1%) occurred between the basements and the third floors in Ontario residential homes. The ground floors are ranked first with 59.9% of the deaths and 53.9% of fires. The second floors are the second most fatal level of origin (17.3%) and are responsible for 14.6% of the fires. The basements come third in terms of deaths (14.8%), and second as to fires (16.0%). The third stories are the other significant level of origin. They account for 4.1% of the deaths and 3.9% of the fires. Only 3.9% of the deaths and 11.6% of the fires took place on the other levels. See Figure 4 for details.

The most deadly fires occurred in the early hours of the morning (between midnight and 5 am). They represent 18.0% of fires but cause 39.1% of fire deaths. With 24.1% of deaths and 18.0% of fires, the time between 6 am and 11 am is the second most deadly portion of the day. See Figure 5 for the average fire deaths by the time of day.

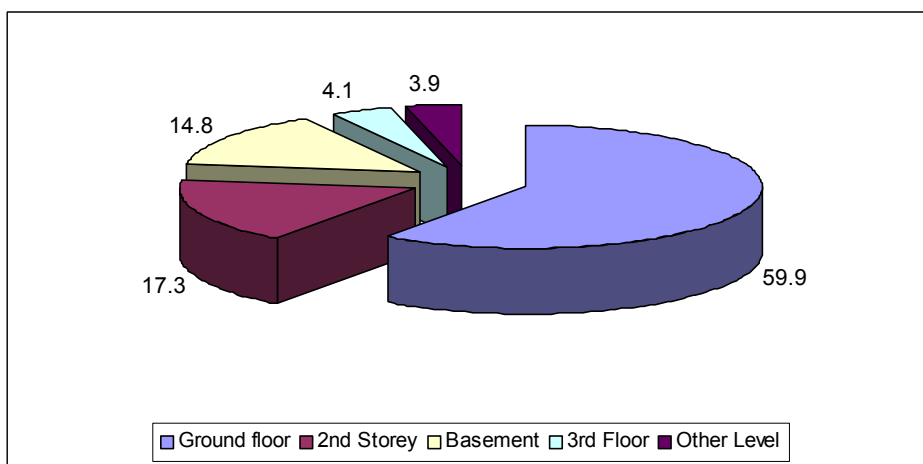


Figure 4: Fire deaths by level of Fire Origin

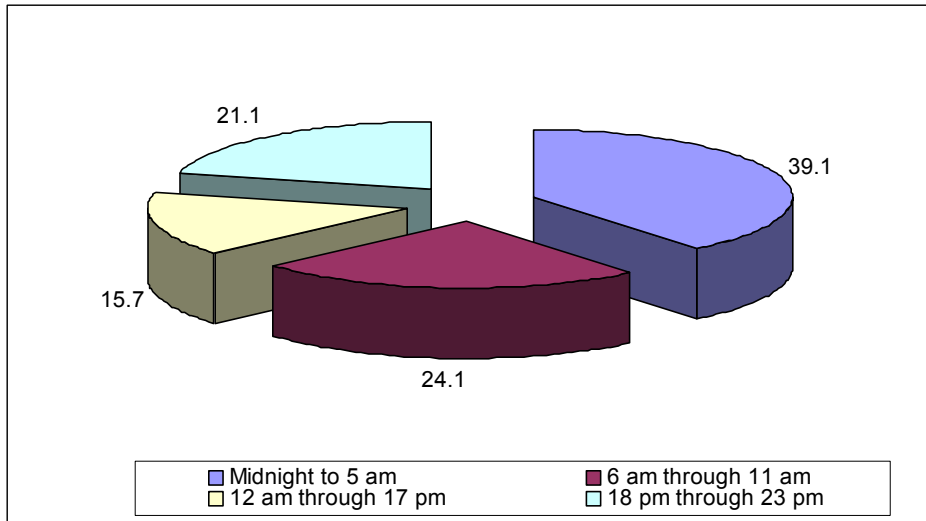


Figure 5: Fire deaths by the Time of Occurrence

6 CONDITION OF CASUALTY

Fire kills many people in Ontario families. 42.9% of the deaths are women and 57.1% are men. Age appears to be a factor in these deaths as the very young and older people have less ability to react effectively to fire incidents. In fact, 24.5% of fire deaths are persons 70 years of age or older while 10.5% of them are persons under 10 years of age. Age is certainly not the only reason why fire causes so many fatalities since these 2 age groups total only 35% of fire deaths and almost 50% of the victims are between 20 and 59 years old. See Figure 6 for the age distribution of fire deaths.

The physical condition of the victims at the time of fire seems to be another influential factor. Indeed, most of these people were unable to save themselves because of their mobility capacity. 53% of the victims suffered from some kind of physical condition. For instance, 16.2% of them were asleep at the time of fires, 14.8% were impaired by alcohol, drugs or medication, 7.9% were too young to react, 6.2% were the bedridden, etc. Even though 22.2% of the deaths were normal people and awake at the time of the fire, the physical conditions of the victims better explain why fire is so deadly in Ontario. See Figure 7 for a graphical representation of conditions of casualties in Ontario.

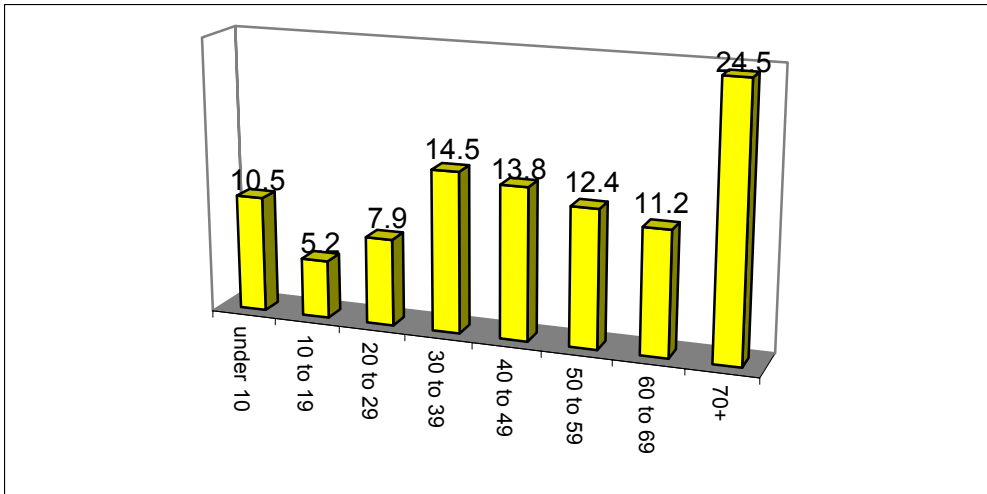


Figure 6: Average Fire Deaths in Ontario by Victims' Age

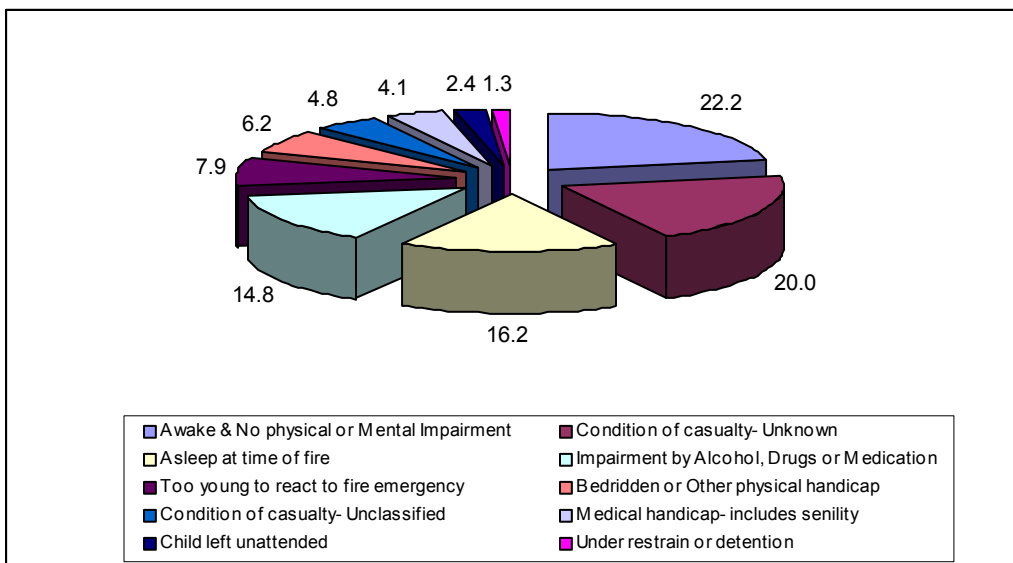


Figure 7: Average Residential fire Deaths by Condition of Casualty in Ontario

7 CONCLUSION

Based on the Ontario data for the period 1995-2003, residential fires usually occurred in the kitchen and cooking areas. However, fatal fires are more frequent in living rooms and are caused in general by smoker's materials such as cigarettes, cigars, matches, lighters, etc. used in conjunction with smoking. When deadly fire breaks out, upholstered furniture is the first material to be ignited most of the time. The most probable levels for deadly fires to occur in Ontario houses are the ground floors, the second stories, the basements, and the third floors. An insignificant number of deadly fires took place in other levels of the houses. Fire kills because partly the victims are either too young or too old to react quickly and effectively to a fire emergency. However, their physical conditions at the time of the fire are a more plausible explanation for their death.

8 ACKNOWLEDGEMENT

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