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Smoke Alarm Ownership in Relation to Socio-Economic Factors

**by
Nick Buchanan**

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School of Engineering
University of Canterbury
Private Bag 4800
Christchurch, New Zealand

Phone 643 364-2250
Fax 643 364-2758
www.civil.canterbury.ac.nz

Introduction

This study focuses on smoke alarm ownership within Christchurch. Two different areas were selected, based on income levels. These two areas, Holmwood and Avon Loop, were then compared to determine if socio-economic factors impact on smoke alarm ownership. This study focused primarily on the relationships between smoke alarm ownership and location, income, education, and home ownership. Other topics discussed include the number of alarms per household, escape plans, people who smoke in the household, heating methods, reasons for non-purchase and other specific relationships that were uncovered during the study. The results between the two areas are significant for various reasons explained in this study.

Hypothesis

The hypothesis of this study was that there would be a higher rate of smoke alarm ownership in a higher socio-economic area.

Aim

The aim of this study was to find out if socio-economic conditions such as location, income, education, home ownership (rent or own), ethnicity, and gender affected the distribution of smoke alarms. The aim was to compare two different areas of Christchurch with each other, one a low-income area and the other a high-income area, and observe if there were similarities or differences.

Literature Review

The literature used in this study to formulate questions, compare results and draw conclusions was found in a number of sources. One of the major sources that initiated this project was Ahrens (1998) who investigated the percentage of smoke alarm usage in America and showed how the percentage had steadily increased since the 1970s. Also important was Ahrens' division of who had smoke alarms into different categories, for example, household income, age of the house, highest level of education, and home ownership. Ahrens also showed variations between the total population and those on a low income, ethnic groups, and those who smoked. Several of these categories were used in the current survey. FEMA (1980) was also a valuable source for establishing questions included in the survey. Topics in this report included

smoke alarm owners and family income, education of the household head, smokers in the household, home ownership, heating systems, methods of obtaining a detector, and reasons for non-purchase. Hygge (1989) illustrated the rate of smoke alarms in Sweden, and compared the maintenance between free and purchased smoke alarms. Another useful article was Birch (2001) which looked at the implications of whether installed smoke alarms were actually working and also provided rates of smoke alarm ownership in Britain. A report done for the American retail chain Sears (1975) also provided some information for the survey. Included results were upon why the smoke detector was purchased, the gender of the purchaser, and house characteristics of the purchaser. Three reports that were submitted for Masters of Engineering (Fire) degrees at Canterbury University, between 1997 and 1999, were also used to inform this project Rusbridge (1999), Duncan (1999), and Grace (1997). Buchanan (2001) provided a solid overview and illustrated the importance of education and flammable materials that were brought into the home. Other supplementary articles were obtained from the New Zealand Fire Service publication, the *Star*, from June/July and August/September 2001.

Methodology

The primary form of data was a survey carried out in Christchurch. To justify the selection of the two areas for the study, the category of average household income was obtained from the 1996 New Zealand Census. In terms of income, the two areas ranked first (Holmwood) and one hundred and second (Avon Loop) out of one hundred and fifteen areas in the Christchurch region. The survey was administered to thirty households per area. This was done over four successive Sunday afternoons in July and August 2001. The surveys were administered by door to door interviews at every fifth house in an attempt to get a representative sample. This was ultimately time consuming with the total amount of time spent in the two areas totalling over twelve hours. The data was compiled in Microsoft Excel before being reformatted in SPSS (a data analysis program). The data was then analysed using cross tabulation and Chi-Square methods. This was to test the strength of the relationship between two specific variables, for example, smoke alarm ownership and location. The chosen significance level (or critical value) was 0.05. If the result was less than 0.05 there was a significant relationship and if the result was greater than 0.05 there was no significant relationship.

Smoke Alarm Ownership and Location within the City

There are several relationships that could be explored in regard to smoke alarms and fire danger that stem from this study. The most important relationship to this study is linking the ownership of at least one smoke alarm to the location of respondents. The results of this survey show that seventeen of thirty Avon Loop respondents had smoke alarms (56.6%). This contrasts to Holmwood where twenty-three of thirty households had a smoke alarm (76.6%). The total for both areas was forty out of sixty, which is 66.6%. These rates of smoke alarm ownership are shown in Figure 1, from the corresponding statistics in Table 1, where a distinctive difference is represented. These individual area rates, and their combined rate, compare poorly when compared to previous studies that have been done in the U.S.A. and Great Britain. The following evidence compares previous data to that which was found by this project. In 1977 twenty-two percent of American homes had a smoke alarm. This had risen to fifty percent by 1980 (FEMA, 1980, p iv). By 1988 smoke alarm ownership had risen to eighty-eight percent and in 1995 ninety-three percent of American homes had smoke alarms (Ahrens, 1998, p 4).

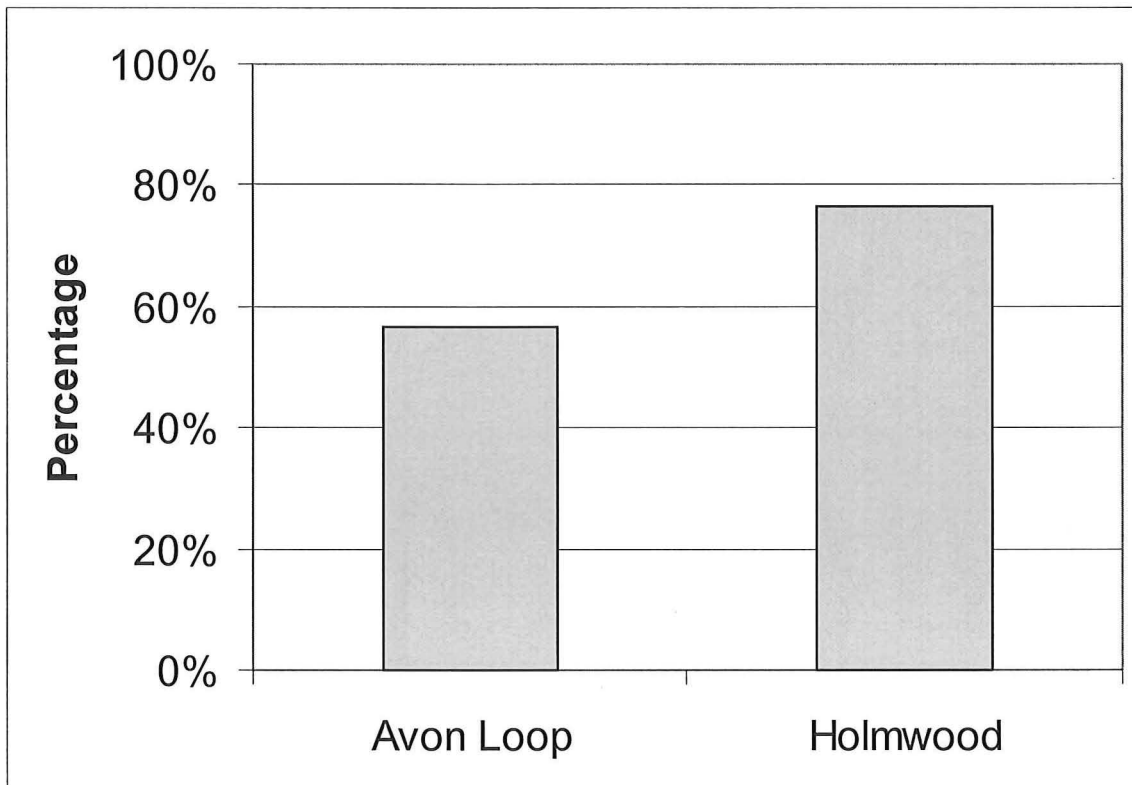


Figure 1: Percentage of households in each area with one or more smoke alarms.

Great Britain had a lower rate of smoke alarm ownership in 2000 where ownership levels were at eighty percent. In Swedish homes in 1981 smoke alarms were installed in only sixteen percent of houses. This had increased to forty-five percent in 1984 and had increased to fifty-five percent in 1987 (Hygge, 1989, p 196). In a previous study within Christchurch (Rusbridge, 1999, p 68) eighty-three percent of households had a smoke alarm. This is significantly higher than what the current survey uncovered, where the combined rate from the two areas was 66.7%. Rusbridge's results represent a different sample population.

Ownership	Location / Respondent category		
	Avon Loop	Holmwood	Total
Smoke alarm	17/30 (56.6%)	23/30 (76.6%)	40/60 (66.6%)
No smoke alarm	13/30 (43.3%)	7/30 (23.3%)	20/60 (33.3%)

The level of significance for the test between smoke alarm ownership and location was 0.0098 which was smaller than the significance level of 0.05, which shows that there is a significant relationship between smoke alarm ownership and area location in this survey. Concluding the topic in comparison to those countries for which there is available data, both of the residential areas of Avon Loop and Holmwood, individually and collectively, had lower rates of smoke alarm ownership than other countries. The Avon Loop area had a considerably low rate of smoke alarm ownership.

Smoke Alarm Ownership and Income

Another crucial relationship to the aim of discovering any correlations between socio-economic factors and smoke alarm ownership was the relationship between smoke alarm owners and the level of household income. The criteria for selecting the two Christchurch areas were based on income. Holmwood had an average household income of \$72,648 in the 1996 New Zealand Census, which was the highest in Christchurch. Avon Loop had an average household income of \$32,179. The relationship between smoke alarm ownership and income can be seen in Figure 2

where clearly the rate of alarm ownership increases in those households over \$50,000. Table 2 also illustrates that fifteen households in the Holmwood area have an income over \$100,000 compared to one household in the Avon Loop. Ahrens (1998, p 5-6) drew comparisons between the total population and households with an income below \$US 7,500. This was in 1991 and there was only a small variation between the total population (88%) and low-income households (84%) who had smoke alarms. Also cited in Ahrens (1998, p 6) was an Injury Control and Risk Survey from 1994. The criterion in the above survey was household income either above or below the poverty level. For those households below the poverty level 82% had smoke alarms while households above the poverty level had 93%. This difference of 11% is more significant than that of 4% in the 1991 study.

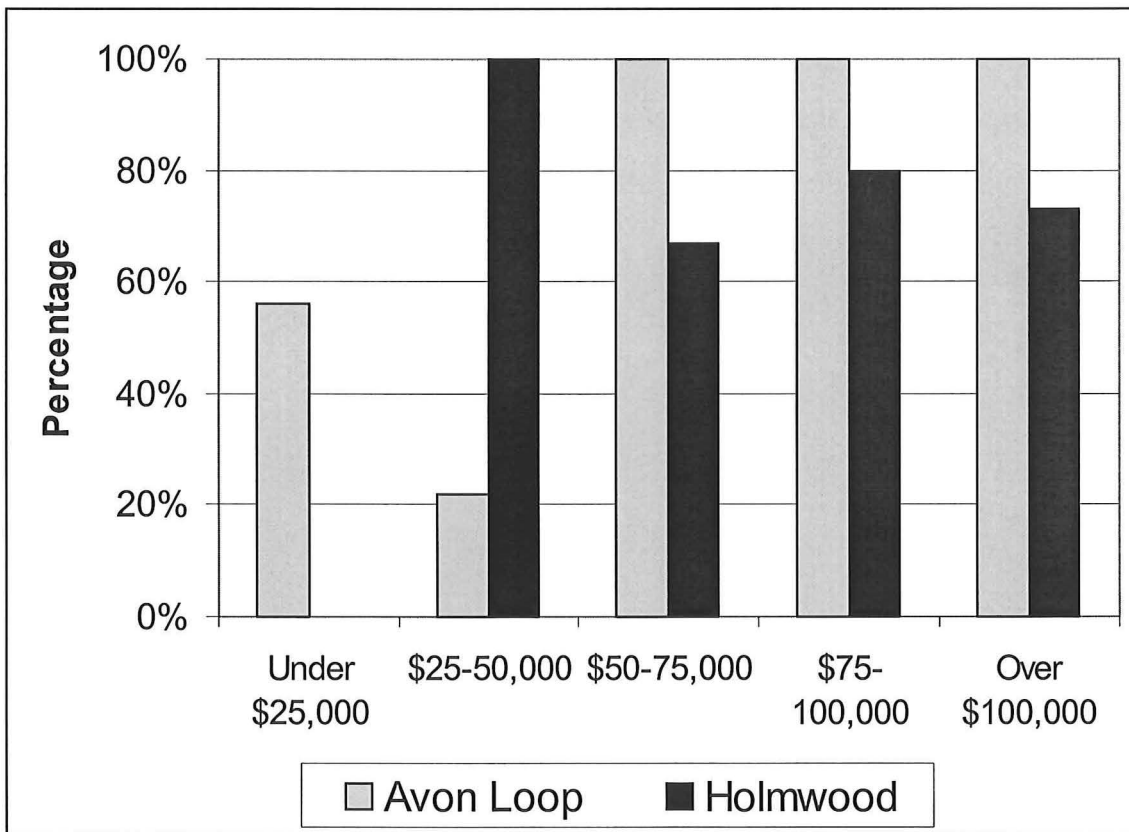


Figure 2: Percentage of households with one or more smoke alarms for each area and level of income.

From the current survey results nine respondents, all in the Avon Loop, identified their households with an income below \$25,000. These low-income households in Christchurch had some similarities with low-income households in the United States.

Five of the respondents had alarms (56%). Of the forty more wealthy respondents who answered the question, twenty-six had smoke alarms (65%). The similarity between the 1994 American survey and this study is a similar differential (approximately ten percent) between low-income groups and the rest of the population. However, the overall figures are very different because smoke alarm ownership in the U.S.A. was between eighty-two and ninety-three percent, while the two areas of Christchurch were between fifty-six and sixty-five percent.

To substantiate the relationship between smoke alarm ownership and income, SPSS produced a significance level of 0.0021 after the income categories had been re-coded into low, medium, and high. This result (under 0.05) confirms that there is a significant relationship between alarm ownership and income.

Table 2: Smoke Alarm Ownership and Income.			
Income level	Smoke alarms / Respondent category		
	Avon Loop	Holmwood	Total
Under \$25,000	5/9 (56%)	0/0 (0%)	5/9 (56%)
\$25-50,000	2/9 (22%)	2/2 (100%)	4/11 (36%)
\$50-75,000	2/2 (100%)	2/3 (67%)	4/5 (80%)
\$75-100,000	3/3 (100%)	4/5 (80%)	7/8 (88%)
Over \$100,000	1/1 (100%)	11/15 (73%)	12/16 (75%)

Note: Six respondents from the Avon Loop and five from Holmwood did not answer.

Location, Income and Number of Alarms

The hypothesis behind this section of analysis is that the number of smoke alarms per household would increase with the level of income. Table 3A, for the Avon Loop, does not show the expected trend clearly. The three households with an income under \$25,000 had two smoke alarms, and the single household over \$100,000 had one smoke alarm. Table 3B, which represents Holmwood, supports the hypothesis, such that with a higher income the number of smoke alarms clearly increases.

Table 3A: Smoke Alarm Ownership & Number of Alarms in Avon Loop.					
Income	Number of Alarms				
	None	One	Two	Three	Four
Under \$25,000	4	2	3		
\$25-50,000	7	2			
\$50-75,000		2			
\$75-100,000			2	1	
Over \$100,000		1			

Table 3B: Smoke Alarm Ownership & Number of Alarms in Holmwood.					
Income	Number of Alarms				
	None	One	Two	Three	Four
Under \$25,000					
\$25-50,000		2			
\$50-75,000	1		2		
\$75-100,000	1	1	2	1	
Over \$100,000	4	4	4	2	1

Note: Respondents that did not answer under income are not included.

When asked the question (Question 12) in the survey “What would prevent you from getting a smoke alarm or another smoke alarm?” no respondents answered that the price of the smoke alarm would prevent them from obtaining a smoke alarm. This response is contradictory to the information illustrated in the two tables, which shows that the income of the household does affect the number of smoke alarms within the household

The statistics from Tables 3A and 3B have been put into a graph form (Figure 3), further illustrating that the average number of smoke alarms per household increases slightly irregularly in the Avon Loop and significantly in Holmwood.

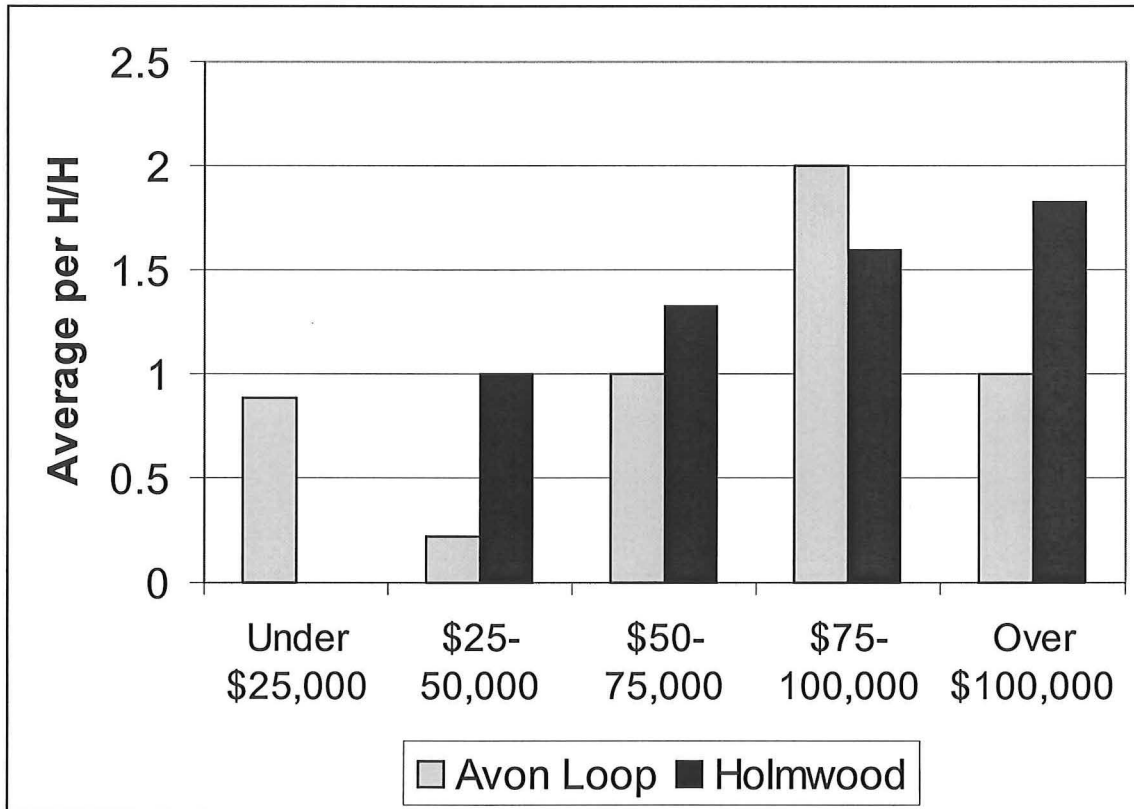


Figure 3: Average number of smoke alarms per household in relation to income and area.

Smoke Alarm Ownership and Education

The third important relationship that was established was between smoke alarm ownership and the level of education in the household. This was then compared between Avon Loop and Holmwood. In the survey the term “tertiary qualification” was interpreted to mean any workplace qualification that was not a university degree. The education level was the highest level in the household, regardless of the respondent.

Education level	Smoke alarms / Respondent category		
	Avon Loop	Holmwood	Total
Less than high school	2/5 (40%)	0/2 (0%)	2/7 (29%)
High school graduate	4/7 (57%)	4/6 (67%)	8/13 (62%)
Tertiary qualification	4/6 (67%)	7/8 (86%)	11/14 (79%)
University graduate	7/11 (64%)	12/14 (86%)	19/25 (76%)

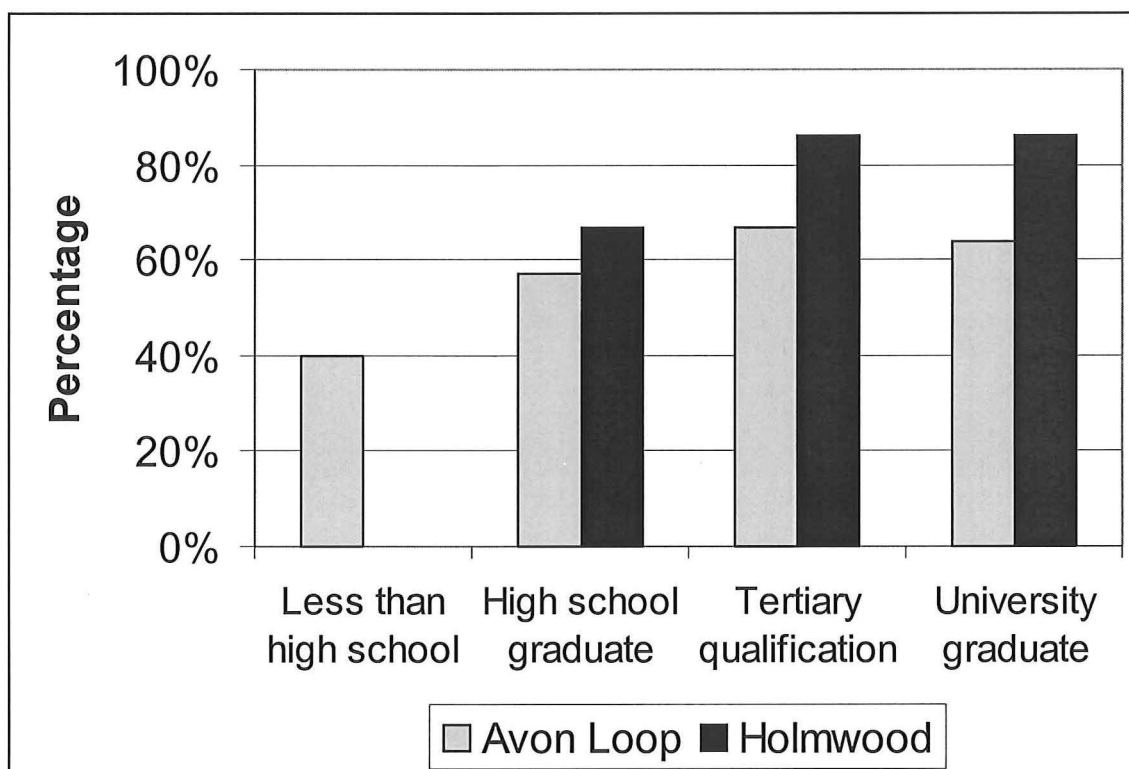


Figure 4: Percentage of households with one or more smoke alarms for each area and level of education.

From the results of the survey several conclusions can be drawn. Firstly, in comparison between Avon Loop and Holmwood, the education level in Holmwood is slightly higher with a few more university graduates and those with a tertiary qualification. Secondly, when alarm ownership is broken down into educational categories significant differentials can be seen between who has a smoke alarm and who does not. The primary feature from the survey (illustrated in Table 4) is that the percentage of smoke alarm ownership increases with a higher level of education. In the Avon Loop, smoke alarm ownership increased from 40% to 67% as the level of education increased. The rate of smoke alarm ownership also increased in Holmwood from 0% up to 86% as the education level increased. Significantly, the two Holmwood respondents with a level of education less than high school graduate did not have smoke alarms. Figure 4 also shows the relationship between levels of education and smoke alarm ownership with an increasing percentage as the education level rises.

The current survey results also compare well with statistics in the Injury Control and Risk Survey, 1994 (Ahrens, 1998, p 6). The category of “less than high school

graduates” had 78.3% smoke alarm usage, “high school graduates” had 88.9%, “some college experience” had 92.6%, and “college graduates” had the highest rate at 93.6%. When testing the strength of the relationship between smoke alarm ownership and education SPSS calculations proved that there was a significant relationship. The critical level of significance was 0.0253, which indicates that the rate of smoke alarm ownership and education are related, reinforcing the findings that the rate of smoke alarm ownership increased when education levels increased.

Smoke Alarm Ownership and Home Ownership

“Fire losses are significantly greater in rented than in owned accommodation (Buchanan, 2001, p 173).” This study also investigated whether fire losses were related to the number of smoke alarms within the household. Home ownership refers to the status of the occupant, the house is either owned or rented. These results are shown in Table 5. In the Avon Loop thirteen respondents rented their houses. Out of these thirteen respondents, six had smoke alarms (46%). For the seventeen respondents who owned their houses, eleven had smoke alarms (65%). This statistic shows that there is a difference in smoke alarm ownership and home ownership within the Avon Loop area. In Holmwood just three respondents rented their houses. Only one had a smoke alarm (33%). The remaining twenty-seven respondents owned their house. Of these Holmwood respondents twenty-two had at least one smoke alarm (81%). The combined statistics were that seven out of sixteen rented houses (44%) had smoke alarms and thirty-three out of forty-four owned houses had smoke alarms (75%).

The statistics from the current survey show that there was a significant increase in smoke alarm ownership from rented houses to owned houses. This is shown in Figure 5, where there is a considerable improvement in smoke alarm ownership in those households that are owned rather than rented. An important point to note is that there is no mandatory regulation in New Zealand that requires landlords to provide their tenants with a smoke alarm for the rented property. However, only two respondents who were renting their houses cited their landlord as a reason that they did not have a smoke alarm (refer Appendix). A contrast can be made to the study in Ahrens where people who rented their house had an 89.6% rate of smoke alarm ownership, while house owners had a rate of 91.9% (Ahrens, 1998, p 6). This statistic may be

misleading in New Zealand because some areas of the U.S.A. require landlords to provide their tenants with a smoke alarm. Using SPSS, there was definitely a relationship between home ownership and those who had smoke alarms. The significance value was under 0.05 (0.0003), which identified a significant relationship.

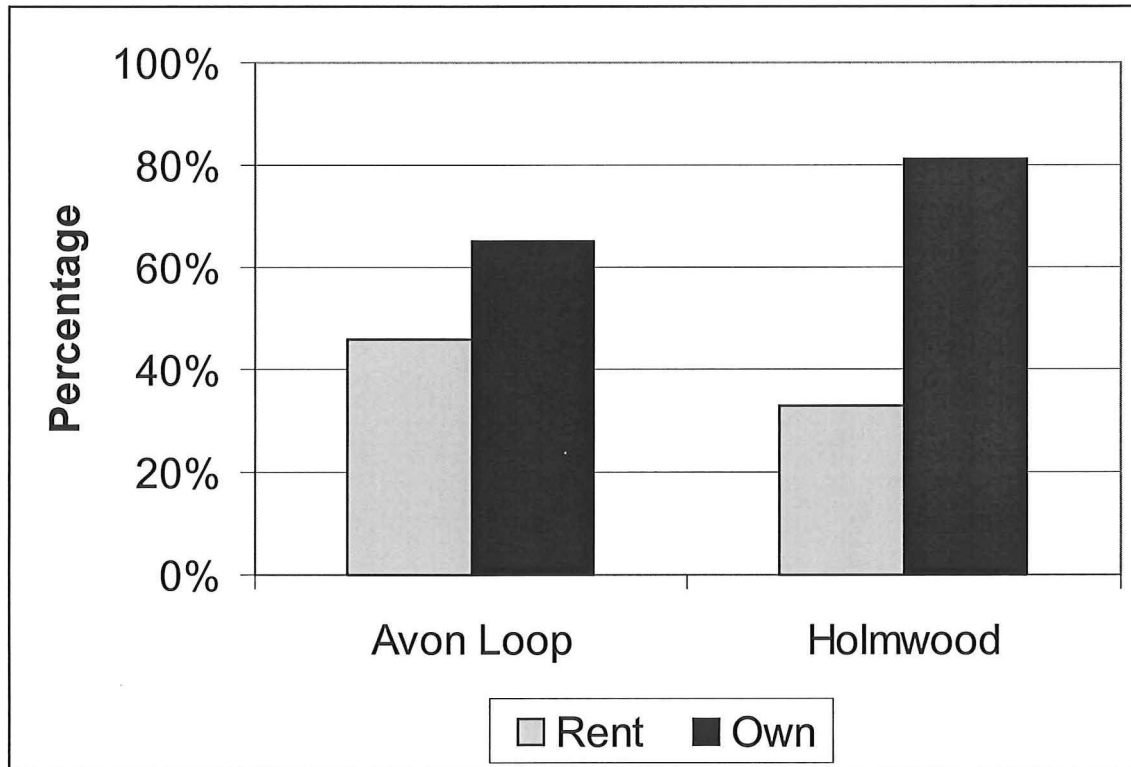


Figure 5: Effect of home ownership on installation of smoke alarms.

Status	Smoke alarms / Respondent category		
	Avon Loop	Holmwood	Total
Rent	6/13 (46%)	1/3 (33%)	7/16 (44%)
Own	11/17 (65%)	22/27 (81%)	33/44 (75%)

Households with People who Smoke

This study also investigated the relationship between the households who had people who smoke and smoke alarm ownership because “smoking is the single biggest cause of fatal fires (Buchanan, 2001, p 173).” This could mean that those households who have a smoker would be more likely to have a smoke alarm because the risk of a fire

is higher. This was not the case in the current study. Of the seventeen households who had a smoker, eleven had a smoke alarm (64.7%), which is fractionally under the rate for the total survey of 66.6%. In the forty-three households that did not have a smoker, twenty-nine had a smoke alarm. This is a rate of 67.4%, which is slightly above the total survey rate. This information can be compared to a previous study in the U.S.A. in 1991 where those households with people who smoked had a 87% installation rate and the total population was at 88% (Ahrens, 1991, p 5). Similarly, both cases have a small differential between smoking and non-smoking households. This scenario also occurred in 1980 where that particular study also found that there were “no significant connections between detector ownership and the number of smokers in households (FEMA, 1980, p 8).” The statistics from this current study conclude that there is no significant difference in smoke alarm ownership between households with people who smoke and households with people who do not.

Smoke Alarm Ownership and Heating

Aside from smoking, which is the biggest cause of fatal fires, other major sources are heaters, candles, cooking accidents and children playing with matches. Simple precautions include education regarding drying of clothes near heaters or open fires and unattended open flames (Buchanan, 2001, p 173-4). This study investigated whether different forms of heating affected smoke alarm ownership. Note that this question in the survey (Question 32) allowed multiple answers, so some overlapping of households does occur. Twenty-two households out of the sixty surveyed had either an open fire or a log burner. Sixteen of these households had a smoke alarm (73%). Thirty-eight households either used gas, oil, or central heating in their houses. Twenty-seven of these households had a smoke alarm (71%). These forms of heating are over the average rate of smoke alarms in the current survey (66.6%). The group of respondents that registered poorly was where either electric fan heaters or electric radiant heaters were used in the household. Of the thirty-six households who used electric heaters, nineteen had smoke alarms. This rate of 53% is low compared to other forms of heating, the survey average, and is even lower than the rates in the Avon Loop (56.6%) and Holmwood (76.6%). This suggests that households who use electric heaters do not perceive them to be as great a risk as other methods of heating.

Reasons for Non-Purchase

As mentioned previously under the section on the number of smoke alarms and income, no respondents from either area who did not have a smoke alarm selected cost as a reason why they would not purchase a smoke alarm. This low figure can be compared to the 1980 study where ten percent of responses cited “Too expensive” as a reason for non-purchase (FEMA, p14). The categories of “Unaware of where to purchase a smoke alarm,” “False alarms” and “Aesthetics” also received no responses from the twenty respondents in the current study who did not have a smoke alarm. “Never had a smoke alarm” registered one response. Two responses for the non-purchase of smoke alarms were because the landlord would not pay for the installation. The category of “Other” also received two responses. In contrast to the above categories that received few responses, “Time and effort” had fifteen replies (75% of the twenty responses from non-owners). This category of response is similar to the 1980 American study, where 49% had “No interest” in purchasing a smoke alarm and 24% thought that purchasing an alarm was “Not necessary (FEMA, p14).” The consequences of such a high response rate under “Time and effort” illustrates that there needs to be some sort of planning, either from the government or the Fire Service, to increase public awareness if smoke alarm installation is to rise significantly.

Escape Plans

Escape plans are very important. Once occupants are aware of a fire they must be able to escape from the building. In the case of a fire, the smoke alarm increases the awareness of the occupants but this will not actually save the life of the occupants unless they can leave the building. This is reiterated where “the effectiveness of a smoke alarm depends on its ability to detect the smoke, and the ability of the occupants to respond to the alarm” (Buchanan, 2001, p 174). In the Avon Loop eight respondents had escape plans while twenty-two did not. Of those respondents who had smoke alarms, five also had an escape plan. The remaining twelve smoke alarm owners did not have an escape plan. Ten respondents in the Avon Loop did not have either a smoke alarm or an escape plan.

In Holmwood twelve households had an escape plan (eighteen did not). Nine respondents had both a smoke alarm and an escape plan, which was slightly higher

than in the Avon Loop. Fourteen households had an alarm but no escape plan. Only four households had neither a smoke alarm nor an escape plan. The total number of households for both areas who had an escape plan, irrespective of smoke alarms, was twenty from sixty (33%). This compares poorly with a level of 59% in the U.S.A. in 1980 (FEMA, p13). Fourteen respondents from the sixty currently surveyed (23%) had both a smoke alarm and an escape plan. An additional twenty-six respondents had a smoke alarm but no escape plan (43%). Fourteen of the respondents' households did not have either a smoke alarm or an escape plan (23%).

False Alarms

Of the forty respondents who had at least one smoke alarm, fifteen also answered that their smoke alarm had been activated when there was no fire (37.5% of smoke alarm owners). When asked the reason of the false alarm, fourteen responded because of "Cooking food." This usually indicates that the location of the smoke alarm is in too close proximity to the kitchen where a small amount of smoke may be created by either the stove or the toaster. Please note that this question (Number Seven) ultimately needed rewording from "Do you have problems with false alarms?" to "Has your smoke alarm ever gone off when there was no fire?" The question asked was changed over the duration of the study to obtain a more accurate response as some respondents misinterpreted the question. The respondents focused on the "problems" part of the question rather than the "false alarm" part, intended to ask if the alarm had been activated when there had not been a fire.

Smoke Alarm Ownership and Ethnicity

This study also attempted to link ethnicity with smoke alarm ownership. This relationship could not be determined from the survey. The reason for this is that out of sixty respondents, fifty-six identified themselves as New Zealand or European, rather than Maori / Pacific Island, Asian or an 'other' category. Because ninety-three percent of the respondents were of one ethnic background any results that came out of this relationship would, while possibly reflecting the ethnic make-up of the two areas, not be reliable when drawing conclusions about the relationship between ethnicity and smoke alarm ownership.

Smoke Alarm Ownership and Gender

The subject of gender was raised under the term of socio-economic in the aim. This study also tried to establish whether there was a relationship between the smoke alarm ownership and gender. This topic cannot be effectively answered. The reason had to do with the administration of the survey. Any member of the household was asked to answer the survey regardless of who the household head was. Because the question “who is the head of the household?” was not asked the person responsible for the installation of the smoke alarm cannot be accurately determined.

Small Fires

It had been claimed that “smoke alarms may cut the number of fires reported to fire departments by 75 – 80% (Ahrens, 1998, p 7).” It is unclear whether this figure by Ahrens is an unsubstantiated guess or an educated estimate. In the current study, the forty respondents with a smoke alarm were asked if they had “ever had a fire that set off the smoke alarm but the Fire Service was not needed?” Only two respondents had a fire that set off the smoke alarm and did not need to call the Fire Service (3%).

Large Fires

Respondents were also asked if they had ever had a fire “large enough to call the Fire Service.” Only two of the sixty respondents replied that they had been involved in a large fire. When the follow-up question of “Did the smoke alarm work?” was asked both replied that they had not had a smoke alarm. One of these respondents now had an alarm while the other did not.

Television Advertising

All respondents were asked if they had seen any of the recent series of television advertisements from the Fire Service promoting people, targeted towards children, to be “Fire Wise.” In total, thirty-seven respondents had seen at least one advertisement (62%). Of the thirty-seven respondents, twenty-six had a smoke alarm. Eleven were in the Avon Loop and fifteen in Holmwood.

Implications

Few studies of this type have been carried out previously. Because of the limitations due to available time, this study is an effort to illustrate differences between socio-

economic classes and how they operate in practice. If further research is done in this area, with this study as a start, trends of smoke alarm owners will be able to be better conceptualised. The results of this survey could have significant implications for organisations such as the New Zealand Fire Service because this, and hopefully future studies, will be able to provide the basis for education on fire danger and smoke alarms, and the installation of smoke alarms in specific areas of society. It is recommended that legislation be introduced that requires every household to have at least one smoke alarm.

Suggestions for Further Research

It is hoped that this study could be used as a base for further research work. To obtain more accurate and even more detailed information it is recommended that more households be interviewed. A suggestion would be from anywhere between fifty and one hundred surveys per area. This study has compared two contrasting income areas within Christchurch. Other options could be comparing different economic areas (perhaps a middle income area, or two similar income areas located in different parts of the city), contrasting ethnic areas, or even a rural versus urban comparison.

Conclusion

The aim of this study was to determine if there was a relationship between smoke alarm ownership and socio-economic areas. To de-construct this question the term 'socio-economic' was broken down into different areas to study. The study then consisted of looking at relationships between smoke alarm ownership and location within the city, differing income levels of the household, differing education levels, and home ownership. What has been demonstrated is that there are definitely relationships between smoke alarm ownership and location within the city (56.6% in Avon Loop and 76.6% in Holmwood), smoke alarm ownership and income, smoke alarm ownership and education, and smoke alarm installation and home ownership. The answer to the proposed hypothesis is yes; there is a relationship between smoke alarm ownership and socio-economic areas.

Acknowledgments

Several people were consulted over the duration of this study. The people that were consulted were: Dr. P. Gruffudd, a visiting lecturer in Geography at Canterbury University, Mr. M. Spearpoint, a Fire Engineering lecturer at the Department of Civil Engineering at the University of Canterbury, and Mr. G. Davies and Mr. I. Fleming, both Christchurch Fire Safety Officers with the New Zealand Fire Service.

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Appendices

1. Map of Christchurch Area Units, showing the Avon Loop and Holmwood.
2. Copy of the survey.
3. Table of survey results.

Examples for interpreting the raw data.

0 = No response

1 = The first response category

2 = The second response category and so on

For example, Question 1. "Do you have a smoke alarm in your house?"

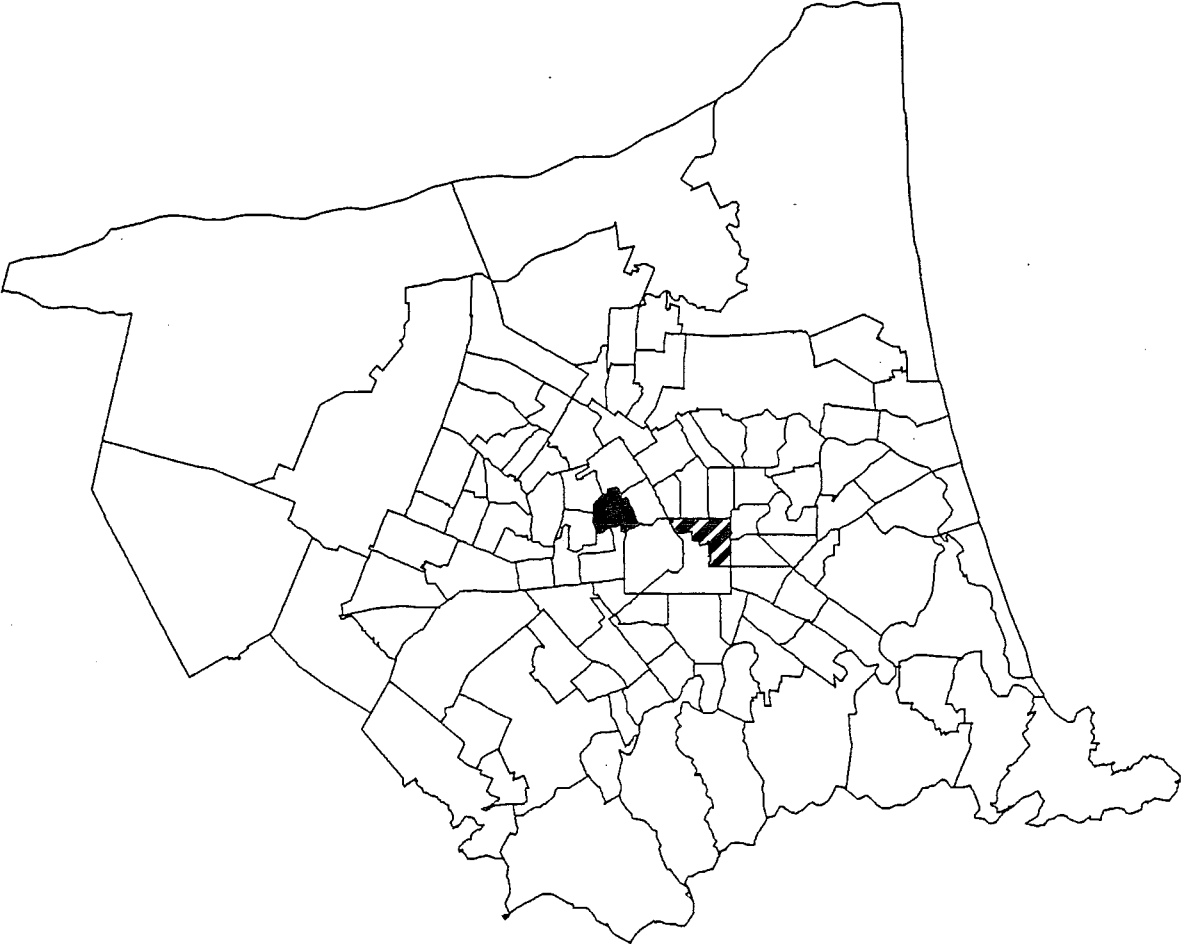
Yes = 1, No = 2.



Question 4 would have answers coded from 1 through to 5.

"Other" always comes at the end of the other possible responses. For example in Question 12 "Other" is coded as the 9th response.

Questions with multiple answers have been divided. For example Question 3 on location of the smoke alarm has been separated into six individual responses.

Christchurch City, Area Units,
1996 census.



Avon Loop	
Holmwood	

SURVEY OF SMOKE ALARM DISTRIBUTION WITHIN CHRISTCHURCH

Nick Buchanan

I am a third year geography student from the University of Canterbury. I am investigating the distribution of smoke alarms within Christchurch. All the information received in this survey will remain confidential. The results of this survey will be used only in my project report and in aggregate form so that no individual can be recognised. For further information please contact course coordinator Doug Johnston in the Geography Department.

SECTION ONE: GENERAL QUESTIONS

Please tick the appropriate boxes.

1. Do you have a smoke alarm in your house?

Yes No

2. If you do have a smoke alarm, how many do you have?

One

Two

Three

Four or more

3. Where is / are the smoke alarm(s) located?

Hallway Kitchen

Bedroom Garage

Living area

Other.....

4. How long have you had a smoke alarm?

Less than one year

Between one and two years

Between two and five years

Between five and ten years

Over ten years

5. Is / are your smoke alarm(s) currently working?

Yes No

Knowledge Assumption

6. Do you know how to check that the battery is working?

Yes No

7. Do you have problems with false alarms?

Yes [] No []

8. If there are problems, how often do they occur (on average)?

Once a week []

Once a month []

Every few months []

Once a year []

Less than once a year []

9. If there are problems, what sets the alarm off?

Cooking food []

Showering []

Faulty battery []

Other.....

10. Why did you decide to get a smoke alarm?

Advertisements [] Gift []

Experience of fires [] Store sale []

Previously installed []

Other.....

11. What are you trying to protect by utilising a smoke alarm?

Individual safety []

Family / children []

Residential building []

Personal possessions []

Other.....

12. What would prevent you from getting another smoke alarm? Or what would prevent you from getting a smoke alarm if you do not have one?

Personal cost [] Aesthetics []

Time and effort [] False alarms []

Landlord will not pay [] Already have several []

Never had an alarm previously []

Unaware of where to buy a smoke alarm []

Other.....

13. In your opinion, do you think smoke alarms are a good way of fire detection?

Yes [] No []

14. In your opinion, is a smoke alarm a good investment even if you never have a fire in your house?

Yes No

15. What do you think the likelihood is of there being a fire in your home at any time?

High chance Moderately low
Moderately high Low chance
Moderate chance No chance

16. Has your family prepared an escape plan if your house was on fire?

Yes No

17. Have you ever had a fire large enough that you called the Fire Service?

Yes No

18. If yes, did the smoke alarm work?

Yes
No
Did not have a smoke alarm

19. If you have a smoke alarm, have you ever had a fire that set off the smoke alarm but you did not need to call the Fire Service?

Yes No

20. If you have a smoke alarm, who raised the issue of buying the smoke alarm and who then bought the alarm?

Male / male
Male / female
Female / female
Female / male

21. When deciding about house furnishings (furniture, curtains, and bedding) did fire safety enter into the decision?

High importance
Moderate importance
Low importance
Not considered

22. Have you seen any recent television advertisements from the Fire Service about being "fire wise"?

Yes No

SECTION TWO: PERSONAL CHARACTERISTICS

23. What is your gender?

Male Female

24. Which age category do you fit into?

Under 20	<input type="checkbox"/>	40 – 49	<input type="checkbox"/>	70 – 79	<input type="checkbox"/>
20 – 29	<input type="checkbox"/>	50 – 59	<input type="checkbox"/>	Over 80	<input type="checkbox"/>
30 – 39	<input type="checkbox"/>	60 – 69	<input type="checkbox"/>		

25. Which ethnic group do you belong to?

New Zealand / European
Maori / Pacific Island
Asian
Do not wish to answer
Other.....

26. How many people live in your house?

One
Two
Three
Four or more

27. How many of these are under primary school age?

None
One
Two
Three or more

28. What is the highest level of education in the household?

School certificate	<input type="checkbox"/>	Tertiary qualification	<input type="checkbox"/>
Secondary school	<input type="checkbox"/>	Post graduate degree	<input type="checkbox"/>
University degree	<input type="checkbox"/>	Do not wish to answer	<input type="checkbox"/>

29. What is the estimated yearly income for your household?

Under \$25,000	<input type="checkbox"/>	Over \$100,001	<input type="checkbox"/>
\$25,001 - \$50,000	<input type="checkbox"/>	Unsure	<input type="checkbox"/>
\$50,001 - \$75,000	<input type="checkbox"/>	Do not wish to answer	<input type="checkbox"/>
\$75,001 - \$100,000	<input type="checkbox"/>		

30. Which time period was your house built in?

- Before 1950
- 1950 – 1970
- 1971 – 1990
- 1991 or later

31. How many bedrooms does your house have?

- One
- Two
- Three
- Four or more

32. How do you heat your house?

- | | | | |
|-------------------------|--------------------------|-----------------|--------------------------|
| Open fire | <input type="checkbox"/> | Gas heater | <input type="checkbox"/> |
| Log Burner | <input type="checkbox"/> | Central heating | <input type="checkbox"/> |
| Electric radiant heater | <input type="checkbox"/> | Oil heater | <input type="checkbox"/> |
| Electric fan heater | <input type="checkbox"/> | | |
| Other..... | | | |

33. Does anyone in your house smoke?

- Yes No

34. Do you have insurance for your house and possessions?

- Yes
- No
- Unsure

35. Is your house rented or owned?

- Rented Owned

Thank you for participating in this survey which will aid my research. I hope it has also raised your awareness of smoke alarms and fire danger.

Smoke Alarm Survey Results

AREA	SMKALM	AMOUNT	W:hallway	W:bedroom	W:living	W:kitchen	W:garage	W:other	LENGTH	Working
AL01	1	1	0	0	1	0	0	0	2	2
AL02	2	0	0	0	0	0	0	0	0	0
AL03	2	0	0	0	0	0	0	0	0	0
AL04	2	0	0	0	0	0	0	0	0	0
AL05	1	2	1	1	0	0	0	0	4	1
AL06	1	1	1	0	0	0	0	0	3	1
AL07	2	0	0	0	0	0	0	0	0	0
AL08	1	1	1	0	0	0	0	0	4	1
AL09	1	2	1	0	1	0	0	0	2	1
AL10	1	1	1	0	0	0	0	0	3	1
AL11	1	1	1	0	0	0	0	0	3	1
AL12	2	0	0	0	0	0	0	0	0	0
AL13	2	0	0	0	0	0	0	0	0	0
AL14	1	2	0	0	0	0	0	1	1	2
AL15	1	3	1	1	0	0	0	0	3	1
AL16	1	2	0	1	0	0	0	0	2	1
AL17	2	0	0	0	0	0	0	0	0	0
AL18	1	2	0	0	1	0	0	0	3	1
AL19	2	0	0	0	0	0	0	0	0	0
AL20	2	0	0	0	0	0	0	0	0	0
AL21	1	3	1	0	0	0	0	0	1	1
AL22	1	1	0	0	0	0	0	1	2	2
AL23	1	1	1	0	0	0	0	0	3	1
AL24	1	2	1	0	1	0	0	0	2	1
AL25	2	0	0	0	0	0	0	0	0	0
AL26	2	0	0	0	0	0	0	0	0	0
AL27	1	1	0	0	1	0	0	0	2	1
AL28	2	0	0	0	0	0	0	0	0	0
AL29	1	3	1	0	1	1	0	0	2	1
AL30	2	0	0	0	0	0	0	0	0	0
H01	1	1	1	0	0	0	0	0	1	1
H02	1	4	1	1	1	0	0	0	4	1
H03	1	2	1	0	0	0	0	1	4	1
H04	1	2	1	0	1	0	0	0	3	1
H05	1	1	0	1	0	0	0	0	2	1
H06	2	0	0	0	0	0	0	0	0	0
H07	1	2	1	0	0	0	0	0	3	2
H08	2	0	0	0	0	0	0	0	0	0
H09	1	1	1	0	0	0	0	0	3	1
H10	1	2	1	1	0	0	0	0	3	1
H11	1	2	1	1	0	0	0	0	2	1
H12	2	0	0	0	0	0	0	0	0	0
H13	1	3	1	0	0	0	0	0	2	1
H14	1	2	1	0	0	0	0	0	4	1
H15	1	3	1	1	0	1	0	0	4	1
H16	2	0	0	0	0	0	0	0	0	0
H17	1	1	1	0	0	0	0	0	1	1
H18	1	3	1	1	0	0	0	0	5	1
H19	1	1	0	0	0	1	0	0	4	1
H20	1	4	1	0	1	0	0	0	3	1
H21	2	0	0	0	0	0	0	0	0	0
H22	1	1	1	0	0	0	0	0	1	1
H23	1	1	1	0	0	0	0	0	2	1
H24	1	2	1	0	1	0	0	0	2	1
H25	1	2	1	1	0	0	0	0	5	1
H26	1	1	1	0	0	0	0	0	5	1
H27	2	0	0	0	0	0	0	0	0	0
H28	1	1	1	0	0	0	0	0	4	1
H29	2	0	0	0	0	0	0	0	0	0
H30	1	2	1	0	1	0	0	0	3	1

WorkKA	CHECK	FALSE	FOFTEN	FREASONWHY	P:Individ	P:Family	P:Building	P:Posses	ANOTHER	
1	1	2	0	0	3	0	0	0	1	2
0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	3
1	1	1	1	1	1	1	0	0	1	8
1	1	2	0	0	6	1	0	0	1	8
0	0	0	0	0	0	0	0	0	0	2
1	1	2	0	0	1	0	1	0	1	8
2	1	1	4	1	6	0	1	0	0	8
1	1	2	0	0	6	0	1	0	0	8
1	1	2	0	0	3	0	1	0	0	8
0	0	0	0	0	0	0	0	0	0	4
0	0	0	0	0	0	0	0	0	0	9
1	1	2	0	0	3	0	1	0	0	8
1	1	2	0	0	1	1	1	1	1	8
1	1	2	0	0	3	1	0	1	0	8
0	0	0	0	0	0	0	0	0	0	9
1	1	1	3	1	1	1	0	0	0	8
0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	2
1	1	1	2	1	1	0	1	0	0	8
1	1	2	0	0	1	0	1	0	0	2
1	1	2	0	0	5	0	1	0	0	8
1	2	1	4	1	3	0	0	0	1	8
0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	2
1	1	2	0	0	3	1	0	0	0	8
0	0	0	0	0	0	0	0	0	0	2
1	1	1	2	1	3	0	1	0	0	8
0	0	0	0	0	0	0	0	0	0	2
1	1	2	0	0	1	0	1	0	0	8
1	1	2	0	0	6	1	1	1	1	8
1	1	2	0	0	3	1	1	1	1	7
1	1	2	0	0	1	0	1	1	1	8
2	1	1	4	1	5	0	1	0	0	8
0	0	0	0	0	0	0	0	0	0	2
2	1	2	0	0	3	0	1	0	0	8
0	0	0	0	0	0	0	0	0	0	2
1	1	2	0	0	3	1	1	1	1	2
1	1	1	1	1	1	0	1	1	0	8
1	1	1	2	1	1	0	1	0	0	6
0	0	0	0	0	0	0	0	0	0	2
1	1	1	5	1	3	0	1	0	0	8
2	1	2	0	0	3	1	1	1	1	8
1	1	1	3	1	1	0	1	1	1	8
0	0	0	0	0	0	0	0	0	0	3
1	2	2	0	0	6	1	1	1	1	2
1	1	2	0	0	1	0	1	1	0	8
1	1	1	3	1	1	0	1	0	0	2
1	1	2	0	0	3	1	1	1	1	8
0	0	0	0	0	0	0	0	0	0	2
1	1	2	0	0	6	1	0	0	0	8
1	1	1	5	1	1	0	1	0	1	8
2	1	2	0	0	3	1	0	0	1	2
1	1	2	0	0	6	0	1	1	0	8
1	1	2	0	0	1	1	1	1	1	8
0	0	0	0	0	0	0	0	0	0	2
1	1	1	3	4	1	0	1	0	0	8
0	0	0	0	0	0	0	0	0	0	2
1	1	1	5	1	3	0	1	0	0	8

DETECT	INVEST	CHANCE	ESCAPE	LFIRE	LFWORK	SFWORK	BUYALM	FURNISH	TVAD	GENDER
1	1	2	2	2	0	2	2	2	1	1
1	1	4	2	2	0	0	0	4	1	2
1	1	5	1	2	0	0	0	4	1	1
1	1	1	2	2	0	0	0	4	2	1
1	1	4	1	2	0	2	3	3	1	2
1	1	5	2	2	0	2	1	2	2	2
1	1	3	2	2	0	0	0	2	2	2
1	1	4	2	2	0	2	1	3	1	1
1	1	2	2	2	0	2	1	4	2	1
1	1	5	1	2	0	2	1	2	2	2
1	1	4	2	2	0	2	3	3	1	2
2	2	6	2	2	0	0	0	4	1	1
1	1	4	2	2	0	0	0	4	2	1
1	1	5	1	2	0	2	3	4	1	1
1	1	5	2	1	3	2	3	4	1	2
1	1	5	2	2	0	2	1	4	1	1
1	1	4	2	1	3	0	0	4	1	2
1	1	6	2	2	0	2	1	4	2	1
1	1	3	2	2	0	0	0	4	2	1
1	1	3	2	2	0	0	0	4	2	2
1	1	5	2	2	0	2	1	4	1	1
1	1	2	2	2	0	2	3	4	2	2
1	1	3	2	2	0	2	3	4	2	1
1	1	3	2	2	0	2	1	4	1	2
1	1	3	2	2	0	0	0	3	1	1
1	1	4	1	2	0	0	0	1	1	2
1	1	5	1	2	0	2	3	4	1	2
1	1	4	1	2	0	0	0	4	1	1
1	1	5	1	2	0	2	1	4	1	1
1	1	5	2	2	0	0	0	4	1	2
1	1	5	2	2	0	2	3	1	2	2
1	1	5	2	2	0	1	1	4	1	1
1	1	5	2	2	0	2	1	4	1	2
1	1	3	1	2	0	2	2	4	2	1
1	1	4	2	2	0	0	0	3	1	2
1	1	5	1	2	0	2	1	4	1	1
1	1	2	1	2	0	0	0	4	2	2
1	1	4	1	2	0	2	1	4	2	1
1	1	4	2	2	0	2	1	4	1	2
1	1	5	2	2	0	2	1	4	2	1
1	1	4	1	2	0	0	1	3	2	1
1	1	4	2	2	0	2	4	3	2	1
1	1	4	2	2	0	2	2	2	2	2
1	1	4	2	2	0	2	2	4	1	2
1	1	3	2	2	0	0	0	1	2	1
1	1	3	2	2	0	2	2	4	1	2
1	1	4	1	2	0	2	3	2	1	2
1	1	3	1	2	0	2	1	3	1	2
1	1	3	1	2	0	2	2	3	1	1
1	1	5	1	2	0	0	0	4	1	1
1	1	5	1	2	0	2	1	1	2	1
1	1	3	2	2	0	2	2	4	1	2
1	1	4	1	2	0	2	1	3	2	1
1	2	4	2	2	0	2	2	4	2	1
1	1	5	1	2	0	2	3	4	1	2
1	1	5	2	2	0	0	0	4	1	2
1	1	3	2	2	0	2	4	2	1	1
1	1	4	2	2	0	0	0	4	1	1
1	1	5	2	2	0	1	3	4	1	1

AGE	ETHNIC	PEOPLE	KIDS	EDUCATE	INCOME	AGEH	BEDROM	H:Openfire	H:LogB	H:ElecRad
1	2	4	1	4	2	2	4	0	0	1
2	1	1	1	2	1	3	2	0	0	1
2	1	2	1	3	2	2	2	0	0	1
5	1	4	1	1	2	1	4	0	0	1
6	1	1	1	2	1	3	2	0	0	0
8	1	1	1	1	1	1	3	0	0	1
7	1	3	1	2	6	2	4	0	1	1
2	1	3	1	5	3	3	3	0	0	1
3	1	4	1	4	4	1	4	0	0	1
4	1	3	2	5	5	1	3	1	0	0
3	1	1	1	5	2	1	3	0	1	0
8	1	1	1	6	1	1	2	0	0	1
2	1	3	1	5	7	2	3	0	0	0
4	1	2	1	2	4	4	3	0	0	1
4	1	2	1	3	4	4	2	0	0	0
2	1	3	1	3	6	1	3	0	0	1
4	1	2	1	5	2	1	2	0	0	0
7	1	1	1	1	1	2	1	0	0	1
4	1	4	1	3	2	1	4	0	0	1
2	1	2	1	2	2	4	2	0	0	0
3	1	2	1	5	7	1	2	0	0	0
5	1	2	1	3	1	1	2	0	0	0
6	1	2	1	4	3	2	2	0	0	0
2	1	4	1	2	1	2	3	1	0	0
4	2	3	2	1	2	2	3	1	0	1
3	1	3	1	4	2	1	2	1	0	1
5	1	1	1	2	7	2	1	0	0	0
7	1	1	1	1	1	3	1	0	0	0
2	1	2	1	4	7	4	2	0	0	0
2	1	2	1	4	1	1	3	1	0	1
5	1	3	1	5	2	2	3	0	1	0
3	1	4	3	5	5	2	4	0	0	0
5	1	4	1	4	5	1	4	1	0	0
6	1	2	1	2	4	2	3	0	1	1
4	1	4	1	5	5	3	4	0	0	0
3	3	2	1	3	5	4	3	0	1	0
7	1	2	1	2	5	4	3	1	0	0
2	1	4	1	4	5	3	4	0	0	0
4	1	4	2	3	5	1	4	0	0	0
3	1	4	2	2	3	1	3	0	1	0
4	1	4	3	5	3	1	4	0	1	1
5	1	3	1	5	5	3	3	0	0	0
4	1	4	1	5	5	2	4	0	0	1
5	1	2	1	4	7	4	3	0	0	0
4	1	4	3	3	5	1	4	1	0	0
2	1	3	1	2	3	1	3	0	0	1
4	1	3	1	4	4	2	3	0	1	0
4	1	4	1	4	4	1	3	1	1	0
1	1	4	1	4	6	1	4	0	0	0
4	1	4	3	4	7	1	4	0	0	1
5	1	2	1	1	5	1	4	0	1	1
4	3	3	1	5	7	1	3	0	0	0
2	1	4	2	3	5	3	3	0	1	0
7	1	2	1	2	5	4	3	0	0	0
5	1	4	1	3	5	1	4	1	0	1
7	1	1	1	4	2	3	3	0	0	1
7	1	1	1	1	7	3	3	0	0	1
4	1	3	1	3	5	1	3	0	1	0
1	1	3	1	2	4	3	3	0	0	0
1	1	4	1	3	4	2	4	0	1	0

H:ElecFan	H:Gas	H:Central	H:Oil	H:Other	SMOKER	INSURE	RNTOWN
1	1	0	0	0	1	2	1
1	0	0	0	0	1	1	1
1	0	0	0	0	2	1	1
0	0	0	0	0	1	1	1
0	0	0	1	0	2	1	2
1	0	0	0	0	2	1	2
0	0	0	0	0	2	1	2
1	0	0	0	0	1	1	2
0	1	0	0	0	2	1	2
0	1	0	1	0	2	1	2
1	1	0	0	0	2	1	1
0	0	0	0	0	2	1	2
1	0	0	1	0	1	1	1
1	0	0	0	0	2	1	1
1	0	0	1	0	2	1	2
0	0	0	0	0	1	1	1
0	1	0	0	0	2	2	2
0	0	0	0	0	2	2	2
0	0	0	1	0	1	1	2
1	0	0	1	0	2	3	2
0	1	0	0	0	2	1	2
0	0	0	0	1	1	1	2
1	0	0	0	0	2	1	2
1	1	0	0	0	1	2	1
0	0	0	0	0	1	1	1
0	0	0	0	0	2	1	1
0	0	0	1	0	2	3	1
1	0	0	0	0	2	1	2
0	0	1	0	0	2	1	2
0	0	0	1	0	2	1	1
0	0	0	0	1	2	1	2
0	1	0	0	0	2	1	2
0	1	0	1	0	1	1	2
1	0	0	0	0	2	1	2
1	0	0	0	1	2	1	2
0	1	1	0	0	2	1	2
0	0	1	0	1	2	1	2
0	1	0	0	1	2	1	2
1	1	0	0	0	2	2	1
0	1	0	0	0	2	1	1
0	0	1	0	0	2	1	2
0	1	1	0	0	1	1	2
0	1	0	0	0	2	1	2
1	1	0	1	0	2	1	2
1	0	0	0	0	2	1	2
0	0	1	1	0	1	1	2
0	0	0	0	1	2	1	2
1	0	1	0	0	2	1	2
0	0	0	1	1	2	1	2
1	0	0	0	1	2	1	2
0	1	0	0	1	2	1	2
1	0	0	1	0	2	1	1
0	1	0	0	1	2	1	2
1	0	0	1	0	2	1	1
0	0	0	0	0	1	1	2

FIRE ENGINEERING RESEARCH REPORTS

95/1	Full Residential Scale Backdraft	I B Bolliger
95/2	A Study of Full Scale Room Fire Experiments	P A Enright
95/3	Design of Load-bearing Light Steel Frame Walls for Fire Resistance	J T Gerlich
95/4	Full Scale Limited Ventilation Fire Experiments	D J Millar
95/5	An Analysis of Domestic Sprinkler Systems for Use in New Zealand	F Rahmanian
96/1	The Influence of Non-Uniform Electric Fields on Combustion Processes	M A Belsham
96/2	Mixing in Fire Induced Doorway Flows	J M Clements
96/3	Fire Design of Single Storey Industrial Buildings	B W Cosgrove
96/4	Modelling Smoke Flow Using Computational Fluid Dynamics	T N Kardos
96/5	Under-Ventilated Compartment Fires - A Precursor to Smoke Explosions	A R Parkes
96/6	An Investigation of the Effects of Sprinklers on Compartment Fires	M W Radford
97/1	Sprinkler Trade Off Clauses in the Approved Documents	G J Barnes
97/2	Risk Ranking of Buildings for Life Safety	J W Boyes
97/3	Improving the Waking Effectiveness of Fire Alarms in Residential Areas	T Grace
97/4	Study of Evacuation Movement through Different Building Components	P Holmberg
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School of Engineering
University of Canterbury
Private Bag 4800, Christchurch, New Zealand

Phone 643 364-2250
Fax 643 364-2758