

## ORIGINAL ARTICLES

## New Zealand children's involvement in home activities that carry a burn or scald risk

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### Abstract

**Objectives**—The self reported involvement of elementary schoolchildren from Auckland, New Zealand was measured for home activities that carry a burn or scald risk.

**Method**—A survey was conducted with 421 children aged 7–13 years. The survey asked children whether they carried out specific home activities involving hot water, fire, or appliances that carry a burn risk. It also measured their knowledge of the three basic fire safety messages taught to New Zealand schoolchildren by the fire service.

**Results**—The results showed that although involvement levels increased with age, the majority of even the youngest children reported carrying out a number of the risky activities, such as preparing hot drinks, running their own baths, or using a microwave without help. No gender differences were found in the number of risky activities engaged in. Significant ethnic differences were found, with higher risk involvement by indigenous Maori and children of Pacific Island descent than children of European or Asian descent. Each of the three fire safety messages were correctly identified by between 79%–91% of the children.

**Conclusions**—Investigation of children's involvement in household activities that carry an injury risk may help in the design of prevention strategies, including school based education. Prevention efforts need to acknowledge the ages at which children begin to undertake specific household tasks, including those that involve care for younger siblings, and be attuned to the needs of different ethnic groups.

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Keywords: burns and scalds; household activities; school based education

Burns and scalds suffered by children can lead to life long scarring and severe cases require long periods of hospitalisation. In the period from 1984–93, 5034 New Zealand children aged 0–14 years were hospitalised as a result of scalds, and 821 children were hospitalised with burns.<sup>1</sup>

One key strategy to try to lower children's injury rates, including those resulting from burns and scalds, has been education designed

to encourage safer practices in the home. A number of studies have reported positive outcomes as a result of injury prevention counselling to parents through routine paediatric visits.<sup>2–5</sup> Such counselling may be particularly effective when part of a community-wide prevention effort that includes training and information dissemination through a variety of outlets, as well as the ready availability of safety devices.<sup>6,7</sup> However, strategies directed at adult behaviour may neglect the part that school aged children play in household tasks and in caring for younger siblings.

A number of burns prevention educational programs have been designed for schoolchildren. These have focused on the effects and treatment of burns,<sup>8</sup> integrating burns prevention messages into aspects of the school curriculum,<sup>9</sup> lectures on the causes and treatment of burns,<sup>10,11</sup> and using a robot and cartoons to deliver burns prevention messages.<sup>12</sup> Evaluations that have been carried out on some of these programs have suggested that they are successful in improving children's knowledge.<sup>10–12</sup> However, these programs do not appear to have been based on research into exactly what injury risk activities children are involved with at home, and at what ages. Therefore, questions remain about the optimal content and timing for these programs. Also, no evaluations have attempted to measure if there has been behaviour change in the home as a result of the education.

The need for a close examination of New Zealand children's involvement in home activities that carry a burn or scald risk became apparent from the discussions of a working group on injuries to children. This was coordinated by *Safe Waitakere*, a community based injury prevention project currently operating in Waitakere City, New Zealand. School nurses in the group reported that children were using many household objects that carried a burn or scald risk. Of special concern was the possible role of children in caring for younger siblings. Scalds from hot water are a particular risk for children under 2 years of age in New Zealand and elsewhere.<sup>13,14</sup> If older siblings are bathing young children, boiling water, or using the elements on the stove, then this needs to be taken into account when planning for prevention.

Previous research on children's involvement in household activities has largely focused on gender differences,<sup>15–17</sup> or the effects of different

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How much do you use hot water and hot things?  
Please help us find out about people your age by answering these questions

1. How old are you? <input style="width: 50px;" type="text"/>	11. Do you ever use the elements on the stove? <input style="width: 100px;" type="text"/> Yes, with an adult's help <input style="width: 100px;" type="text"/> Yes, by myself <input style="width: 50px;" type="text"/> No
2. Are you a girl or a boy? <input style="width: 50px;" type="text"/> Girl <input style="width: 50px;" type="text"/> Boy	12. Do you ever use the microwave? <input style="width: 100px;" type="text"/> Yes, with an adult's help <input style="width: 100px;" type="text"/> Yes, by myself <input style="width: 50px;" type="text"/> No
3. What ethnic group are you? <input style="width: 100px;" type="text"/>	13. Do you ever light the fire, or put wood on the fire? <input style="width: 100px;" type="text"/> Yes, with an adult's help <input style="width: 100px;" type="text"/> Yes, by myself <input style="width: 50px;" type="text"/> No
4. Do you have younger brothers or sisters living in your house?? <input style="width: 50px;" type="text"/> Yes <input style="width: 50px;" type="text"/> No Write how old each one is here. Use as many boxes as you need to <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/> <input style="width: 20px;" type="text"/>	14. Do you ever use the iron? <input style="width: 100px;" type="text"/> Yes, with an adult's help <input style="width: 100px;" type="text"/> Yes, by myself <input style="width: 50px;" type="text"/> No
5. Do you ever have hot drinks, like tea or coffee or milo? <i>Only tick "yes" if they are as hot as an adult would have</i> <input style="width: 50px;" type="text"/> Yes <input style="width: 50px;" type="text"/> No	15. Do you ever use matches and lighters? <input style="width: 100px;" type="text"/> Yes, with an adult's help <input style="width: 100px;" type="text"/> Yes, by myself <input style="width: 50px;" type="text"/> No
6. Do you ever make hot drinks for people in your family? <input style="width: 50px;" type="text"/> Yes <input style="width: 50px;" type="text"/> No	16. What is the first thing you do if your clothes are on fire? <input style="width: 100px;" type="text"/> Run around very fast <input style="width: 100px;" type="text"/> Stop, drop, and roll <input style="width: 100px;" type="text"/> Take them off quickly <input style="width: 100px;" type="text"/> Ring 111
7. Do you ever run the bath for yourself? <input style="width: 50px;" type="text"/> Yes <input style="width: 50px;" type="text"/> No	17. If there is lots of smoke, how do you get to the door to get out? <input style="width: 50px;" type="text"/> Run <input style="width: 50px;" type="text"/> Walk <input style="width: 50px;" type="text"/> Crawl
8. Do you ever give your little brother or sister a bath? <input style="width: 50px;" type="text"/> Yes <input style="width: 50px;" type="text"/> No <input style="width: 100px;" type="text"/> No little brother or sister	18. What do you do if you get a burn? <input style="width: 100px;" type="text"/> Butter <input style="width: 100px;" type="text"/> Ointment <input style="width: 100px;" type="text"/> 5 minutes cold water <input style="width: 100px;" type="text"/> 10 minutes cold water
9. Do you ever run the bath for your little brother or sister? <input style="width: 50px;" type="text"/> Yes <input style="width: 50px;" type="text"/> No <input style="width: 100px;" type="text"/> No little brother or sister	
10. Do you ever use the oven? <input style="width: 100px;" type="text"/> Yes, with an adult's help <input style="width: 100px;" type="text"/> Yes, by myself <input style="width: 50px;" type="text"/> No	

Figure 1 Questionnaire used in the study.

contexts and family structures on children's participation in tasks.<sup>18, 19</sup> Possible burn injury risk can be found in some of the activities looked at in these studies, for example in questions about whether the child has "baked a cake or a pie", "cooked a complete meal for the family", "ironed things",<sup>16</sup> or spent time in "food/meal preparation".<sup>17, 18</sup> However, burn risk was not the primary focus in these studies, and it is not always possible to separate a measure of children's involvement in these risky activities from their involvement in other activities.

The items chosen for the questionnaire described in this paper (see fig 1), were derived from a list of practices thought to be major causes of burns and scalds in children. Thirty four practices were initially identified by

SafeKids, a New Zealand agency involved in research and advocacy on child safety. The 11 items chosen for this study were those activities in which it was possible for children to be involved, and where safety improvements could potentially be made.

## Method

### SAMPLING

Two schools in the city of Auckland, New Zealand, were selected. These were chosen to represent the diversity of Auckland's population. In order to select the schools, a socioeconomic indicator developed by the Ministry of Education was used. This indicator codes schools from decile 1 (low) to 10 (high) socioeconomic

Table 1 Percentage of children of each age group involved in burns risk activities

	7/8 years (n=120)	9 years (n=82)	10 years (n=99)	11 years (n=65)	12/13 years (n=55)	Total (n=421)
Burn risk activity						
Have hot drinks	69	67	68	80	87	73
Prepare hot drinks	64	79	88	92	91	81
Run own bath	69	79	68	80	84	74
Run sibling's bath	41	50	43	45	45	46
Give bath to sibling	32	35	34	29	27	32
Use elements alone	26	50	46	66	74	48
Use oven alone	21	21	26	43	44	28
Use microwave alone	64	81	86	72	86	76
Use iron alone	21	34	46	46	65	39
Use open fire alone	26	26	19	34	26	25
Use matches alone	17	31	40	63	69	39
Mean number of the 11 activities engaged in by each age group						
Mean	4.5	5.5	5.6	6.5	7.0	5.6
SD	2.2	2.4	2.0	2.4	2.1	2.4

strata. One of the selected schools had a decile rating of 1 and the other had a rating of 9. All students in years 4–8 (aged 7–13) took home a letter informing parents of the study, and giving them the opportunity to call the researchers or talk to the school principal if they had concerns about their child's participation. No parents refused to participate. All the children in the selected years who were present on the day of the survey took part, a total of 421.

The number of children in each age group can be seen on table 1. The two youngest and two oldest age groups were combined. In total, 215 girls and 206 boys participated. The largest ethnic group represented were children of European descent (49%). The second largest group were of Pacific Island descent (22%); 13% of the children were indigenous Maori, and 15% were Asian. Sixty five per cent indicated that they had younger siblings. Children of Pacific Island descent and Maori more often reported having younger siblings than children of European descent, while Asian children were the group least often to report this.

#### PROCEDURE

The children completed the questionnaire in their classes, in the presence of a public health nurse, two researchers, and the teacher. The conditions under which the questionnaire was filled in were tightly controlled. Children were instructed not to talk with each other, but to raise their hand if they had questions. Particular care was taken to ensure that the questions and format were understood by every child. Each question was read and explained to the

children. Role playing was used to help illustrate exactly what was meant. In some classes the researchers worked with small groups to help them. Children with limited English skills were helped by a researcher and/or a student in the class who spoke the child's first language. The children appeared to take their task seriously, and there was no evidence of any peer pressure influencing their responses.

#### CONTENT

Three general types of information were gathered. First, demographic details were obtained: age, sex, ethnicity, and the number of younger siblings. Second, children were asked whether they ever carried out five activities using hot water and another six using objects that could burn (see fig 1 and table 1). The five hot water items used a yes/no format to determine if children had ever carried out the activity in question. The other six questions allowed children to indicate if they had participated in the activity alone, with supervision, or not at all. These three categories of response were considered necessary for the more complex activities that were likely to be learnt under adult supervision, over a period of time. However, for the purposes of analyses, the children who responded that they either had no involvement, or only engaged in the activity with adult help, were separated from the children who indicated they engaged in the activity alone. This enabled the construction of a composite burns risk exposure score.

Finally, information was collected about the child's knowledge of the safety procedures taught at schools by the fire service. They were asked what was the correct thing to do if their clothes were on fire, how to get to the door in a room with lots of smoke, and what to do if they got a burn. Each of these questions was presented in a multiple choice format, with the correct answers being: stop, drop, and roll; crawl; and 10 minutes cold water, respectively.

#### Results

The children reported considerable exposure to burns risks in their home environments, with a mean involvement in 5.6 of the 11 activities asked about. As shown on table 1, particularly

Table 2 Percentage of children of each ethnic group involved in burns risk activities

	Maori (n=57)	Pacific Island (n=94)	European (n=206)	Asian (n=64)
Burn risk activity				
Have hot drinks	81	74	71	68
Prepare hot drinks	86	88	79	69
Run own bath	83	81	70	70
Run sibling's bath	61	54	39	34
Give bath to sibling	44	42	25	31
Use elements alone	61	55	47	27
Use oven alone	32	32	28	22
Use microwave alone	84	62	82	73
Use iron alone	44	54	33	31
Use open fire alone	19	29	29	16
Use matches alone	49	47	34	34
Mean number of the 11 activities engaged in by each ethnic group				
Mean	6.4	6.2	5.3	4.7
SD	2.0	2.0	2.4	2.7

Table 3 Percentage of girls and boys involved in burns risk activities

	Girls (n=215)	Boys (n=206)
Burn risk activity		
Have hot drinks	71	74
Prepare hot drinks	81	80
Run own bath	73	76
Run sibling's bath	49	40
Give bath to sibling	40	24
Use elements alone	44	52
Use oven alone	32	25
Use microwave alone	77	76
Use iron alone	39	38
Use open fire alone	18	33
Use matches alone	29	49
Mean number of the 11 activities engaged in by each ethnic group		
Mean	5.5	5.7
SD	2.4	2.3

large numbers of children indicated involvement in the following activities: preparation of hot drinks (81%), having hot drinks themselves (73%), running their own baths (74%), and using a microwave without help (76%). Table 1 also shows the percentage of children in each age group involved in the burns risk activities. The exposure of each ethnic group is shown in table 2, and table 3 shows the relative involvement of girls and boys.

A burns risk exposure score was made up from the total of the 11 risk activities reported. A four way analysis of variance (ANOVA) was then used to examine possible sex, age, ethnicity, and sibling status effects on this score. The ANOVA revealed significant main effects for age,  $F(4,352) = 10.94$ ,  $p < 0.001$ , ethnicity,  $F(3,352) = 4.76$ ,  $p < 0.005$ , and sibling status,  $F(1,352) = 4.09$ ,  $p < 0.05$ . There were no significant higher order interactions between factors. The higher levels of risk reported for children with younger siblings was not surprising, given that two items in the composite risk index specifically referred to siblings (run bath for sibling and give bath to sibling). When these items were removed and the analyses repeated, the main effect of siblings disappeared, but the age and ethnicity effects remained.

Post hoc comparisons using Tukey's HSD test with a 0.05 significance level were carried out on the age and ethnicity subgroup means reported in tables 1 and 2. With regard to age

group differences, the youngest children (7 and 8 year olds) reported exposure to significantly fewer burn risks than all the older age groups. The reported risk exposures of the 9 and 10 year old children were also significantly lower than those of the oldest age group (12 and 13 year olds). Tests carried out on the ethnic subgroups revealed that the Maori and Pacific Island children reported significantly greater exposure to burn risks than the European and Asian subgroups.

The possible direct or interactive effects of different school backgrounds on exposure to burns risks were also assessed. No significant main or interaction effects for school background emerged from these analyses.

The use of a composite burn risk index in the present study tended to obscure gender differences in individual activities. Table 3 shows, for example, that 20% more boys reported using matches alone than did girls, and 15% more reported lighting or putting wood on fires. However, 16% more girls reported bathing younger siblings.

#### BURNS SAFETY KNOWLEDGE

The total rate of safety knowledge was high, with 79% of the sample knowing "stop, drop, and roll", 91% knowing "crawl low in smoke", and 80% knowing 10 minutes cold water for burns.

$\chi^2$  Analyses were performed to assess sex, age, ethnicity, and sibling status differences in the extent of knowledge. Once again, significant differences occurred by age ( $\chi^2(8) = 18.1$ ,  $p < 0.05$ ) and ethnicity ( $\chi^2(6) = 63.9$ ,  $p < 0.001$ ). Table 4 shows the percentage of children in each age group with low, moderate, or high knowledge scores for the three items, and table 5 shows the knowledge of children in each ethnic group. As can be seen, the safety knowledge of the youngest age group appeared to be less than that of the older children. Children of European descent, followed by those of Maori descent, showed greater knowledge than children in the other two ethnic subgroups.  $\chi^2$  Analyses were performed on the distributions of the European and Maori children's knowledge scores between the two schools. No significant differences emerged.

Table 4 Burns safety knowledge of children (percentage) in each age group

	7/8 years (n=120)	9 years (n=82)	10 years (n=99)	11 years (n=65)	12/13 years (n=55)	Total (n=421)
Low knowledge	16	4	13	5	13	11
Moderate knowledge	33	22	24	23	24	26
High knowledge	51	74	63	72	64	63

Note: percentages do not always add up to 100 because of rounding.

Low knowledge = 0 or 1 question correct, moderate knowledge = 2 correct, high knowledge is all three questions correct.

Table 5 Burns safety knowledge of children (percentage) in ethnic group

	Maori (n=57)	Pacific Island (n=94)	European (n=206)	Asian (n=64)
Low knowledge	5	21	3	24
Moderate knowledge	35	32	17	38
High knowledge	60	47	80	38

Note: percentages do not always add up to 100 because of rounding.

Low knowledge = 0 or 1 question correct, moderate knowledge = 2 correct, high knowledge is all three questions correct.

#### Discussion

The results of this study clearly indicate that New Zealand elementary schoolchildren are involved in a large number of household tasks that carry a burn or scald risk. While the involvement of children increased steadily with age, the majority of even the youngest children surveyed, 7 and 8 year olds, reported having hot drinks, preparing hot drinks for other family members, running their own baths, and using a microwave without help. The study also pointed to ethnic differences in exposure to these risk activities, with Maori and Pacific Island children showing the highest levels of involvement. Children from these groups also have the highest death rates from injury in New Zealand.<sup>20</sup> The differences found in the study could not be explained by the tendency of

Maori and Pacific Island children to have more younger siblings, as having siblings was not related to involvement once the two items which specifically addressed sibling care were removed from the analysis. Instead, the results suggest cultural differences in children's involvement in household tasks. In practical terms, these findings indicate that it is essential for any prevention strategies developed to be sensitive to, and effective with, Maori and Pacific Island children and their families.

Ethnic differences were also found in the extent to which children could recognise the correct safety action to take in the event of a fire, or when they received a burn. It is possible that these differences reflect language problems. European and Maori children showed generally good understanding of these messages, which are taught at all schools on a regular basis by the fire service. These children are likely to have English as a first language. Some children of Pacific Island descent, however, and in particular Asian children who received the lowest knowledge scores as a group, may not have had sufficient English to fully comprehend the fire service instructions. The Asian children were also more likely to have been recent immigrants and may not yet have received the teaching.

Despite the lack of a gender difference in burns risk exposure, there were differences in some of the activities that might be expected to be particularly sex typed with boys reporting considerably more involvement in using matches and fires, and girls more often indicating they had bathed their younger sibling. A recent Australian study found a similar sex typing in children aged 8–14 years.<sup>15</sup>

#### LIMITATIONS

This study did not measure frequency of involvement—it simply asked if children had ever done the activities in question. A study that measured how often children carried out the activities may yield somewhat different gender and ethnicity patterns. A further limitation is that the information gathered was restricted to children's reports. Although every effort was made to ensure children understood the task, and that they did not compare their responses with their classmates, a follow on study using older siblings' and parents' reports may add to the understanding of children's involvement in potentially injurious home activities.

#### Implications for prevention

This study raises a number of questions about prevention strategies. Passive strategies, such as lowering hot water temperatures,<sup>14</sup> will clearly be of value in protecting children, regardless of whether it is children themselves, or adults who are responsible for tasks such as running children's baths. However, the finding that young children are involved in activities that carry a burn or scald risk, suggests the need for additional targeted interventions. It may be possible to encourage parents to monitor their children, but it would also seem advisable to look closely at the viability of teaching safe

practices to children themselves. While safety messages can be delivered through media campaigns and health professionals, schools are a promising outlet for instruction tailored to the needs of children from different communities.

Previous school based burns education programs have suggested that children are eager to learn and readily absorb knowledge about safe practices.<sup>10–12</sup> While the effect of these programs on behaviour has not been demonstrated, a recent study that involved teaching elementary schoolchildren about seat belts found some success in increasing usage in schools where the teaching protocols were properly observed.<sup>21</sup>

The current study could be used in the design of a teaching program that targeted children at the ages they are beginning to engage in the relevant activities. Children in their fourth year of school are clearly ready to learn about the safe use of a microwave and an electric jug, safe placement of hot drinks, and how it is safest to run cold water in the bath first. It is particularly notable that 7 and 8 year olds reported highly similar levels of involvement in the sibling bathing activities as did the older age groups. With children aged 0–2 years at particular risk from scalds,<sup>13 14</sup> these results suggest that education about scalds risks in the home could be included in the earlier school years. Education regarding burn risk activities could be more heavily focused upon in somewhat later years. Use of the elements, stove, iron, and matches increased steadily with age, with only around a quarter or less of children in the youngest age group reporting using these objects without help.

Particular care would need to be taken to ensure that any school based strategies are appropriate to ethnic groups that may have increased levels of involvement and be at greater risk. The effectiveness of such education on behaviour would then need to be evaluated. The role of children in household activities that carry an injury risk should not be ignored. Targeted strategies such as school based education may be useful in encouraging safe practices at an age when habits are being formed, and therefore may form a valuable part of comprehensive programs to reduce childhood injury.

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