

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

# **The aetiology of dog bites in New Zealand**

A thesis in partial fulfilment of the requirements for the degree of  
Master of Science  
in  
Zoology  
at Massey University, Palmerston North,  
New Zealand.

Amy Aroha Foster Wake

2005

## **Abstract**

This thesis looks at factors associated with dog bites to people in New Zealand. It focuses on the causes of dog bites, the characteristics of both the dogs involved in bite incidents and the people bitten, and opinions on issues related to dog control.

This information was collected through two separate surveys. The first was a survey of veterinary and veterinary nursing students at Massey University. Students were included in this sample regardless of whether or not they had been bitten by a dog or how minor their injuries were. This study provided an insight into how many people had been bitten by a dog as well as factors associated with an increased risk of being bitten. Males, people in rural areas and people with a longer history of living with dogs were more likely to have been bitten by a dog. Many respondents had been bitten while between the ages of 5 and 10 years.

For the second study, surveys were sent to people who had made claims to the Accident Compensation Corporation because of dog bites. People in this sample had sustained injuries that required medical attention. More people were bitten by male dogs than female dogs. Protection of territory, accidental bites, fear, and pain were considered to be the most common reasons for dogs to bite. The victim's home was the most common location for attacks, although many bites took place in public areas. Almost half of all respondents said it was either very or somewhat likely that their bite would have been prevented by a law requiring dog owners to fence their houses so visitors can access a door without coming into contact with a dog.

This research highlights the need for more data on the causes and circumstances of dog attacks. This information is extremely useful for formulating effective dog control legislation and making recommendations aimed at reducing the incidence of dog attacks.

## **Thesis format and Authorship**

Each chapter is written as a stand-alone paper. Consequently, there will be some repetition of material and the references are at the end of each chapter.

I am the principal author of each chapter/paper. I carried out the research and analysed and wrote up the results for each chapter. Ed Minot and Kevin Stafford both provided editorial advice and Ed also provided statistical advice. Paul Perry assisted in survey design and provided editorial advice.

Approval for this research was obtained from the Massey University Human Ethics Committee.

### **Chapter 1 Introduction**

Co-authors:

Kevin J Stafford, Institute of Veterinary and Biomedical Sciences, Massey University, Palmerston North.

Edward O Minot, Ecology Group, Massey University, Palmerston North.

Chapter One will be submitted to an as-yet undecided journal.

### **Chapter 2 Dog bites in New Zealand: A survey of veterinary students**

Co-authors:

Kevin J Stafford, Institute of Veterinary and Biomedical Sciences, Massey University, Palmerston North.

Edward O Minot, Ecology Group, Massey University, Palmerston North.

Paul E Perry, School of Sociology, Social Policy and Social Work, Massey University, Palmerston North.

Chapter Two will be submitted to the New Zealand Veterinary Journal.

### **Chapter 3 A survey of dog bite victims in New Zealand**

Edward O Minot, Ecology Group, Massey University, Palmerston North.

Kevin J Stafford, Institute of Veterinary and Biomedical Sciences, Massey University, Palmerston North.

Paul E Perry, School of Sociology, Social Policy and Social Work, Massey University, Palmerston North.

Chapter Three will be submitted to the New Zealand Medical Journal.

## **Acknowledgements**

A huge thanks must go to my supervisors, Ed Minot and Kevin Stafford for all their help throughout my masters. Their guidance was greatly appreciated and both were always willing to provide encouragement through all the setbacks that seem to go hand-in-hand with conducting research.

Paul Perry also acted as an unofficial supervisor. Paul's expertise in the fine art of survey design was invaluable and, having a background in sociology, he was able to look at the results from a slightly different angle.

This research would not have been possible without the cooperation of the ACC and, in particular, Peter Larking in the ACC research department. The ACC were responsible for drawing the sample from their records and were kind enough to organise and pay for the mail-out of the surveys.

Thanks to Suzanne Young and Kiryn Weaver who helped take some of the pain out of entering data from hundreds of surveys. To the students in the Community Lab who answered calls from some of the participants trying to get hold of me, thank you. I know some of the calls were interesting, to say the least!

And, finally, many thanks to all the participants who took the time to fill out my surveys. This research would not have been possible without their help and many also offered some sincere encouragement. Thank you!

# Contents

	<b>Page</b>
<b>Chapter 1</b> Introduction	1
<b>Chapter 2</b> Dog bites in New Zealand: A survey of veterinary students	23
<b>Chapter 3</b> A survey of dog bite victims in New Zealand	43
<b>Chapter 4</b> Discussion and recommendations	71
<b>Appendix 1</b> Questionnaire for veterinary student study	
<b>Appendix 2</b> Questionnaire for ACC survey	
<b>Appendices</b> Chi-square analyses for chapters two and three <b>1-79</b>	CD

## List of Tables

		<b>Page</b>
<b>Chapter 1. Introduction</b>		
Table 1.1	Total admittances to public hospitals in New Zealand and total day cases (0 days stay and routine discharge) resulting from dog bites from 1995 to 2000.	2
Table 1.2	Number of breeds reported as being in the top five most aggressive breeds and whether they were reported out of proportion with comparison populations in ten studies of dog aggression.	7-9
<b>Chapter 2. Public experience of dog bites: a survey of veterinary students</b>		
Table 2.1	Percentage of people who have lived with a dog from 0 years to more than 15 years who have been bitten by a dog compared to those that have never been bitten.	26
Table 2.2	Percentage of injuries rated from very minor to severe in different age groups.	27
Table 2.3	Percentage of physical and psychological injuries to the face/head, legs/feet and hands rated minor and moderate/severe.	28
Table 2.4	Percentage of bites to the face/head, hand, legs/feet and multiple body parts compared to the sex of the dog responsible.	29
Table 2.5	Dog breeds reported to have bitten at least three respondents.	30
Table 2.6	Percentage of physical and psychological injuries rated very minor/non-existent, minor or moderate/severe caused by small, medium and large dogs.	30
Table 2.7	The percentage of people from different types of areas (excluding those who had never been bitten) and the percentage of people that were bitten in each area.	31
Table 2.8	Percentage of bites taking place in different locations.	32

Table 2.9	The percentage of dogs that bit on the hand, leg-foot and face/head compared to the most common reasons for the bite.	33
Table 2.10	The most common reasons for dogs to bite compared to the sex of the dog responsible.	33

### **Chapter 3. A survey of dog bite victims in New Zealand**

Table 3.1	Percentage of people bitten on the arm, hand, leg or multiple parts of the body compared to the sex of the biting dog. Percentage and frequency of bites by breed.	48
Table 3.2	Percentage of people bitten on the arm, hand, leg or multiple parts of the body compared to the size of the biting dog.	49
Table 3.3	Frequency and percentage of bites that took place in different areas of New Zealand.	52
Table 3.4	Percentage of male and female respondents bitten in each of the top five locations for dog bites.	53
Table 3.5	The percentage of bites attributed to different causes as suggested by the respondent and the researcher.	54
Table 3.6	Percentage of people bitten on the face/head, hand, legs/feet or multiple body parts compared to the reason for the bite.	55
Table 3.7	The top five reasons for dogs to bite compared to the sex of the dog responsible.	56
Table 3.8	The top five reasons for dogs to bite compared to the fate of the dog.	57

## Introduction

Dangerous dogs, which have been defined as any dogs that display aggression with minimal provocation, thereby posing a threat to the safety of people and other animals (Anonymous, 1999), have received much media attention recently. Injuries resulting from dog bites are a serious public health problem in New Zealand and in many other countries. Large numbers of people are bitten each year and these attacks often involve substantial injuries, trauma, scarring and, sometimes, death.

Dog control is an issue that potentially affects every member of society in one way or another. While some sub-groups of the population are more at risk than others, anyone could be bitten by a dog and, with the New Zealand dog population conservatively estimated at 500,000 (Department of Internal Affairs, 2003), there are many dog owners who will be affected by tougher dog control laws. As the dog-control issue has such far-reaching implications, it would be wise to have an accurate understanding of factors associated with dog bites so that effective measures can be taken to reduce the incidence and severity of dog bite incidents.

### **The victims of dog attacks**

Langley (1992) reported 961 dog bite-related hospitalisations between 1979 and 1988 and a further 3025 hospitalisations between 1989 and 2001 were attributed to dog bites (Marsh et al., 2004). One study reported 386 people were admitted to public hospitals following dog bites in one year from 1999 to 2000 (Table 1.1)(Department of Internal Affairs, 2003). This is a large increase on the 158 hospitalisations in New Zealand following dog bites in 1988 (Langley, 1992).

**Table 1.1 Total admittances to public hospitals in New Zealand and total day cases (0 days stay and routine discharge) resulting from dog bites from 1995 to 2000.\***

	1995/1996	1996/1997	1997/1998	1998/1999	1999/2000
<b>Total</b>	373	352	314	333	386
<b>admittances</b>					
<b>Number of</b>	31	34	31	55	45
<b>day cases</b>					
<b>Total:</b>	1,722				

\*After Department of Internal Affairs (2003)

### Age

Most studies dog bite victims have reported strong and consistent trends with regards to age and sex. Bites to children are reported more often than those involving adults (Blackshaw, 1991; Wright, 1991; Langley, 1992; Sacks and Lockwood, 1996; Marsh et al., 2004). Sacks and Lockwood (1996) found that 56.9% of people killed by dogs in America from 1989 to 1994 were less than 10 years of age. The death rate was particularly high for babies less than 1 month old and fell steadily until age 29 when it began to rise slowly again. Langley (1992) found that 55% of people in New Zealand requiring hospital treatment for dog bites from 1979 to 1988 were under 10 years old but a later study found that this age group had dropped to 38.8% of people needing medical treatment for dog bites between 1989 and 2001 (Marsh et al., 2004). Of the 1,722 people needing medical attention for dog bites in New Zealand between 1995/1996 and 2000/2001, 34% were aged 0 to 10 years and 45% were under 15 (Department of Internal Affairs, 2003). Wright's (1991) literature review found that around half of reported bites involved children less than 10 years old. Similarly, Overall and Love (2001), carried out an extensive review of the literature and concluded that children are more likely to be the victims of reported bites than adults.

It has been suggested that children are more commonly the victims of dog attacks due to the often provocative nature of their behaviour and due to misinterpretation of body language by both children and dogs (Overall and Love, 2001). The high-pitched squeals and erratic movements of children during play may trigger predatory responses in some dogs (Overall and Love, 2001) or fear in others. Many children are rough in their

handling of dogs and this may cause dogs to bite due to fear, pain or annoyance (Love and Overall, 2001). Furthermore, children may misinterpret signals such as the wagging tail of the confident aggressive dog as a sign of happiness (Love and Overall, 2001) and they may also be more likely to approach unfamiliar dogs than older people (Langley, 1992).

The majority of the studies mentioned so far looked at bites causing death or requiring medical attention and there is some evidence that children are not actually bitten more often than adults – they may simply be more likely to require medical attention when they do get bitten. In a survey of veterinary clients from 20 veterinary practices in Canada, respondents were asked if their dog had ever bitten anyone regardless of severity (Guy et al., 2001c). The results suggested that more adults were bitten than children. In fact 63.8% of the population exposed to the biting dogs in this survey were adults but adults made up 73.5% of the people who had been bitten.

Incidents involving children may be more likely to be reported than those involving adults due to concern on the part of the parents (Langley, 1992) and also because of the nature and severity of the injuries they are likely to sustain. Most of the injuries to adults are to the arms, legs, hands and feet (Write, 1991; Langley, 1992; Overall and Love, 2001) whereas children are far more likely to be bitten on the head, neck or face (Szapkowski et al., 1989; Langley, 1992; Brogan et al., 1995) with most studies reporting that, probably due to their height, around 70% of injuries to children involve these areas (Overall and Love, 2001). It is these injuries that are much more likely to require medical attention (Guy et al., 2001).

## **Gender**

Another fairly consistent finding is that males are bitten more often than females (Szapkowski et al., 1989; Podberscek, Blackshaw and Nixon, 1990; Avner and Baker, 1991; Wright, 1991; Langley, 1992; Brogan et al., 1995; Overall and Love, 2001; Department of Internal Affairs, 2003; Marsh et al., 2004). Podberscek et al. (1990) found that 66% of children admitted to a hospital in Australia for dog bite injuries were male which was similar to the 55% (Langley, 1992), 60% (Department of Internal Affairs, 2003) and 60.5% (Marsh et al., 2004) reported for people of all ages admitted to New Zealand hospitals for treatment of dog bites. This suggests that males may act in ways

that are more likely to provoke aggression in some dogs (Overall and Love, 2001) or that males may interact with dogs more often (Wright, 1991). Wright (1991) cites a study looking at contacts between people and free-ranging dogs in public places around Sacramento, California. Males were involved in 67% of the 2767 interactions observed suggesting that they do indeed come into contact with dogs more often than females. This may explain why they appear to get bitten more often (Wright, 1991). Podberscek et al. (1990) suggested that male children may be more inclined to play roughly or tease dogs than female children and points out that this may also increase their likelihood of being bitten.

Not all studies support the suggestion that males are more likely to be bitten than females. Sacks and Lockwood (1996) found that males made up 50.5% of people killed by dogs in America between 1989 and 1994, while Podberscek and Blackshaw (1993) found slightly more females (53%) had been bitten by dogs in an Australian survey.

### **Ethnic background**

There appear to be very few studies that have looked at whether people from different ethnic background or socioeconomic groups are more or less likely to be bitten by dogs. Langley (1992), however, does report that the rate of hospitalisations due to dog bites is much higher in Maori than in non-Maori. The admittance rate for non-Maori from 1979 to 1988 was 2.6 per 100,000 population and 6.7 for Maori (Langley, 1992) and 5.9 per 100,000 for non-Maori and 10.6 for Maori from 1989 to 2001 (Marsh et al., 2004). The reason for this difference is unclear. It is possible that Maori are more likely to own or come into contact with dogs than non-Maori, or that they are more likely to own or interact with larger breeds that are more capable of causing injuries requiring medical attention. Avner and Baker (1991) report that 81% of children taken to the Hospital of Philadelphia Emergency Department (Pennsylvania, USA) were African-American but did not discuss the finding further. It is possible that this simply reflects the demographics of the wider population of this area.

## **Characteristics of dogs that bite**

### **Breed**

A number of breed-related factors are associated with the potential to injure (Overall and Love, 2001). These include behavioural factors such as duration, intensity and frequency of aggression and response to contextual information and physical factors, including jaw structure, muscle mass and size (Overall and Love, 2001).

It is extremely difficult to get an accurate picture of trends in aggression by the various breeds of dog. It is not appropriate to assume that because a particular breed is responsible for the most bites to people that it must be more aggressive than other breeds. Relative frequency of that breed within the population must be taken into account and gaining accurate data on the breeds present in a given population presents numerous problems (Wright, 1991; Overall and Love, 2001). To determine whether particular breeds are presented for aggression problems or bite people more often than expected, most studies compare their results with either numbers of breeds presented as general veterinary patients or the numbers of registered dogs of each breed. Using the proportions of registered breeds to compare such data is particularly problematic (Wright, 1991; Langley, 1992). Generally, the proportion of dogs that are registered is extremely low (Wright, 1991). Wright (1991) reported that up to 70.9% of the estimated dog population in some areas may be unregistered. Only around 47% of the estimated 173,000 dogs in the Auckland area are thought to be registered (Langley, 1992) but another New Zealand study estimated that only 6% of all dogs are unregistered (Department of Internal Affairs, 2003). Further complications include the possibility that many owners misidentify their dogs' breed and thus register them incorrectly and the fact that not all breeds are equally likely to be registered (Wright, 1991; Langley, 1997). For example, Overall and Love (2001) suggest that American Pit Bull Terrier owners in the United States may be less likely to register their dogs. Finally, national registration statistics may be misleading when looking at a particular population due to variation in breed distributions within a particular country, city or region and variation in breed popularity over time (Wright, 1991).

These factors aside, there do appear to be some trends concerning aggression and dog breeds. Table 1.2 provides a summary of the findings of a number of studies that have looked at the breeds that are most often involved in bite incidents or those that are presented most often to animal behaviour or veterinary practitioners for treatment of aggression towards humans.

Perhaps the most obvious breed trend is the finding that mixed breed dogs, while often among the top five most common breeds in these studies of aggression, are usually under-represented compared to the wider population, especially in studies of dominance aggression (Line and Voith, 1986; Beaver, 1993; Lund et al, 1996; Takeuchi et al., 2001). Indeed, none of the above studies found mixed breeds to be presented to behaviour clinics or be responsible for bites more than expected. Lund et al. (1996) found that mixed breed dogs had significantly lower risks for all types of aggression and problems related to children. Line and Voith (1986) found that only 12% of dogs requiring treatment for dominance aggression were of mixed breeds but mixed breed dogs made up 27% of the population of dogs treated at the same practice for medical reasons. Borchelt (1983) examined 245 cases of aggression and found mixed breeds to be significantly less likely to exhibit dominance aggression than pure-breds. In light of this finding, it was suggested that there is a genetic component to dominance aggression and that the tendency to display dominance aggression is a recessive trait (Borchelt, 1983). This may be advantageous as too many dominant individuals in a social group like that of the wolf or dog would probably have caused excessive social conflicts (Lockwood, 1976, cited in Borchelt, 1983). It is also possible that humans have selectively bred for dominance aggression in pure-bred dogs (Borchelt, 1983; Cameron, 1997). Showing standards mean that show dogs are encouraged to willingly hold dominant postures including erect tail and ears and confident body posture with the head held high (Borchelt, 1983; Cameron, 1997). It is generally the winning males at these dog shows that perform a large percentage of the matings within each breed, meaning that the tendency to show dominant postures (and any associated dominance aggression) could unintentionally be selected for (Borchelt, 1983).

**Table 1.2. Number of breeds reported as being in the top five most aggressive breeds and whether they were reported out of proportion with comparison populations in ten studies of dog aggression.**

<b>Breed</b>	<b>Study</b>	<b>Reported out of proportion*</b>
German shepherd	Borchelt (1983)	-
	Wright and Nesselwrote (1987)	-
	Spakowski et al. (1989)	Y
	Avner and Baker (1991)	-
	Blackshaw (1991)	Y
	Landsberg (1991)	Y
	Shewell and Nancarrow (1991)	-
	Beaver (1993)	Y
	Podberscek and Blackshaw (1993)	Y
	Lund et al. (1996)	Y
	Thompson (1997)	Y
	Takeuchi et al.(2001)	N
Cocker spaniel	Borchelt (1983)	-
	Wright and Nesselwrote (1987)	-
	Blackshaw (1991)	Y
	Beaver (1993)	Y
	Lund et al. (1996)	Y
	Line and Voith (1986)	-
Springer spaniel	Borchelt (1983)	-
	Takeuchi et al.(2001)	Y
	Wright and Nesselwrote (1987)	-
	Line and Voith (1986)	-
	Landsberg (1991)	Y
	Beaver (1993)	Y

<b>Breed</b>	<b>Study</b>	<b>Reported out of proportion*</b>
Doberman	Borchelt (1983)	-
	Spakowski et al. (1989)	Y
	Avner and Baker (1991)	-
	Landsberg (1991)	Y
	Beaver (1993)	Y
	Podberscek and Blackshaw (1993)	N
	Lund et al. (1996)	Y
	Thomson (1997)	Y
Poodle	Borchelt (1983)	-
	Line and Voith (1986)	-
	Szpakowski et al. (1989)	N
	Blackshaw (1991)	Y
Lhasa Apso	Borchelt (1983)	-
	Line and Voith (1986)	-
	Landsberg (1991)	Y
Rottweiler	Avner and Baker (1991)	-
	Thompson (1997)	Y
	Takeuchi et al. (2001)	Y
Dalmatian	Takeuchi et al. (2001)	N
	Landsberg (1991)	Y
Kelpie	Podberscek and Blackshaw (1993)	N
Australian cattledog	Podberscek and Blackshaw (1993)	Y
	Blackshaw (1991)	Y
	Thompson (1997)	Y
Labrador	Szpakowski et al. (1989)	-
	Shewell and Nancarrow (1991)	-
	Podberscek and Blackshaw (1993)	N
	Takeuchi et al. (2001)	N

<b>Breed</b>	<b>Study</b>	<b>Reported out of proportion*</b>
Pit bull terrier	Avner and Baker (1991)	-
Bull terrier	Blackshaw (1991)	Y
	Podberscek and Blackshaw (1993)	Y
	Thompson (1997)	Y
Staffordshire bull terrier	Shewell and Nancarrow (1991)	-
Jack Russel terrier	Shewell and Nancarrow (1991)	-
Fox terrier	Lund et al. (1996)	Y
Collie	Lund et al. (1996)	Y
Mix	Borchelt (1983)	-
	Line and Voith (1986)	N
	Wright and Nesselwrote (1987)	-
	Szpakowski et al. (1989)	N
	Avner and Baker (1991)	-
	Landsberg (1991)	-
	Shewell and Nancarrow (1991)	-
	Beaver (1993)	N
	Lund et al. (1996)	N
Takeuchi et al. (2001)	N	

\*Y= yes the breed was reported out of proportion

N = no the breed was not reported out of proportion

- = relative frequency of this breed was not compared to a wider population

At the other end of the scale, German shepherds consistently appear among the top five most aggressive breeds for almost all of the studies reviewed here. Out of 13 studies that looked at the frequencies of various breeds which had bitten people or had aggression problems, 12 listed the German shepherd as being one of the top 5 most commonly aggressive breeds (Avner and Baker, 1991; Borchelt, 1983; Line and Voith, 1986; Wright and Nesselwrote, 1987; Blackshaw, 1991; Landsberg, 1991; Beaver, 1995; Podberscek and Blackshaw, 1993; Lund et al., 1996; Spakowski et al., 1989; Takeuchi, et al., 2001; Thompson, 1997). Eight studies compared the proportion of aggressive dogs of each

breed with the proportion of the general population that these breeds comprised (Blackshaw, 1991; Landsberg, 1991; Beaver, 1995; Podberscek and Blackshaw, 1993; Lund et al., 1996; Spakowski et al., 1989; Takeuchi, et al., 2001; Thompson, 1997). Seven of these studies reported that German shepherds were presented more often for aggression problems or were responsible for more bites than expected from their frequency within the population (Blackshaw, 1991; Landsberg, 1991; Beaver, 1995; Podberscek and Blackshaw, 1993; Lund et al., 1996; Spakowski et al., 1989).

Cocker spaniels and springer spaniels were also identified as among the top five most aggressive breeds in six of these studies each. Three of the six studies identifying cocker spaniels as among the most aggressive breeds compared the number of aggressive dogs with their frequency within the wider population and all three found the cocker spaniel to bite or be presented for aggression problems more often than expected (Blackshaw, 1991; Beaver, 1995; Lund et al., 1996). The same was also true for springer spaniels, with Takeuchi et al. (2001), Landsberg (1991) and Beaver (1996) all reporting this breed to do be more aggressive than expected. Landsberg (1991) recorded the numbers of dogs presented for various behaviour problems at one animal behaviour practice in Canada and two in America. Springer spaniels were the most commonly presented breed for aggression problems at all three practices. When compared with breeds registered with the Canadian and American Kennel Clubs, Springer spaniels did not rate among the top 15 most popular breeds in either country. This suggests that springer spaniels are presented for aggression problems out of proportion with their actual numbers in the general population (Landsberg, 1991). Overall and Love (2001) point out that owners of springer spaniels may be more likely to seek treatment for aggression in their dogs than owners of other breeds which may partly account for this startling finding. Some American lines of springer spaniels selected for certain aspects of their conformation are known to have higher risks for developing aggression problems (Overall and Love, 2001) and if springer spaniel owners are aware of this risk they may be more inclined to seek professional help for any aggression problems that develop.

Interestingly, the fighting breeds, for which there has been so much media attention in many countries, are not frequently mentioned in studies of breed-related aggression trends. Three of the studies looked at here found bull terriers to be among the top five breeds most often responsible for bites or presented for aggression problems (Blackshaw,

1991; Podberscek and Blackshaw, 1993; Thompson, 1997). Blackshaw (1991) looked at 223 cases of dogs presented to a behavioural clinic in Australia. Bull terriers were the most commonly presented breed in this study, making up 16% of the dogs brought to the clinic for treatment of aggression (predominantly directed towards strangers). This is high for this breed given that bull terriers made up only 3.1% of the registered dog population in Australia at the time of the study (Blackshaw, 1991). A survey of 406 people around the city of Brisbane, Australia, found bull terriers and their crosses were responsible for 8.3% of the 263 bites to people (Podberscek and Blackshaw, 1993). This places bull terriers as the third most common breed to bite people in this study (behind German Shepherds and Cattle Dogs) and, again, means they are over-represented compared to their breed registrations (Podberscek & Blackshaw, 1993). Two other bull terrier breeds – the pit bull terrier and the Staffordshire bull terrier – were only mentioned in one study each (Avner and Baker, 1991; Shewell and Nancarrow, 1991)

Sacks and Lockwood (1996) found that pit bulls terriers and their crosses were responsible for 24 of 84 deaths caused by dogs in America from 1989 to 1994 where breed was reported. This was a large jump in numbers compared to the next two breeds most often involved in fatal attacks. These were rottweilers and German shepherds which caused 16 and 10 deaths respectively (Sacks and Lockwood, 1996).

There is some evidence that owners of fighting breeds may differ from owners of other breeds. Avner and Baker (1991) report that 67% of pit bull terriers that attacked children were freely roaming compared to 38% of dogs of other breeds. Sacks and Lockwood (1996) found 25% of fatal attacks involving pit bull terriers were by unrestrained dogs that were not on the owner's property whereas this was true for only 18% of attacks by other breeds. Pit bull terriers were also more likely to be chained than other dogs and 63.6% of pit bull terriers involved in fatal attacks were reported as having had a history of aggression prior to the fatal incident compared to only 38.7% for other dog breeds (Sacks and Lockwood, 1996). While these findings need more investigation, they could suggest that owners of pit bull terriers are more likely to allow their dogs to roam free off their properties and are less likely to seek help for aggression problems or take other measures to prevent future attacks when they know their dogs are aggressive towards people. Both these factors could increase the numbers of fighting dogs involved in attacks. In addition, Overall and Love (2001) suggest that owners of fighting breeds may be less likely to

register their dogs than owners of other breeds. This would mean that comparisons between the numbers of fighting dogs involved in bite incidents or presented for aggression problems with the number of these dogs registered in the population are particularly inaccurate and that these breeds would be more likely to be reported as being over-represented in studies of aggression.

### **Sex and neuter status**

Sex has a definite effect on the likelihood that a dog will display aggression. Male dogs are presented more often for aggression problems and bite more often than female dogs (Borchelt, 1983; Landsberg, 1991; Beaver, 1993; Podberscek and Blackshaw, 1993; Lund et al., 1996; Takeuchi et al., 2001). Males made up between 66% and 73.2% of dogs presented for treatment of aggression problems or dogs responsible for bites to humans in 6 studies (Borchelt, 1983; Landsberg, 1991; Beaver, 1993; Podberscek and Blackshaw, 1993; Lund et al., 1996; Takeuchi et al., 2001). This gender difference is particularly apparent for dogs displaying dominance aggression (Landsberg, 1991; Guy et al., 2001a; Takeuchi et al., 2001). For example, Takeuchi et al. (2001) found 72.1% of dogs treated for aggression towards owners but only 58.4% of dogs treated for aggression towards strangers at an animal behaviour clinic were male.

There is also some evidence for a relationship between neuter status and aggression problems (Borchelt; 1983; Beaver, 1993; Overall, 1995; Guy et al., 2001a). Beaver (1993), Borchelt (1983), Wright and Nesselwrote (1987) and Guy et al. (2001a) all found that intact males are most often presented to behaviour clinics for aggression problems, followed by castrated males, spayed females then intact females. Borchelt (1983), however, compared the number of dogs treated for aggression problems in each category (intact male/castrated male/intact female/spayed female) with the numbers of dogs in each category presented for general veterinary care at the same practice and found the proportions to be roughly equal. His analysis suggests that, for example, spayed females are not more likely to develop aggression problems than intact females but that there are simply more spayed females in the population.

The possibility that spayed females may be more likely to develop aggression problems is interesting and has implications for dog owners who may wish to spay their dog for practical reasons. Overall (1995) analysed data obtained by O'Farrel and Peachy (1990)

in an effort to look into this issue further. She found that bitches spayed after two years of age did subsequently show an increase in aggression, but that the same was also true for bitches that had not been spayed. Overall (1995) attributed this increase in aggression in bitches over the age of two years to the onset of social maturity. Perhaps a more important finding was that for bitches spayed before 11 months of age, aggression increased more often than it decreased. This indicates that early spaying in some bitches may result in a strengthening of any aggressive tendencies (Overall, 1995). As a result, it may be wise to delay this procedure for young bitches showing early signs of aggression.

This is not true for male dogs, however, in which case castration is often recommended in an effort to weaken aggressive tendencies (Neilson et al, 1997). Neilson et al. (1997) looked at the effect of castration on a number of behaviour problems in dogs. Castration significantly reduced the incidence of aggression towards other dogs, family members and territorial intruders but not aggression towards unfamiliar people. Age of the dog at the time of castration and duration of problem behaviour prior to castration did not appear to affect the level of improvement (Neilson et al., 1997).

### **Age**

There are few data on age of dogs presented for treatment of aggression problems and those involved in bite incidents. There is some indication, however, that younger dogs are more likely to display aggression towards people. Wright and Nesselwrote (1987) report that the average age for dogs with various aggression problems was 3.4 years. They found no significant differences in the average ages of dogs with different types of aggression problems.

Lund et al. (1996) found that dogs between the ages of 6 and 17 months accounted for 42.1% of dogs presented for various behaviour problems and the mean age was 23 months. Interestingly, dogs with aggression problems were significantly older than those presented for toileting problems, phobias and problems associated with lack of training but dogs presented for aggression towards the owner were significantly younger than dogs with other types of aggression problems. It is unclear whether this reflects differences in the length of time owners will tolerate different types of problem behaviours before seeking professional help or whether it is due to differences in the age of onset. Wright and Nesselwrote (1987) reported that many owners tried to correct

problem behaviours themselves before seeking help, suggesting that most dogs in their study had been displaying problem behaviours for some time.

The finding that dogs presented for aggression towards the owner were younger than dogs with other types of aggression problems (Lund et al., 1996) is an interesting one. It could be that aggression towards owners develops earlier than other forms of aggression. It is also possible that this type of aggression is more severe or puts a greater strain on the dog-owner relationship and, therefore, owners with these types of aggressive dogs could be more inclined to seek professional help promptly.

## **Circumstances surrounding dog bites**

### **Location of attacks and relationships between dogs and victims**

Many people are bitten by their own dogs or a dog known to them (Wright, 1991; Overall and Love, 2001). Podberscek and Blackshaw (1993) found that 42% of bite victims were attacked by dogs with which they were familiar and 15.6% of these people had been bitten by a dog living in their own house. Most fatal attacks (58.5%) involve unrestrained dogs on the owner's property (Sacks and Lockwood, 1996). A further 18.3% of fatal attacks in this study were by dogs restrained on their owner's property, while 22% involved unrestrained dogs off the owner's property and one fatal attack was by a police or guard dog on duty (Sacks & Lockwood, 1996).

In New Zealand, 38% of attacks requiring medical attention occurred in the home (Langley, 1992). 11% took place on a public street, 5% were by dogs on farms and location was not specified for 41% of attacks (Langley, 1992).

There is some evidence that people in urban areas are more likely to be bitten by dogs (Department of Internal Affairs, 2003). 85% of dog attacks reported to councils around New Zealand in 2001/2002 occurred in urban areas. This is not surprising given that 83% of the population live in urban areas (Department of Internal Affairs, 2003). What is surprising, however, is that a much higher proportion of dogs live in mixed/rural areas (Department of Internal Affairs, 2003). The proportion of registered dogs reported by councils in mixed/rural areas is between 237 and 245 per 1000 people and only 86 to 87

per 1000 people in urban areas (Department of Internal Affairs, 2003). Given this finding, one might expect a higher proportion of bites in mixed/rural areas and quite why this is not the case is unclear. Perhaps people in mixed/rural areas are simply less likely to report bites to their local council. Coming from smaller communities where bite victims may be more likely to know the owner of the dog that bit them, these people may be less willing to report bites for fear of causing conflicts between themselves and the owners.

### **Placing the blame**

The dogs involved in attacks on humans often carry much of the blame for aggressive interactions (Wright, 1991). Dog control laws in many countries have focused on dangerous breeds of dogs and many dog attacks are reported as being unprovoked (Avner and Baker, 1991; Wright, 1991; Overall and Love, 2001). There are some who argue victims provoke attacks and others who believe owners should be made responsible for their dogs (Wright, 1991).

Owners and bite victims often report that attacks are unprovoked. For example, Podberscek and Blackshaw (1993) found that 33% of people bitten by dogs believed the attack was unprovoked. Truly unprovoked aggression (idiopathic aggression or rage) is, however, extremely uncommon (Blackshaw, 1991; Reisner et al., 1994) and when the circumstances leading up to the bite are examined more closely, it is usually possible to determine what caused the dog to bite (Borchelt, 1983; Wright, 1991; Reisner et al, 1994; Cameron, 1997). In a study on dominance aggression, Cameron (1997) found that many owners reported sudden changes in their dogs and that these dogs often attacked without warning. Cameron (1997), however, concluded that most of these “sudden changes” occurred after a period of escalating aggression that had gone unanswered by the owner.

A number of studies have looked at the situations that commonly lead to attacks and found that victim behaviour is an important factor (Podberscek and Blackshaw, 1993). In a survey of bite victims in Australia, 21.7% of biting dogs were reported as being unintentionally provoked (eg. through play or petting), 15.3% of dogs were defending a resource (eg. the victim approached a dog that was eating), 3.5% were intentionally provoked, while 19.8% of attacks were predatory and 33% were said to be unprovoked (Podberscek and Blackshaw, 1993). Guy et al. (2001b) surveyed dog owners who had been bitten by their own dogs. In this study, dominance aggression (where the owner

carried out an act perceived by the dog to be unacceptably dominant) accounted for 42.4% of bites, play (excitement/accident) accounted for 28.6% of bites and fear caused another 16.5% of bites. A further 3.1% of bites were attributed to protective aggression (where the dog bit someone approaching the owner) and 5.8% were health-related (Guy et al., 2001b).

In many countries, including New Zealand, revised dog control laws focus on making owners pay for the actions of their dogs through tougher fines and jail sentences. While some studies do suggest that owner behaviour, personality and the upbringing they have given their dogs may be a factor in the development of aggression, there is not a lot of evidence supporting this idea and what little there is is often conflicting. Podberscek and Serpell (1997) compared the personalities of cocker spaniel owners whose dogs had various types of aggression problems with a control group of owners whose dogs were not aggressive. Owners of very aggressive Cocker Spaniels were more likely to be undisciplined, tense and emotionally less stable (Podberscek and Serpell, 1997). As a result, it was suggested that shyness, neuroses and/or anxiety of the owners were causing the dogs in this study to become more “aggressively assertive” (p.75) in a range of situations (Podberscek and Blackshaw, 1997). Similarly, Cameron (1997) reports that non-dominant owners (either those who did not realise there was a need for dominance over their dogs or those who were anti-authoritarian) were responsible for many cases of dominance aggression treated at a behaviour practice. Rather different results concerning owner characteristics were obtained by Unshelm (1997) who surveyed veterinary clients whose dogs had either caused or been the victim of dog-fights. Owners of the aggressive dogs were more likely to be male, to report not having an emotional attachment to the dog, to use physical force on their dogs, to select specific breeds and to keep dogs for security purposes (Unshelm, 1997). Owners of dogs in the victim group were more often women who keep dogs to prevent loneliness, did not often use physical force during training and did not choose their dogs on the basis of breed (Unshelm, 1997). In contrast to these studies, Dodman et al (1996) found no effect of owner personality type on either the development of aggression in their dogs or the outcome of treatment for aggression.

While evidence for an association between owner personality type and the development of aggression is inconclusive, it seems certain that other aspects of owner behaviour are linked with dog aggression and bite incidents. For instance, many attacks are by

unrestrained dogs in public areas (Sacks and Lockwood, 1996) and these attacks would probably have been prevented had the owners ensured their dogs remained restrained and/or on the owner's property. In addition, Sacks and Lockwood (1996) report that a large proportion of fatal attacks on humans are by dogs with histories of aggressive behaviour. Had the owners of these dogs that were known to be aggressive sought professional help, had their dogs euthanized, or ensured they did not come into contact with people, it is likely that these fatalities could have been prevented. Proper socialisation and training can also determine whether aggression develops and in which situations it occurs (Langley, 1997) and, again, this is the responsibility of the owner.

Given the data suggesting that dog characteristics, victim behaviour and owner characteristics all have an effect on the development and/or display of aggression in dogs, it is likely that nothing will be achieved by placing the blame on any one of these parties. Indeed, it is commonly stated that canine aggression is the result of a combination of factors including genetic make-up, hormones, health, experience, training and situational influences (Borchelt, 1983; Wright, 1991; Stafford, 1996)

### **Dog control legislation**

The fact that aggression in dogs is the result of interactions between a variety of factors (Borchelt, 1983; Wright, 1991; Stafford, 1996) suggests that legislation aimed at reducing the incidence of dog bites should target the dogs, their owners and potential victims rather than focusing on one or two of these parties only.

There has been much debate over whether breed-specific bans are effective in reducing bite rates. There does seem to be some evidence suggesting that certain breeds are more likely to bite than others and that some breeds are more likely to cause serious injury. Still, many people argue that the owners of these dogs are to blame and that these supposedly dangerous breeds are no more likely to attack than others (Langley, 1997). The data on dogs involved in bite incidents generally suggest that breeds targeted by breed-ban legislation (ie. fighting breeds) are not often among the most common aggressors. Less stigmatised breeds such as German Shepherds are more often found to be among the most aggressive breeds but when one considers the degree of injury sustained in attacks by these fighting breeds, a different picture emerges.

Pit bulls terriers are the breed most often responsible for fatal attacks in America (Sacks and Lockwood, 1996). Pit bull terriers were responsible for 57 of 177 fatal attacks between 1979 and 1994 where the breed of dog responsible was recorded (Sacks and Lockwood, 1996). The next most common breed in this study was the Rottweiler which was involved in only 19 fatal attacks. Unshelm (1997) found that fighting breeds were most often responsible for moderate, severe and lethal injuries to their victims during dogs fights. Fighting breeds made up 13.2% of the aggressive dogs in this study but were involved in 35% of attacks where the victim sustained severe or lethal injuries (Unshelm, 1997). This finding lead Unshelm (1997) to conclude that “the severity of an injury is related to breed specific aggressiveness” (p.241). Certain breeds of dog have been selected for their abilities to carry out certain activities. Fighting breeds have been selected for their fighting abilities and, as a result, are more capable of causing serious injuries than other breeds (Unshelm, 1997).

Breed bans alone will not alleviate the dangerous dog problem (Unshelm, 1997). Breed specific laws and bans were put in place in France making it illegal buy, sell or import fighting breeds and making it compulsory for any of these dogs already in the country to be sterilised (Koppinen, 2000). Since these laws were passed, owners of these breeds have merely taken their dogs into hiding and the breeding and sale of these dogs has gone underground. Very few dogs have been taken to veterinarians for sterilisation (Kopinnen, 2000).

Among other recent changes to dog control legislation in New Zealand, the maximum penalties for owners of dangerous dogs has increased with the aim of motivating owners to take greater responsibility for their pets. The effectiveness of this law change remains to be seen. Previously, the maximum fine for owners of ‘dogs causing serious injury’ (section 58 of the Dog Control Act) was \$5000. In 2001/2, however, the average fine for owners of dogs causing serious injury was only \$475 and the maximum fine handed out was well under \$5000 (Department of Internal Affairs, 2003). Given this information, there seems to be little point to the legislation changes which set the maximum fine at \$20,000.

New laws ensure that owners have their dogs leashed in public at all times, other than in designated off-leash areas. Owners of dangerous breeds will have to muzzle their dogs in

public. A law was proposed that would have had owners allow visitors access to their front door without coming into contact with the dog through adequate fencing. This law was not included in the final draft of the dog control amendment act. The proposed fencing law, while possibly being highly impractical, may have helped prevent some of the large number of attacks by unrestrained dogs on the owner's property reported by Sacks and Lockwood (1996).

A further method of reducing dog bite incidents may be public education. Given that victim behaviour is often an important factor in dog attacks (Borchelt, 1983; Podberscek and Blackshaw, 1993; Reisner et al., 1994; Cameron, 1997; Guy et al., 2001c), programs aimed at educating people (particularly children) as to what behaviours may cause dogs to bite and how attacks may be prevented could be effective in reducing the number of attacks (Love and Overall, 2001)

## **Conclusions**

Dog aggression is a complex problem involving the interplay of characteristics associated with the dogs, owners and victims involved as well as situational factors (Borchelt, 1983; Wright, 1991; Stafford, 1996). As a result, it is important that dog control laws focus on all parties involved – the dogs, their owners and potential victims.

While there is some evidence suggesting that certain breeds of dog are more dangerous than others, and that certain situations, victim behaviours and owner behaviours may increase the risk of attacks, the data are often inconclusive, contradictory or simply too scarce for definite conclusions to be drawn. Given the social implications associated with dangerous dogs (e.g. medical and dog control costs, injury, trauma) it is important that accurate data are collected on factors associated with dog attacks so that appropriate measures can be taken to reduce the number of attacks that occur.

This research was undertaken with the intention of filling some of the gaps in our knowledge of the incidence, circumstances and risk factors associated with dog bites. Prior to this research there were only three New Zealand studies on this subject (Langley,

1992; Department of Internal Affairs, 2003; Marsh et al, 2004). While these studies all provided valuable information on the characteristics of people bitten by dogs, none went into the circumstances and aetiology of bite incidents in any detail and it is this information that has the greatest potential to be of use in reducing the number of bites that take place.

## References

- Anonymous.** Protocol for assessing aggression in dogs by veterinarians. *Australian Veterinary Journal* 77, 74, 1999
- Avner JR, Baker MD.** Dog bites in urban children. *Pediatrics* 88, 55-7, 1991
- Blackshaw JK.** An overview of types of aggressive behaviour in dogs and methods of treatment. *Applied Animal Behaviour Science* 30, 351-61, 1991
- Beaver BV.** Profiles of dogs presented for aggression. *Journal of the American Animal Hospital Association* 29, 564-69, 1993
- Borchelt PL.** Aggressive behaviour of dogs kept as companion animals: classification and influence of sex, reproductive status. *Applied Animal Ethology* 10,45-61, 1983
- Brogan TV, Bratton SL, Dowd D, Hegenbarth MA.** Severe dog bites in children. *Pediatrics* 96, 947-50, 1995
- Cameron DB.** Canine dominance-associated aggression: concepts, incidence, and treatment in a private behaviour practice. *Applied Animal Behaviour Science* 52, 265-274, 1997
- Department of Internal Affairs.** Survey of territorial authorities on dog control issues – interim report March 2003
- Dodman NH, Moon R, Zelin M.** Influence of owner personality type on expression and treatment outcome of dominance aggression in dogs. *Journal of the American Veterinary Medical Association* 209, 1107-09, 1996
- Guy NC, Luescher UA, Dohoo SE, Spangler E, Miller JB, Dohoo IR, Bate LA.** Demographics and aggressive characteristics of dogs in a general veterinary caseload. *Applied Animal Behaviour Science* 74, 15-28, 2001a

- Guy NC, Luescher UA, Dohoo SE, Spangler E, Miller JB, Dohoo IR, Bate LA.** Risk factors for dog bites to owners in a general veterinary caseload. *Applied Animal Behaviour Science* 74, 29-42, 2001b
- Guy NC, Luescher UA, Dohoo SE, Spangler E, Miller JB, Dohoo IR, Bate LA.** A case series of biting dogs: characteristics of the dogs, their behaviour, and their victims. *Applied Animal Behaviour Science* 74, 43-57, 2001c
- Koppinen J.** Special report. *Australian Veterinary Journal* 78, 520, 2000
- Landsberg GM.** The distribution of canine behaviour cases at three behaviour referral practices. *Veterinary Medicine* 86, 1011-18, 1991
- Langley J.** The incidence of dog bites in New Zealand. *New Zealand Medical Journal* 105, 33-5, 1992
- Langley J.** Controlling dangerous dogs. *New Zealand Medical Journal* 110, 427, 1997
- Line S, Voith VL.** Dominance aggression of dogs towards people: behaviour and response to treatment. *Applied Animal Behaviour Science* 16, 71-83, 1986
- Love M, Overall KL.** How anticipating the relationship between dogs and children can help prevent disasters. *Journal of the American Veterinary Medical Association* 219, 446-52, 2001
- Lund JD, Agger JF, Vestergaard KS.** Reported behaviour problems in pet dogs in Denmark: age distribution and influence of breed and gender. *Preventative Veterinary Medicine* 22, 33-48, 1996
- Marsh L, Langley J, Gauld R.** Dog bite injuries. *The New Zealand Medical Journal* 117, 1042-7, 2004
- Neilson JC, Eckstein RA, Hart BL.** Effects of castration on problem behaviours in male dogs with reference to age and duration of behaviour. *Journal of the American Veterinary Medical Association* 211, 180-182, 1997
- Overall KL.** Sex and aggression. *Canine Practitioner* 20, 16-8, 1995
- Overall KL, Love M.** Dog bites to humans – demography, epidemiology, injury and risk. *Journal of the American Veterinary Medical Association* 218, 1923-34, 2001
- Podberscek AL, Blackshaw JK.** A survey of dog bites in Brisbane, Australia. *Australian Veterinary Practitioner* 23, 178-83, 1993
- Podberscek AL, Blackshaw JK, Nixon JW.** The incidence of dog attacks on children treated at a city hospital. *Australian Veterinary Journal* 67, 79-80, 1990
- Podberscek AL, Serpell JA.** Aggressive behaviour in English cocker spaniels and the personality of their owners. *Veterinary Record* 141, 73-6, 1997

- Reisner IR, Erb HN, Houpt KA.** Risk factors for behaviour-related euthanasia among dominant-aggressive dogs: 110 cases (1989-1992). *Journal of the American Veterinary Medical Association* 205, 855-62,
- Sacks JJ, Lockwood R.** Fatal dog attacks, 1989-1994. *Paediatrics* 97, 891-7, 1996
- Shewell PG, Nancarrow JD.** Dogs that bite. *British Medical Journal* 303, 1512-3, 1991
- Stafford KJ.** Opinions of veterinarians regarding aggression in different breeds of dogs. *New Zealand Veterinary Journal* 44, 138-41, 1996
- Szpakowski NM, Bonnet BN, Martin SW.** An epidemiological investigation into the reported incidents of dog biting in the City of Guelph. *Canadian Veterinary Journal* 30: 937-942, 1989
- Takeuchi Y, Ogata N, Houpt KA, Scarlett JM.** Differences in background and outcome of three behaviour problems of dogs. *Applied Animal Behaviour Science* 70, 297-308, 2001
- Thompson PG.** The public health impact of dog attacks in a major Australian city. *Medical Journal of Australia* 167, 129-32, 1997
- Unshelm ARJ.** Aggressive conflicts amongst dogs and factors affecting them. *Applied Animal Behaviour Science* 52, 229-42, 1997
- Wright JC, Nesselwrote MS.** Classification of behaviour problems in dogs. *Applied Animal Behaviour Science* 19, 169-78, 1987
- Wright JC.** Canine aggression towards people: bite scenarios and prevention. *Veterinary Clinics of North America: Small Animal Practice* 21, 299-314, 1991

## **Dog bites in New Zealand: A survey of veterinary students.**

### **Abstract**

**AIM:** To gain information on factors relating to dog bites in New Zealand, including the incidence of dog bites, characteristics of dogs that bite, the victims and the circumstances that lead to dog bites.

**METHODS:** Veterinary and veterinary nursing students enrolled at Massey University in 2003 were asked to complete a questionnaire. The questionnaire contained questions relating to the students' experience of dog bites and their opinions on dog control legislation.

**RESULTS:** There were 228 valid responses to the survey. 38.6% of respondents had been bitten by a dog with most bites being rated as very minor or minor. 19.5% of bites required medical attention. Male respondents were more likely to have been bitten and a particularly high proportion of people had been bitten while between the ages of 6 and 10 years. The hand was the part of the body most often injured. 20.7% of bites involved a stranger's dog but most involved a dog with which the victim had some degree of familiarity. Taking the number of respondents from rural and city environments into account, respondents were 3.3 times more likely to have been bitten in rural areas than in cities. The victim's home was the most common location for bites (35.6%). Male dogs were responsible for a larger proportion of bites (43.7%) than females (27.6%). Protection of the home, play, accidental bites and rough handling/pain were identified as the most common reasons for dogs to bite. Only four of the 88 bites (4.5%) were reported to authorities.

**CONCLUSION:** Almost 40% of people surveyed had been bitten by a dog. Individuals most at risk of dog bites were those with more experience living with or owning a dog, people in rural areas, those who are under 11 years of age, and males.

## **Introduction**

In New Zealand, the incidence of dog attacks is poorly understood. A survey by the Department of Internal Affairs (2003) found that 3,020 dog attacks were reported to 58 of the 72 regional or city councils in one year to March 2002. In that period, 420 people were admitted to hospitals because of dog bites and around \$19.8 million was spent on dog control by the 58 councils. A further \$760,000 was spent on dog-related education by 28 of the 72 councils. Given the magnitude of this problem, it is perhaps surprising that there are so few New Zealand data on this topic. There is no information on how common dog bites are, the proportion of bites that go unreported, dog breeds involved in attacks, common causes of attacks, or the impact that legislation has on the incidence of dog attacks in New Zealand.

In this study, we surveyed veterinary undergraduate students to gain information on factors relating to dog attacks. We report the proportion of respondents bitten by a dog, characteristics of the respondents, characteristics of the dogs involved in attacks, the impact that recent legislation changes could have had on these attacks and opinions on issues related to dog control.

## **Methods**

### **Subjects and sampling methods**

In 2003, a questionnaire on dog bites was distributed to veterinary and veterinary-nursing students at Massey University (Appendix 1. Please note: from this point on, appendices will be referred to as A2, A3 etc). This questionnaire was distributed to students in the beginning of a lecture for each year in the vet programme. International students were excluded from the sample.

The questionnaire comprised 32 questions in four sections. The first section included questions about the history of dog ownership. At the end of section one, those who had never been bitten were instructed to go to section three. In section two, participants were

asked about the physical and psychological impacts of the worst bite they had experienced. There were questions about the dog that bit them, how certain they were that they had correctly identified the breed, the circumstances of the attack (e.g. where the attack took place, whether or not the bite was reported) and events leading up to the bite. Respondents were asked whether recent legislation (muzzling dangerous breeds in public, having dogs on leads in public places and re-fencing houses) would have prevented the bite. Section three included questions on dog control and the fourth section included questions about the participants (age, gender, the area they came from).

### **Data analysis**

Data were collated and analysed using SPSS statistical software. Variables were cross-tabulated and further analysed using chi-square contingency tests for nominal data and the Kolmogorov-Smirnov two-sample test for ordinal data.

## **Results**

### **Respondent characteristics**

All students present at the relevant lectures completed questionnaires. Of the 228 student respondents, 78.5% were female, 85% were between 18 and 25 years of age and 15% were more than 25 years of age. The majority of respondents (59.6%) were from cities but many were from rural properties (18.4%) or large towns (12.3%). 9.7% were from villages or small towns. 38.6% of respondents had been bitten at least once in their lives. 81.1% had lived with or owned a dog and many (43.9%) had lived with or owned a dog for more than 15 years. Respondents were more likely to have lived with a dog if they were from a rural area compared to an urban area ( $\chi^2 = 10.66$ , d.f = 1,  $P=0.001$ , A3). 95.3% of people from rural properties, villages or small towns had lived with a dog but only 76.8% of people from large towns or cities had lived with a dog. Males were slightly, but not significantly ( $\chi^2 = 2.56$ , d.f = 1,  $P=0.110$ , A4), more likely to have owned a dog (89.8%) than females (79.9%).

### **Bite victim characteristics**

Most victims had been bitten on one (65.9%) or two (22.7%) occasions. 63.2% were less than 16 years of age at the time of their worst bite. A particularly high proportion of respondents (31.0%) were between 6 and 10 years of age when bitten.

Males were more likely to have been bitten by a dog (55.1%) than females (33.5%) ( $\chi^2 = 7.59$ , d.f = 1,  $P=0.006$ , A5) and those with more experience of living with dogs tended to be more likely to have been bitten (Table 2.1).

**Table 2.1 Percentage of people who have lived with a dog from 0 years to more than 15 years who have been bitten by a dog compared to those that have never been bitten (Kolmogorov-Smirnov two-sample test,  $K = 1.47$ ,  $P<0.05$ ).**

	Number of years living with a dog						Total
	0	<1	1-5	6-10	11-15	>15	
<b>Not bitten</b>	85.4	70.0	50.0	59.3	68.8	55.0	61.8
<b>Bitten</b>	14.6	30.0	50.0	40.7	31.3	45.0	38.2
<b>N</b>	41	10	34	27	16	100	228

### **Nature and severity of injuries sustained**

None of the respondents sustained “very severe” injuries (resulting in surgery and lengthy rehabilitation) from a dog and 80.5% of bites were rated as very minor or minor (did not require medical treatment). However, 19.5% were moderate or severe, requiring medical treatment or hospitalisation (Table 2.2). Psychological effects of dog bites showed an almost identical trend with 87% of bite victims reporting either no effects or minor effects. Half of the respondents reported the bite had no effect on the way they view dogs. 15% said they were now more wary of unfamiliar dogs and another 15% were more wary of certain breeds of dog while 4.6% were more wary of all dogs. The remainder were unsure.

Injuries tended to be rated as more severe when participants were less than 11 years of age ( $\chi^2 = 11.54$ , d.f =1,  $P=0.001$ , A6) at the time of the bite (Table 2.2). The two respondents who reported severe psychological effects were 6 to 10 years of age when bitten and 88.8% of moderate psychological effects were reported by people who were

under 16 at the time. No one over 21 at the time of the bite reported anything more than minor psychological effects.

**Table 2.2 Percentage of injuries rated from very minor to severe in different age groups.**

Age at time of attack	Severity of physical injuries (%)				N
	Very minor	Minor	Moderate	Severe	
0 – 5	37.5	25.0	25.0	12.5	8
6 – 10	25.9	37.0	33.3	3.7	27
11 – 15	45.0	45.0	10.0	0.0	20
16 – 20	61.1	38.9	0.0	0.0	18
21 – 25	53.8	38.5	7.7	0.0	13
26 – 30	0.0	0.0	100.0	0.0	1
<b>Total %</b>	42.5	37.9	17.2	2.3	

The hand was the part of the body most often bitten (48.3% of bites) followed by legs or feet (27.6%), arms (16.1%), and face or head (14.9%). Four people had been bitten on the buttocks and one on the torso. 9.2% of bitten respondents received bites to multiple parts of the body. People bitten before the age of 11 were more likely to have been bitten on the face or head than other age groups ( $\chi^2 = 4.13$ , d.f = 1,  $P=0.042$ , A7). 70.0% of people bitten on the face or head were under 11 years of age at the time. People who were older than 15 at the time of the bite were more likely to have been bitten on the hand ( $\chi^2 = 6.59$ , d.f = 1,  $P=0.010$ , A8). While 59.5% respondents who were bitten were over 10 years old at the time of the bite, they made up 75.0% of people bitten on the hand.

Injuries to the hand were associated with more minor physical ( $\chi^2 = 9.00$ , d.f = 1,  $P=0.003$ , A9) and psychological ( $\chi^2 = 9.58$ , d.f = 1,  $P=0.002$ , A10) effects (Table 2.3), while injuries to the face or head were generally rated as more severe physically ( $\chi^2 = 9.37$ , d.f = 1,  $P=0.002$ , A11) but not psychologically ( $\chi^2 = 0.558$ , d.f = 1,  $P=0.445$ , A12). Injuries to the leg or foot were associated with more severe psychological effects ( $\chi^2 = 7.28$ , d.f = 1,  $P=0.007$ , A13) but not physical injuries ( $\chi^2 = 1.43$ , d.f = 1,  $P=0.233$ , A14). Multiple bites were generally rated as more severe in terms of physical injuries ( $\chi^2 = 5.19$ , d.f = 1,

$P=0.023$ , A15). Half of all multiple bites were rated moderate or severe compared to 19.5% of bites to individual body parts.

**Table 2.3 Percentage of physical and psychological injuries to the face/head, legs/feet and hands rated minor and moderate/severe.**

Bite location	Severity of physical injuries (%)		Severity of psychological injuries (%)	
	Very minor/Minor	Moderate/Severe	None/Minor	Moderate/Severe
Face/head	50.0	50.0	80.0	20.0
Legs/feet	75.0	25.0	70.0	30.0
Hand	97.2	2.8	100.0	0.0
<b>Total</b>	83.5	16.5	87.3	12.7

### The dogs

While 20.7% of people were bitten by a stranger's dog, most people were bitten by dogs with which they had some degree of familiarity and 35.6% had been bitten by a dog living in the same house as them. 21.8% of bite victims were bitten by a dog belonging to a family member living in the same house as them, 12.6% were bitten by a friend's dog, 13.8% by a neighbour's dog, and 11.5% were bitten by their own dog. 2.3% were bitten by dogs belonging to a flatmate and 3.4% by dogs owned by a family member not living in the same house as the victim while 13.8% were reported as "other".

Bites by dogs living in the same house as the victim were likely to be less severe than bites by dogs not living with the bite victim ( $\chi^2 = 5.24$ , d.f = 1,  $P=0.022$ , A16). 19.5% of all bites were rated moderate or severe but only 6.5% of bites by dogs living with the victim were moderate or severe. People bitten by dogs living in their house were less likely to have been bitten on the leg or foot ( $\chi^2 = 10.60$ , d.f = 1,  $P=0.001$ , A17) and more likely to have been bitten on the hand ( $\chi^2 = 16.09$ , d.f = 1,  $P<0.001$ , A18).

More people were bitten by male dogs (43.7%) than females (27.6%). 28.7% were unsure of the dog's sex. Of the male dogs involved in bites, 34.2% were de-sexed, and 34.2%

were not castrated (31.6% unknown). In contrast, 50% of the female dogs that bit respondents were de-sexed and 29% were not (21% unknown). People bitten on the face or head were more likely to have been bitten by a female dog (Table 2.4), although this was not significant ( $\chi^2 = 3.47$ , d.f = 2,  $P=0.178$ , A19). People bitten on the hand were more likely to say they were bitten by a female dog and less likely to be unsure of the dog's sex ( $\chi^2 = 12.46$ , d.f = 2,  $P=0.002$ , A20). People bitten on the legs/feet were less likely to report the sex of the dog as female and more likely to be unsure ( $\chi^2 = 4.80$ , d.f = 2,  $P=0.091$ , A21). People bitten on multiple parts of the body were more likely to have been bitten by a female dog and less likely to have been bitten by a male dog, although this was not significant ( $\chi^2 = 2.35$ , d.f = 2, 0.309, A22).

**Table 2.4. Percentage of bites to the face/head, hand, legs/feet and multiple body parts compared to the sex of the dog responsible.**

Sex of dog (%)	Part of the body bitten					Total
	Face/head	Hand	Legs/feet	Total	Multiple	
Male	20.0	50.0	45.0	45.6	25.0	43.7
Female	30.0	38.9	10.0	25.3	50.0	27.6
Unsure	50.0	11.1	45.0	29.1	25.0	28.7
<b>N</b>	10	36	20	79	8	87

Mixed-breed dogs were responsible for 20.9% of bites. Overall, 22 different breeds were reported to have bitten participants but most breeds were responsible for only one or two bites. German shepherds were responsible for more bites (15.1%) than any other breed (Table 2.5). 55.2% of people who were bitten were very sure that they had correctly identified the breed of dog that bit them. Only 22.9% were either unsure or very unsure.

**Table 2.5. Dog breeds reported to have bitten at least three respondents.**

Breed	Number of respondents	% of bitten respondents
	bitten	
Mix	18	20.9
German shepherd	13	15.1
Jack Russell terrier	9	10.5
Unsure	8	9.3
Border collie	5	5.8
Golden retriever	5	5.8
Corgi	4	4.7
Fox terrier	4	4.7
Labrador	3	3.5
Rottweiler	3	3.5

Similar proportions of people were bitten by small and large dogs (25.3% and 27.6% respectively). Medium-sized dogs were responsible for 47.1% of bites. Bites by large dogs tend to be rated as more severe (Table 2.6), although this trend was not significant ( $\chi^2 = 6.13$ , d.f = 4,  $P=0.189$ , A23). Psychological effects were also likely to be more severe in people who were bitten by large dogs (Table 2.6) but, again, this was not significant ( $\chi^2 = 8.70$ , d.f = 4,  $P=0.069$ , A24).

**Table 2.6. Percentage of physical and psychological injuries rated very minor/non-existent, minor or moderate/severe caused by small, medium and large dogs.**

Size of Dog (%)	Severity of Physical Injuries			Severity of Psychological Injuries			Total
	Very minor	Minor	Moderate/severe	None	Minor	Moderate/severe	
	<b>Small</b>	24.3	30.3	17.6	35.7	17.6	
<b>Medium</b>	59.5	36.4	41.2	40.5	58.8	36.4	47.1
<b>Large</b>	16.2	33.3	41.2	23.8	23.5	54.5	27.6
<b>N</b>	37	33	17	42	34	11	

Only 4 dogs were destroyed as a result of bites to participants. 65.5% of bite victims reported that nothing happened to the dogs that bit them. A few dogs were re-homed (3), or given obedience training (3) or behaviour modification training (8).

### **Circumstances of the attacks**

Most bites occurred in either rural (39.1%) or city (37.9%) environments (Table 2.7). Compared to the number of people who reported they were from each type of area, a disproportionate number of attacks occurred in rural areas compared to urban areas ( $\chi^2 = 23.64$ , d.f = 1,  $P < 0.001$ , A25).

**Table 2.7. The percentage of people from different types of areas (excluding those who had never been bitten) and the percentage of people that were bitten in each area.**

<b>Type of area</b>	<b>% from each area</b>	<b>% bitten in each area</b>
<b>Rural</b>	15.9	39.1
<b>Village</b>	4.5	5.7
<b>Small Town</b>	8.0	10.3
<b>Large Town</b>	13.6	6.9
<b>City</b>	58.0	37.9

The victim's home was by far the most common location (Table 2.8) for dog bites. Bites that took place on the bite victim's property were likely to be less severe than those that took place on another person's property ( $\chi^2 = 4.76$ , d.f = 1,  $P = 0.029$ , A26). People bitten in their own home were more likely to have been bitten on the hand ( $\chi^2 = 16.09$ , d.f = 1,  $P < 0.001$ , A27) and were less likely to have been bitten on the leg or foot ( $\chi^2 = 10.60$ , d.f = 1,  $P = 0.001$ , A28). 78.6% of people bitten in their home were bitten on the hand. Only 3.6% had been bitten on the leg or foot.

**Table 2.8. Percentage of bites taking place in different locations.**

Location of attack	% of people bitten
Victim's home	35.6
Neighbour's home	11.5
Public street/walkway	10.3
Friend's home	10.3
Other private property	10.3
Family member's home	8.0
Stranger's home	5.7
Other public area	5.7
Park	2.3
N	87

87.4% of people who were bitten identified why the dog bit them. Protection of home (20.7%), play (18.4%), accidental (12.6%) and rough handling/pain (10.3%) were the most common reasons for dogs to bite. Other possible causes were protection of a person (4.6%), item (2.3%) or puppies (1.1%), dominance (8.0%), or fear on the part of the dog (5.7%). The remainder were classed as other (3.4%) or unsure (12.6%).

Among the four most common reasons for dogs to bite, dogs that attacked because of protection of their home were less likely to bite on the hand ( $\chi^2 = 15.73$ , d.f = 4,  $P=0.003$ , A29) than dogs that bit by accident, during play or because of rough handling/pain (Table 2.9). Dogs that bit because of protection of their home were more likely to bite on the leg or foot ( $\chi^2 = 29.85$ , d.f = 4,  $P<0.001$ , A30) than dogs that bit because of other reasons (Table 2.9). Dogs that bit due to rough handling/pain were more likely to have bitten on the face or head ( $\chi^2 = 9.30$ , d.f = 4,  $P=0.054$ , A31) than dogs that bit for other reasons (Table 2.9).

**Table 2.9. The percentage of dogs that bit on the hand, leg-foot and face/head compared to the most common reasons for the bite.**

<b>Reason for the bite</b>	<b>% bitten on hand</b>	<b>% bitten on leg/foot</b>	<b>% bitten on the face/head</b>	<b>N</b>
<b>Protect home</b>	11.1	72.2	0.0	18
<b>Play</b>	53.8	7.7	15.4	13
<b>Accidental</b>	81.8	0.0	0.0	11
<b>Rough handling/Pain</b>	62.5	0.0	37.5	8
<b>Other</b>	44.8	20.7	17.2	29
<b>Total %</b>	45.6	25.3	17.2	79

Respondents bitten by dogs protecting their territory were less likely to have been bitten by a female dog and more likely to be unsure of the dog's sex (Table 2.10). People sustaining accidental bites were less likely to be unsure of the dog's sex and more likely to have been bitten by a female. People bitten because of rough handling/pain were more likely to have been bitten by a female dog and less likely to be unsure but these findings were not significant ( $\chi^2 = 15.47$ , d.f = 8,  $P=0.051$ , A32).

**Table 2.10. The most common reasons for dogs to bite compared to the sex of the dog responsible.**

<b>Reason for the bite</b>	<b>% bitten by male dogs</b>	<b>% bitten by female dogs</b>	<b>% unsure of dog's sex</b>
<b>Protect home</b>	44.4	11.1	44.4
<b>Play</b>	50.0	31.3	18.8
<b>Accident</b>	36.4	45.5	18.2
<b>Pain</b>	33.3	66.7	0.0
<b>Other</b>	45.5	18.2	36.4
<b>Total</b>	43.7	27.6	28.7

Only four of the 88 bites were reported to authorities. Three of these involved bites to people who were under 16 at the time. Two bites were reported to police, one to the local council, and one to dog control. 85.1% were not reported and 9.2% of bite victims were unsure if the bite was reported.

### **Opinions on dog control legislation**

The majority of participants who had been bitten were doubtful as to whether their attacks could have been prevented by legislation. 11.5% said that it was either somewhat likely or very likely that their attack could have been prevented if the dog had been on a lead in a public place. Only 6.8% said that muzzling “dangerous” breeds was somewhat or very likely to have prevented their bites. However, 28.7% reported that fencing properties so that visitors could get to the front door of a house without coming into contact with a dog may have prevented them from being bitten. People who had been bitten on the leg were more likely to say that it was very likely that fencing properties would have prevented the attack ( $\chi^2 = 13.86$ , d.f = 2,  $P=0.001$ , A33). 45.0% of people who had been bitten on the leg said it was very likely that this law could have prevented the attack compared to 11.9% of people who had not been bitten on the leg. 27.1% of people bitten in rural areas thought it was very likely that their bite could have been prevented had the dog been adequately fenced on the owner’s property compared to only 12.8% of people bitten in urban areas, but this was not significant ( $\chi^2 = 4.01$ , d.f = 2,  $P=0.134$ , A34).

55.6% of respondents said that dogs that injure someone severely should be euthanized. A further 36.8% said it depends on the circumstances and the remainder were unsure. Males were more likely to say dogs should be euthanized (71.4%) compared to females (50.8%) who were more likely to say that the circumstances of the attack should be taken into account. Only 13.6% thought fighting breeds should be banned and 37.7% said they should have to be muzzled when in public.

When asked how owners should be penalised if their dog injures someone severely, 75.9% said fines were appropriate, 48% said they should be made to get their dogs retrained and 50.9% thought their ownership rights should be revoked. Only 18.4% said they should get jail-time.

Recent media coverage of dog attacks reportedly had no effect on the way most (61.8%) participants view dogs. 10.5% said they are now more wary of unfamiliar dogs, 17.5% said they are more wary of certain breeds and 4.4% are more wary of all dogs. The remainder were unsure.

## **Discussion**

No past research was found that gave any indication of the total number of bites that take place or the percentage of dog bites that go unreported in New Zealand and only one international study was found that provided this information (Podberscek and Blackshaw, 1993). In addition, most previous research, both in New Zealand and abroad, focuses on reported bites or those requiring medical attention. In contrast, this study could be said to cover all bites, regardless of whether bites were reported or seen by a health professional.

As this sample was small and made up of veterinary and veterinary-nursing students, these results must be interpreted with caution. In particular, rate of dog ownership and ability to identify dog breeds was expected to be greater than for the general population. However, the rate of ownership and ratings on how sure the respondents were that they had correctly identified the breed of dog that bit them were very similar to those reported by Wake et al (2005). Very few students reported that they had been bitten during activities related to their education.

### **Characteristics of respondents who were bitten**

The proportion of people in this survey that had been bitten by a dog (38.6%) is surprisingly high, especially considering 85% of respondents were only between 18 and 25 years of age. However, this proportion is much lower than that reported by Podberscek and Blackshaw (1993) in an Australian survey (64.7%). The latter may be artificially elevated as questionnaires were distributed in places such as medical and veterinary clinics and to people who had made complaints about aggressive dogs to the local council (Podberscek and Blackshaw, 1993). Also the age range in Podberscek and Blackshaw's (1993) study was 4 to 84 years. The fact that older people were included in the sample

could account for the higher proportion of bitten respondents, although the mean age was 26.2 years.

Only 5.7% of respondents in this study who had been bitten said the bite had been reported to an authority and only one bite (1.2%) had been reported to a local council. This confirms that the estimated 3,435 bites reported to councils around New Zealand for 2001/2002 is only a small percentage of the total number of dog bites that occur.

The finding that respondents were bitten more often as children than young adults is consistent with past research (Department of Internal Affairs, 2003; Langley, 1992; Wright, 1991). The behaviour of young children may trigger predatory or fear reactions in some dogs (Love and Overall, 2001) and children may react inappropriately to the threats that usually precede bites by dogs. It has been suggested that children are not more likely to be bitten - bites are simply more likely to be reported because of parental concern or the severity of their injuries (Langley, 1992). However, the present study does not support this idea. Although people bitten when they were children generally rated their injuries as more severe, most (62.9%) respondents bitten while younger than 11 still rated their injuries as very minor or minor (not requiring medical attention).

That males were more likely to have been bitten also supports previous studies. Males generally make up 55 to 66% of people requiring medical attention for dog bites (Department of Internal Affairs, 2003; Langley, 1992; Podberscek et al., 1990; Brogan et al., 1995; Thomson, 1997; Anonymous, 2003). This may be because males come into contact with dogs more often than females (Wright, 1991). Indeed, in this study males were more likely to have owned dogs and participants that had owned dogs were more likely to have been bitten. People who own dogs spend more time around dogs, are likely to be less afraid of dogs, and may find themselves in dangerous situations (e.g. breaking up a dog fight) that non-owners may not. Dogs may also find the large stature and deep voice of a man more threatening than those of a woman (Podberscek et al., 1990).

### **Bite injuries**

People bitten before 11 years of age were more likely to have been bitten on the face or head. This is a common finding amongst studies of dog aggression and is probably due to the stature of the bite victim (Write, 1991; Langley, 1992; Brogan et al., 1995;

Thompson, 1997; Overall and Love, 2001; Anonymous, 2003) - an adult's head is not an easily-accessible target for a dog. The most obvious targets on an adult are the hands and legs and, accordingly, injuries to these areas were most common in adults.

The fact that injuries to the head were likely to be rated as moderate or severe is unsurprising, due to the fragile nature of this part of the body and the increased aesthetic impact that facial injuries impose. The finding that bites to the leg were rated as more severe is somewhat harder to explain. Dogs that attacked when protecting their territory were more likely to bite on the leg and it is possible that dogs that bite for these reasons tend to attack with increased intensity compared to dogs that bite for other reasons. There were no significant differences between the tendencies of small, medium and large dogs to bite on the leg. Alternatively, this finding may be an artefact of the small sample size as it has not been reported in previous studies.

### **Characteristics of the dogs**

Around 60% of bitten respondents were bitten by a dog that was known to them and 35.6% had been bitten by a dog living in their own home. This reflects an American study which found that 30% of bites treated in hospital emergency departments involved a family dog (Anonymous, 2003). Only 20.7% of participants in this study were bitten by a dog belonging to a stranger, but in an Australian survey, Podberscek and Blackshaw (1993) found that only 42% of bites involved dogs with which the bite victim was familiar and 58% involved a stranger's dog.

The finding that more people are bitten by male dogs is an almost universal one among studies of dog attacks and aggression problems in dogs (Borchelt, 1983; Landsberg, 1991; Shewell and Nancarrow, 1991; Beaver, 1993; Podberscek and Blackshaw, 1993; Lund et al., 1996; Tacheuchi et al., 2001). Most studies also found that entire males are more aggressive than neutered males (Beaver, 1993; Borchelt, 1983; Wright and Nesselwrote, 1987; Guy et al., 2001) but this was not observed here, with equal proportions of male dogs reported as being neutered and un-neutered. Female dogs that had bitten people in this study were more likely to be neutered, a finding that mirrors many previous studies (Beaver, 1993; Borchelt, 1983; Wright and Nesselwrote, 1987; Guy et al., 2001). It is important to note, however, that the proportions of male and female dogs and de-sexed

and entire dogs in these studies may be an artefact of the proportions of these dogs in the population as a whole.

It is unclear why people bitten on the head were more likely to have been bitten by a female dog compared to people bitten on other parts of the body but this finding may be related to the reason for the attack. Bites to the face or head were most likely to be due to rough handling/pain and dogs that bit for this reason were more likely to be female. Females may be more likely to bite on the hand because of their increased tendency to bite due to rough handling/pain or by accident. The finding that female dogs were less likely to bite on the legs/feet may be attributable to the fact that they are also less likely to bite because of protection of their home (dogs that attacked for this reason tended to bite the legs/feet).

Studies of breeds involved in dog attacks and requiring treatment for aggression problems generally turn up two consistent findings, both of which are repeated in this study. One is that mixed-breed dogs are in the top five most numerous breeds in these studies (Borchelt, 1983; Line and Voith, 1986; Wright and Nesselwrote, 1987; Landsberg, 1991; Beaver, 1993; Stafford, 1993; Lund et al., 1996; Tacheuchi et al., 2001). This does not necessarily mean that mixed-breed dogs are particularly aggressive – they may simply be particularly common. Of the seven studies that named mixed-breeds as among the most commonly aggressive breeds, four compared the numbers of aggressive mixed breed dogs with estimates of the number of mixed breed dogs in the dog population and none found mixed-breeds to be represented in higher percentages than one would expect from their proportion in the dog population as a whole.

The other common breed-related finding is that German Shepherds appear to be one of the most aggressive breeds (Borchelt, 1983; Line and Voith, 1986; Wright and Nesselwrote, 1987; Blackshaw, 1991; Landsberg, 1991; Beaver, 1993; Podberscek and Blackshaw, 1993; Lund et al., 1996; Tacheuchi et al., 2001). Ten out of eleven studies on dog aggression reported that German Shepherds were in the top five breeds requiring treatment for aggression or reported to have bitten people (Borchelt, 1983; Line and Voith, 1986; Wright and Nesselwrote, 1987; Blackshaw, 1991; Landsberg, 1991; Beaver, 1993; Podberscek and Blackshaw, 1993; Brogan et al., 1995; Lund et al., 1996; Thompson, 1997; Tacheuchi et al., 2001). Seven of these studies compared the proportion

of German Shepherds in their samples with those in the wider population. All but one found this breed to be responsible for more bites or be presented for treatment of aggression problems more often than expected (Blackshaw, 1991; Landsberg, 1991; Beaver, 1993; Podberscek and Blackshaw, 1993; Lund et al., 1996; Thompson, 1997; Tacheuchi et al., 2001).

### **Circumstances**

In this study, a disproportionate number of dog bites occurred in rural areas. This contrasts with reports that urban councils in New Zealand had a higher number of attacks reported to them per 1000 people (Department of Internal Affairs, 2003). However, reported attacks do not necessarily correlate with the actual number of bites and it is possible that people in urban areas are more likely report bites to the local council. Participants from rural areas in this study were more likely to have lived with or owned a dog. This indicates that the dog-human ratio may be higher in rural areas. Rural/mixed areas in New Zealand have a ratio of between 237 and 245 registered dogs per 1000 people whereas urban areas have a ratio of only 86 to 87 registered dogs per 1000 people (Department of Internal Affairs, 2003). This may account for the higher bite rate observed here. Differences in human factors may also contribute. Participants bitten in rural areas were more likely to report that their bite could have been prevented by having houses adequately fenced, suggesting that owners in rural areas may be less inclined to confine their dogs.

Most bites (35.6%) took place in the victim's home. Langley (1993) reported that 38% of bites requiring medical attention in New Zealand took place in the home, but not necessarily the home of the bite victim. In contrast, only 15.6% of bites in an Australian survey of the general public were in the victim's home (Podberscek and Blackshaw, 1993) which is similar to the 20.8% reported by Wake et al (2005).

Many bite victims in the media report that dog attacks are unprovoked and in one study, 33% of people who had been bitten by a dog reported that the attack was unprovoked (Podberscek and Blackshaw, 1993). It is likely, however, that most of these "unprovoked" attacks were unintentionally provoked – the bite victims simply could not identify why they were bitten. Because of this, respondents in this study were not given the option of saying the attack was unprovoked. They were given a number of possible

reasons as well as the categories “other” and “unsure”. Most of the few “other” responses could be fitted into one of the more specific categories. Only 13% of bite victims said they were unsure why the dog attacked. This low figure is most likely a result of the sample being made up of veterinary and veterinary-nursing students who may be likely to have a better understanding of canine behaviour than the average person, but suggests that the vast majority of dog bites are not unprovoked.

Dogs that bite due to protection of their territory or protection of a person tend to bite on the leg, but the reason for this is unclear. It is possible that people bitten for these reasons were not actively interacting with the dog (perhaps simply walking past the dog’s home) so dogs in these situations may not have an obvious body part to target. In contrast, for dogs which bite due to rough handling or pain, during play or by accident (e.g. while breaking up a dogfight) the hand is probably the most obvious target.

### **Opinions on dog control issues**

Most participants were sceptical about whether the new legislation could have prevented their bites. Only legislation regarding the fencing of properties may have prevented a reasonable number of the attacks reported here.

A surprisingly low proportion of respondents (13.6%) thought fighting breeds should be banned. Many participants commented that dog attacks are the result of bad owners rather than bad dogs but, given the frequency of these statements, opinions on how owners should be punished if their dog injures someone severely were surprisingly lenient. While 75.9% thought fines were appropriate, just under 50% thought they should still be allowed to own dogs and only 18.4% said they should be made to serve time in jail.

### **References**

- Anonymous.** Nonfatal dog bite-related injuries treated in hospital emergency departments – Unites States, 2001. *Morbidity and Mortality Weekly* 52, 605-610, 2003
- Beaver BV.** Profiles of dogs presented for aggression. *Journal of the American Animal Hospital Association* 29, 564-569, 1993

- Blackshaw JK.** An overview of types of aggressive behaviour in dogs and methods of treatment. *Applied Animal Behaviour Science* 30, 351-61, 1991
- Borchelt PL.** Aggressive behaviour of dogs kept as companion animals: classification and influence of sex, reproductive status. *Applied Animal Ethology* 10, 45-61, 1983.
- Brogan TV, Bratton SL, Dowd D, Hegenbarth MA.** Severe dog bites in children. *Pediatrics* 96, 947-950, 1995.
- Department of Internal Affairs (DIA).** Survey of territorial authorities on dog control issues – interim report March 2003
- Guy NC, Luescher UA, Dohoo SE, Spangler E, Miller JB, Dohoo, IR, Bate LA.** A case series of biting dogs: characteristics of the dogs, their behaviour, and their victims. *Applied Animal Behaviour* 74, 43-57, 2001
- Landsberg GM.** The distribution of canine behaviour cases at three behaviour referral practices. *Veterinary Medicine* 86, 1011-1018, 1991
- Langley J.** The incidence of dog bites in New Zealand. *New Zealand Medical Journal* 105, 33-35, 1992
- Line S, Voith VL.** Dominance aggression of dogs towards people: behaviour and response to treatment. *Applied Animal Behaviour Science* 16, 17-83, 1986
- Love M, Overall KL.** How anticipating the relationship between dogs and children can help prevent disasters. *Journal of the American Veterinary Medical Association* 219, 446-452, 2001
- Lund JD, Agger JF, Vestergaard KS.** Reported behaviour problems in pet dogs in Denmark: age distribution and influence of breed and gender. *Preventative Veterinary Medicine* 22, 33-48, 1996
- Overall KL, Love M.** Dog bites to humans – demography, epidemiology, injury and risk. *Journal of the American Veterinary Medical Association* 218, 1923-1934, 2001
- Podberscek AL, Blackshaw JK.** A survey of dog bites in Brisbane, Australia. *Australian Veterinary Practitioner* 23, 178-183, 1993
- Podberscek AL, Blackshaw JK, Nixon JW.** The incidence of dog attacks on children treated at a city hospital. *Australian Veterinary Journal* 67, 79-80, 1990
- Sacks JJ, Lockwood R.** Fatal dog attacks, 1989-1994. *Paediatrics* 97, 891-897, 1996
- Shewell PG, Nancarrow JD.** Dogs that bite. *British Medical Journal* 303, 1512-1513, 1991

- Stafford KJ.** Opinions of veterinarians regarding aggression in different breeds of dog. *New Zealand Veterinary Journal* 44, 138-141, 1996
- Takeuchi Y, Ogata N, Houpt KA, Scarlett JM.** Differences in background and outcome of three behaviour problems of dogs. *Applied Animal Behaviour Science* 70, 297-308, 2001
- Thompson PG.** The public health impact of dog attacks in a major Australian city. *Medical Journal of Australia* 167, 129-132, 1997
- Wake AAF, Minot EO, Stafford KJ.** A survey of dog bite victims in New Zealand. In prep (to be submitted to the New Zealand Medical Journal)
- Wright JC, Nesselwrote MS.** Classification of behaviour problems in dogs. *Applied Animal Behaviour Science* 19, 169-178, 1987
- Wright JC.** Canine aggression towards people: bite scenarios and prevention. *Veterinary Clinics of North America: Small Animal Practice* 21, 299-314, 1991

## A survey of dog bite victims in New Zealand

### Abstract

**AIM:** To describe the aetiology of dog bites in New Zealand.

**METHODS:** A questionnaire was sent to 2000 adults who had made claims to the Accident Compensation Corporation in 2002 as a result of dog bites.

**RESULTS:** 535 questionnaires were returned. 50.3% of respondents were male. Most injuries were to the legs or hand. More people were bitten by male dogs than female dogs. A disproportionate number of bites took place in rural areas and the most common locations for attacks were streets/walkways and the victim's home. Protection of territory, accidental bites, fear, and pain were considered to be the most common reasons for dogs to bite. 30% of bites were reported.

**CONCLUSIONS:** Understanding the causes and circumstances of dog bites is an important step in formulating recommendations aimed as reducing the incidence of dog attacks.

### Introduction

Following a survey of 72 councils throughout New Zealand, the Department of Internal Affairs reported that 58 councils dealt with 3,020 dog attacks on humans in one year (Department of Internal Affairs, 2003). Even when these data are extrapolated to give an overall figure of 3,435 bites for all of the 72 councils in the country, this is still well below the number of claims made to the Accident Compensation Corporation (ACC) following dog bites in the same time period, which totalled 8,677 (Department of Internal Affairs, 2003). This number is likely to greatly under-represent the actual number of dog bites that occurred during this time as only injuries requiring medical attention will result in ACC claims.

Dog aggression is an expensive problem. Around New Zealand, 54 councils spent \$19,793,726 on dog control in 2001/2002 (Department of Internal Affairs, 2003) and in 2003, the ACC paid \$831,000 for moderate to serious injuries resulting from dog bites (Fox, 2004).

From the standpoint of cost alone, the public would benefit from a reduction in the incidence of dog bites. Any legislative approach to the dangerous dog problem requires an understanding of the factors associated with dog aggression.

We surveyed people who made claims to the Accident Compensation Corporation as a result of dog bites. Data were gathered on the dogs responsible for the bites, the aetiology of attacks, opinions on dog control issues and the respondents themselves.

## **Methods**

### **Subjects and sampling methods**

Participants were adults who had made claims to the Accident Compensation Corporation (ACC) in 2002 as a result of dog bites. The ACC is a Crown entity that provides injury cover for people in New Zealand.

Due to restrictions imposed by the ACC, claimants who were less than 17 years of age at the time of the claim and those who had received serious injuries were excluded from the study. The ACC selected 2000 participants at random from the remaining pool of claimants. To preserve confidentiality, the ACC sent out questionnaires on behalf of the researchers. To be included in the ACC study, respondents had to have received injuries severe enough to need some form of medical attention, although in many cases, respondents reported that they only went to a doctor to get a tetanus shot or because of a secondary infection.

The questionnaire (A2) consisted of 32 questions in four sections. The first section included questions about dog ownership history. In the second section, participants were asked about the physical and psychological impacts of the bite that resulted in their ACC

claim. There were questions about the dog that bit them, how certain they were that they had correctly identified the breed, the circumstances of the attack (e.g. where the attack took place), whether or not the bite was reported and how the dog was restrained. Respondents were asked to describe the events leading up to the bite and then were asked what they thought was the main reason the dog bit them. In section three, respondents were asked whether legislation would have prevented the bite. The three items of legislation were: muzzling dangerous breeds in public, having dogs on leads in public places, and requiring dog owners to fence their houses so visitors can access a door without coming into contact with the dog. This section also included general questions on dog control. The final section consisted of general questions about the participants.

### **Data analysis**

Data were coded and analysed using SPSS statistical software. Variables were cross-tabulated and further analysed using the chi-square contingency test for nominal data and the Kolmogorov-Smirnov two-sample test for ordinal data.

## **Results**

### **Respondent Characteristics**

535 people made valid responses to the survey. The ACC received 160 surveys returned due to wrong addresses and the researcher received a further 30 from respondents who said they were sent surveys due to errors in the ACC records. These people had not been bitten by dogs but had made claims arising from other animal-related injuries. If these are subtracted from the 2000 surveys sent out, the response rate for this study is 29.5%.

50.3% of respondents were male. Only 12.8% of respondents were between the ages of 16 and 29 at the time of the bite. 15.6% were aged 30 to 39, 22.8% were in their 40s, 24.3% were 50 to 59 and 24.5% were older than 59 years.

49.9% of respondents reported they were from a city. The remainder were from large towns (12.8%), small towns or villages (22.2%) and rural properties (15.1%). 19.1% of respondents had never lived with or owned a dog. Respondents were more likely to have

lived with or owned a dog if they were from a rural property or small town than if they were from a large town or city ( $\chi^2 = 4.59$ , d.f = 1,  $P < 0.05$ , A35). Only 10.1% of people from rural properties had never lived with a dog and 51.9% had spent more than 30 years living with dogs. By contrast, 21.8% of people from cities had never lived with a dog and only 21.5% had lived with a dog for more than 30 years.

Most respondents (65.8%) had been bitten on one occasion and 21.1% had been bitten twice. The remaining 13.1% had been bitten on three or more occasions.

### **Nature of injuries sustained**

84.5% of injuries were rated by participants as moderate (requiring medical attention). 12.0% of bites were minor (little/no blood drawn, treated at home). Many respondents who rated their injuries as minor noted that they went to the doctor for a tetanus shot rather than to have their injuries treated and that this is what resulted in their record with the ACC. Despite filtering by the ACC, 13 bites (2.4%) were rated severe (requiring hospitalisation) and 3 were very severe (requiring surgery and lengthy rehabilitation).

The leg (44.5%), hand (34.9%) and arm (20.6%) were the most common parts of the body to be injured. 5.3% of respondents were bitten on the buttocks, 4.3% on the face and 3.9% on the torso. 11.3% of respondents were bitten on more than one part of the body. There were no significant associations between the part of the body injured and the severity of the injuries.

71.8% of respondents reported psychological effects from their bites. 46.4% reported minor effects (slightly shaken after the attack), 14.0% reported moderate effects (lasting up to one month) and 10.8% said their attack resulted in severe (long-term) psychological effects. Three people (0.6%) reported very severe psychological effects which required counselling. Women were likely to report more severe psychological effects (Kolmogorov-Smirnov two-sample test,  $K = 1.72$ ,  $P < 0.02$ ). 33.0% of women rated the psychological effects of their bites as moderate to very severe compared to only 17.7% of men. People bitten on the hand tended to rate their psychological injuries as less severe than people bitten on other parts of the body (Kolmogorov-Smirnov two-sample test,  $K = 2.33$ ,  $P < 0.002$ ). 12.3% of bites to the hand were rated moderate, severe, or very severe compared to 30.1% of people bitten elsewhere. In contrast, bites to the legs or feet were

rated as more severe than bites to other areas (Kolmogorov-Smirnov two-sample test,  $K = 2.02$ ,  $P < 0.002$ ). 31.1% of bites to the legs or feet were rated moderate to very severe (19.3% of bites to other parts of the body).

In 64.1% of cases, bites had affected the ways participants viewed dogs. 22.9% reported that they are now more wary of unfamiliar dogs, 14.7% are more wary of certain breeds and 24.2% are more wary of all dogs. The remainder were reported as unsure (0.6%) or other (1.7%). Most people who responded as “other” said that they are now wary of specific factors relating to their bite.

### **Characteristics of the dogs**

36.2% of respondents were bitten by a stranger’s dog, but in 18.9% of cases the victim owned the dog. 14.0% of dogs were owned by a friend, 10.0% by a neighbour, 5.1% by a family member not living with the victim and 4.2% were owned by a family member living in the same house as the bite victim. 0.6% were bitten by a flatmate’s dog and 11.0% were recorded as “other”. Most people who recorded the dog’s owner as “other” were people who had gone to someone’s house during the course of their work and were bitten by their client’s dog. A few people were bitten by a dog belonging to their employer and five people were bitten by police dogs. Female respondents were more likely to be bitten by a family member’s dog (either living in the same house as them or in another house) while men were more likely to record the dog’s owner as “other”, although these relationships only approached significance ( $\chi^2 = 13.76$ ,  $d.f = 7$ ,  $P = 0.056$ , A36). 63.6% of people bitten by a dog belonging to a family member living with the victim and 63.0% of people bitten by a dog owned by a family member not living with them were female. 64.9% of respondents who reported the owner as “other” were male.

While 29.4% of respondents were unsure of the sex of the dog that bit them, 46.8% said they were bitten by male dogs and 23.8% were bitten by females. 22.1% of dogs were de-sexed, 27.6% were not (50.3% unsure). 30.9% of male dogs were unknown to the respondents compared to 17.6% of female dogs and 77.0% of dogs of unknown sex ( $\chi^2 = 108.68$ ,  $d.f = 2$ ,  $P < 0.001$ , A37).

Amongst the known-sex biting dogs in this survey, females were more likely to be identified as neutered ( $\chi^2 = 13.82$ ,  $d.f = 2$ ,  $P = 0.001$ , A38). 41.6% of female dogs were

neutered and 38.4% were not (20.0% unsure). Only 25.8% of male dogs were de-sexed and 37.9% were not (36.3% unsure).

As shown in Table 3.1, people bitten on the hand were less likely to be unsure of the dog's sex ( $\chi^2 = 27.16$ , d.f = 2,  $P < 0.001$ , A39) than people bitten on other parts of the body, whereas the opposite was true for those bitten on the legs/feet ( $\chi^2 = 23.32$ , d.f = 2,  $P < 0.001$ , A40).

**Table 3.1. Percentage of people bitten on the arm, hand, leg or multiple parts of the body compared to the sex of the biting dog.**

Sex of Dog	Arm (%)	Hand (%)	Leg (%)	Total	Multiple bites (%)	Total
Male	50.0	51.9	41.8	47.6	40.7	46.9
Female	17.6	33.8	17.9	23.7	23.7	23.7
Unsure	32.4	14.3	40.3	28.6	35.6	29.4
N	195	153	74	466	52	525

54 different breeds of dog were reported as having bitten respondents (Table 3.2). In 14% of cases, the breed of dog was unknown and 26.6% were reported as mixed-breed dogs. The five most common pure-breeds were German shepherds (8.0%), pit bull terriers (6.6%), rottweilers (5.5%), Jack Russell terriers (4.2%) and Labrador retrievers (2.7%).

48.4% of respondents were very sure that they had correctly identified the breed of dog. 11.6% were sure and 12.0% were reasonably sure. 26.6% were unsure or very unsure that they had identified the breed correctly. However, there were a number of discrepancies between the breed of the dog and the size of the dog reported by respondents who were "very sure" that they had correctly identified the breed. For example, two respondents reported that they were very sure they had been bitten by pit bull terriers but then recorded the size of the dog as "small (less than 40cm at the shoulder)".

**Table 3.2 Percentage and frequency of bites by breed.**

Breed	Frequency	Percentage
Mixed-breed	140	26.2
Unknown breed	75	14.0
German shepherd	42	7.9
Pit bull terrier	35	6.5
Rottweiler	29	5.4
Jack Russell terrier	22	4.1
Labrador	14	2.6
Border collie	13	2.4
Blue heeler	12	2.2
Bull terrier	12	2.2
Huntaway	10	1.9
Heading dog	10	1.9
Fox terrier	10	1.9
Bull mastiff	9	1.7
Cocker spaniel	9	1.7
Staffordshire terrier	9	1.7
Other	78	14.6

Labradors that bit respondents were less likely to be male when compared to all other breeds and more likely to be recorded as unsure ( $\chi^2 = 13.37$ , d.f = 2,  $P < 0.001$ , A41). 48.0% of dogs of other breeds were male but only 7.1% of Labradors were male and 71.4% of Labradors were recorded as unsure compared to 28.5% of other dogs. Jack Russel terriers were more likely to be neutered ( $\chi^2 = 10.97$ , d.f = 2,  $P = 0.004$ , A42), with half of all Jack Russel terriers reported to be neutered compared to 20.6% of dogs of all other breeds. In contrast, pit bull terriers were less likely to be neutered ( $\chi^2 = 10.34$ , d.f = 2,  $P = 0.006$ , A43). None of the 34 pit bull terriers were said to be neutered (61.8% unsure).

There was no significant relationship between the breed of dog and the severity of the injuries to the bite victim but bites involving rottweilers were associated with more severe psychological effects ( $\chi^2 = 6.16$ , d.f = 1,  $P = 0.013$ , A44). 44.8% of bites by rottweilers

were rated moderate, severe or very severe compared to 24.2% of bites by dogs of other breeds. Rottweilers were more likely to bite the arms than other breeds, although this was not significant ( $\chi^2 = 3.7$ , d.f = 1,  $P = 0.054$ , A45) and were less likely to bite the legs or feet ( $\chi^2 = 5.81$ , d.f = 1,  $P = 0.016$ , A46). 30.4% of bites by rottweilers were to the arms (15.3% of bites by other breeds) but only 17.4% of rottweilers injured the legs or feet (42.8% of other breeds). 60.6% of bites by pit bull terriers involved the legs or feet compared to 40.1% of other breeds ( $\chi^2 = 5.31$ , d.f = 1,  $P = 0.021$ , A47). German shepherds were also more likely to bite the arms ( $\chi^2 = 6.46$ , d.f = 1,  $P = 0.11$ , A48), with 32.3% of bites by this breed resulting in injury to the arms (14.9% of other breeds). No Jack Russell terriers bit on the arm ( $\chi^2 = 3.99$ , d.f = 1,  $P = 0.046$ , A49). German shepherds were more likely to be responsible for injuries to multiple parts of the body ( $\chi^2 = 10.27$ , d.f = 1,  $P = 0.001$ , A50). 26.2% of bites by German shepherds and 9.9% of bites by other breeds involved multiple body parts.

Small dogs (less than 40cm at the shoulder) were reported to have bitten 17.2% of respondents, while 53.3% were bitten by medium sized dogs (40-60cm at the shoulder) and 28.2% were bitten by large dogs (taller than 60cm at the shoulder). Psychological injuries associated with bites by larger dogs were rated as more severe than bites by small or medium-sized dogs ( $\chi^2 = 10.90$ , d.f = 2,  $P = 0.004$ , A51). 13% of bites by small dogs were rated moderate to very severe, compared to 25.7% of bites by medium-sized dogs and 32.0% of bites by large dogs. Large dogs were responsible for half of all severe or very severe physical injuries ( $\chi^2 = 11.63$ , d.f = 4,  $P = 0.020$ , A52). As shown in Table 3.3, larger dog were more likely to bite on the arms (Kolmogorov-Smirnov two-sample test,  $K = 1.97$ ,  $P < 0.002$ ). Smaller dogs were more likely to bite the hand (Kolmogorov-Smirnov two-sample test,  $K = 1.52$ ,  $P < 0.02$ ). Large dogs were also more likely to cause injury to multiple parts of the body (Kolmogorov-Smirnov two-sample test,  $K = 1.59$ ,  $P < 0.02$ ).

**Table 3.3. Percentage of people bitten on the arm, hand, leg or multiple parts of the body compared to the size of the biting dog.**

Dog's size	Part of body bitten (%)					
	Leg	Hand	Arm	Total	Multiple bites	Total
Small	14.4	28.1	8.1	18.0	10.2	17.1
Medium	62.1	53.6	44.6	55.8	42.4	54.3
Large	23.6	18.3	47.3	26.2	47.5	28.6
N	195	153	74	466	52	525

13.3% of dogs were destroyed as a result of attacks on respondents. Rottweilers and pit bull terriers were more likely to be destroyed than other breeds. 27.6% of rottweilers involved in attacks were destroyed compared to 12.7% of other breeds ( $\chi^2 = 5.16$ , d.f = 1,  $P= 0.023$ , A53) and 32.4% of pit bull terriers were destroyed compared to 12.2% of other dogs ( $\chi^2 = 10.97$ , d.f = 1,  $P = 0.001$ , A54). 3.9% of dogs that bit respondents were rehomed while 6.4% were given obedience or behaviour modification training. In 54.4% of cases, nothing happened to the dog and 13.3% were reported as unsure. 7.3% were listed as “other”. Many people who checked “other” had been bitten by a dog that was in pain and died as a result of injuries. Others said that the dog was later destroyed as a result of attacks on other people.

#### **Circumstances of the bites**

31.7% of bites took place in large cities and 13.9% in provincial cities. 11.4% took place in large towns and a further 19.4% in small towns. 23.7% of bites occurred on rural properties. Compared to the proportion of people who said they were from rural and urban areas, people were more likely to be bitten in rural areas ( $\chi^2 = 251.06$ , d.f = 1,  $P<0.001$ , A55). 37.4% of people were from rural areas but 43.1% were bitten in rural areas whereas 62.6% of respondents were from urban areas and 56.9% of respondents were bitten in urban areas. 24.2% of people bitten in rural areas reported that they were from an urban area while only 8.3% of people bitten in rural areas were from urban areas. Table 3.4 shows the distribution of bites around New Zealand.

**Table 3.4. Frequency and percentage of bites that took place in different areas of New Zealand.**

<b>Where bite took place</b>	<b>Frequency</b>	<b>Percentage</b>
Auckland	157	29.3
Canterbury	88	16.4
Waikato	38	7.1
Wellington	35	6.5
Bay of Plenty	32	6.0
Northland	27	5.0
Manawatu	22	4.1
Hawkes Bay	20	3.7
Wairarapa	18	3.4
Taranaki	17	3.2
Nelson	15	2.8
Otago	14	2.6
Kapiti Coast	10	1.9
Southland	8	1.5
Taupo	7	1.3
West Coast	6	1.1
Marlborough	5	0.9
Wanganui	5	0.9
Dunedin	5	0.9

The most common locations for dog bites were public streets/walkways (25.9%), the victim's home (20.8%), a stranger's property (14.6%) and a friend's property (12.5%). 4.7% took place at a family member's property, 4.2% in parks and 4.0% at a neighbour's property. 7.8% were recorded as other private property and 5.7% as other public area. Among the top five locations for dog bites (Table 3.5), men were more likely to be bitten on a stranger's property, while women were more likely to be bitten in their own home.

**Table 3.5. Percentage of male and female respondents bitten in each of the top five locations for dog bites ( $\chi^2 = 16.05$ , d.f = 4,  $P = 0.003$ , A56).**

Gender	Location (%)					Total
	Street/ walkway	Victim's property	Stranger's property	Friend's property	Other private property	
Male	48.2	40.0	68.4	45.5	56.1	50.0
Female	51.8	60.0	31.6	54.4	43.9	50.0
N	137	110	76	66	41	430

When asked how the dog was restrained prior to the bite, 6.2% said the dog was on a lead in a public place, 9.3% said it was free in a public place but supervised by the owner and 11.8% said it was running free and unsupervised in a public place. 23.9% said the dog was fenced on private property (but some respondents said the dog jumped the fence or was allowed access to public areas through an open gate), 6.8% of dogs were chained on private property and 29.2% were on private property but not fenced or tied. 0.9% were unsure how the dog was restrained and 10.3% were recorded as “other”. Most respondents who recorded restraint as “other” said the dog was inside a car or house at the time of the bite. In one case the dog was inside a kennel.

Dogs that were free and unsupervised in a public place were more likely to be destroyed than dogs that were in public but with their owners at the time of the bite ( $\chi^2 = 10.17$ , d.f = 2,  $P = 0.006$ , A57). No dogs that were on leads were destroyed and only 8.0% of dogs running free under supervision of the owner were put down. 21.0% of dogs that were in public places without the owner were destroyed. People bitten in rural areas were more likely to be bitten by a dog that was on private property at the time ( $\chi^2 = 7.05$ , d.f = 1,  $P = 0.008$ , A58). 75.4% of people bitten in rural areas were bitten by dogs on private property compared to 63.9% of people bitten in urban areas. Dogs that bit people on private property in rural areas were less likely to be fenced on the property (32.0% of dogs in rural areas, 47.0% of dogs in urban areas) and were more likely to be neither fenced or tied (54.9% of dogs in rural areas, 42.9% of urban dogs) ( $\chi^2 = 7.51$ , d.f = 2,  $P = 0.023$ , A59). 13.1% of dogs in rural areas and 10.1% of dogs in urban areas were tied up at time of the bite.

70.0% of respondents said their bite was unprovoked. 16.4% said the dog was provoked and 12.7% were unsure. However, 78.5% of respondents identified a likely reason for the dog to bite them (Table 3.6). The reason given by the respondent was also compared to their description of the incident and where necessary the researcher made a note of an alternative explanation for the bite. For the remainder of the analysis, the researcher's reason for the bite was used.

**Table 3.6. The percentage of bites attributed to different causes as suggested by the respondent and the researcher.**

<b>Reason for bite</b>	<b>% of bites (respondent)</b>	<b>% of bites (researcher)</b>
Protect territory	21.7	31.4
Unsure	21.5	16.2
Accident	14.0	16.0
Dog was afraid	8.2	9.0
Dog was in pain	5.6	6.6
Protect person	3.4	5.3
Play	4.5	5.1
Protect item	3.2	2.6
Protect puppies	1.9	1.9
Other	21.3	6.0
N	530	532

Among the top five reasons for dogs to bite (territory defence, unknown reasons, accident, fear and pain), dogs that caused injury to the face or head were less likely to bite due to territory defence or by accident (Table 3.7) and more likely to bite due to fear or pain than dogs that injured other parts of the body ( $\chi^2 = 33.89$ , d.f = 4,  $P < 0.001$ , A60). People bitten on the hand were less likely to have been bitten due to protection of territory or unknown reasons and more likely to have been bitten by accident or because of fear or pain ( $\chi^2 = 81.57$ , d.f = 4,  $P < 0.001$ , A61). In contrast, dogs that bit the legs or feet were more likely to bite because of territory defence and less likely to bite because of fear, pain or by accident ( $\chi^2 = 52.82$ , d.f = 4,  $P < 0.001$ , A62). Dogs that bit multiple parts of the body were less likely to have bitten by accident and more likely to have been in pain ( $\chi^2 = 12.53$ , d.f = 4,  $P = 0.014$ , A63).

**Table 3.7. Percentage of people bitten on the face/head, hand, legs/feet or multiple body parts compared to the reason for the bite.**

<b>Reason</b>	<b>Face/head (%)</b>	<b>Hand (%)</b>	<b>Legs/feet (%)</b>	<b>Multiple (%)</b>	<b>N</b>
Territorial	6.7	14.0	59.4	14.4	167
Unsure	6.4	15.4	48.7	8.2	85
Accident	0.0	63.0	24.7	3.6	84
Fear	7.0	51.2	20.9	10.4	48
Pain	23.1	57.7	3.8	23.5	34
Total	4.0	32.3	41.2	11.2	418

Accidental bites and those attributable to pain or fear were rated less severe in terms of psychological impacts ( $\chi^2 = 31.33$ , d.f = 4,  $P < 0.001$ , A64). 5.7% of bites by dogs in pain, 17.0% of bites by dogs that were afraid, and 14.3% of accidental bites caused moderate to very severe psychological injuries compared to 34.1% of territorial bites and 42.4% of bites classed as “unsure”. Dogs that bit due to territory protection or for unknown reasons were likely to cause more severe psychological injuries than dogs that bit for other reasons ( $\chi^2 = 31.33$ , d.f = 4,  $P < 0.001$ , A64). 34.1% of territorial bites and 42.4% of bites due to unknown causes were rated moderate to very severe compared to 14.3% of accidental bites, 17.0% of fear-related bites and 5.7% of bites by dogs that were in pain.

Bites by dogs that were in pain were more likely to take place in rural areas than bites that had other causes ( $\chi^2 = 12.00$ , d.f = 4,  $P = 0.017$ , A65). 68.6% of dogs that bit because they were in pain were in rural areas at the time (43.7% of all bites took place in rural areas).

Dogs that bit for territorial reasons were less likely to be female and more likely to be recorded as “unsure” (Table 3.8). In contrast, dogs that bit by accident or due to pain were more likely to be female and less likely to be recorded as “unsure” than dogs that bit for other reasons. No dogs that bit while in pain were recorded as “unsure”.

**Table 3.8. The top five reasons for dogs to bite compared to the sex of the dog responsible ( $\chi^2 = 58.56$ , d.f = 8,  $P < 0.001$ , A66).**

Sex	Reason for the bite (%)					Total
	Protect territory	Unsure	Accident	Dog afraid	Dog in pain	
Male	43.3	48.2	48.8	47.9	51.4	46.6
Female	12.8	18.8	39.3	20.8	48.6	23.3
Unsure	43.9	32.9	11.9	31.3	0.0	30.0
N	164	85	84	48	35	416

Labrador retrievers were more likely to bite due to protection of territory (50.0%) and fear (40.0%) and less likely to bite due to unknown reasons (0.0%), pain (0.0%) or by accident (10.0%) than other breeds ( $\chi^2 = 10.95$ , d.f = 4,  $P = 0.027$ , A67). Pit bull terriers were more likely to bite because of territory protection (57.1%) and less likely to bite due to fear (0.0%), pain (0.0%) or by accident (10.7%) than other breeds ( $\chi^2 = 11.78$ , d.f = 4,  $P = 0.019$ , A68).

29.5% of bites were reported to authorities. 68.6% were not reported and respondents were unsure in 1.9% of cases. 12.5% said they reported the bite to a dog control officer, 12.5% were reported to the local council and 6.9% to police. Some respondents said that they reported the incident to the police who referred them to the council so some bites were reported to both the local council and the police. Bites resulting in more severe psychological effects were more likely to be reported (Kolmogorov-Smirnov two-sample test,  $K = 2.81$ ,  $P < 0.02$ ). 22.7% of respondents with very minor or minor psychological effects reported the bite compared to 51.5% of people suffering moderate to very severe effects. No bites involving a family member's dog were reported. 2 bites by dogs belonging to the victim, 2 by dogs belonging to a friend and one involving a flatmate's dog were reported. In contrast, 16 (30.2%) bites by dogs owned by a neighbour and 118 (61.8%) bites by a stranger's dog were reported. 17 (29.3%) bites where owner was recorded as "other" were reported.

Bites that were said to have been provoked were less likely to be reported ( $\chi^2 = 26.27$ , d.f = 1,  $P < 0.001$ , A69). 9.2% of bites that were considered to be provoked were reported compared to 37.8% of bites thought to be unprovoked and 15.4% reported as "unsure".

Bites attributed to territory defence or unknown reasons were more likely to be reported as unprovoked ( $\chi^2 = 72.98$ , d.f = 4,  $P < 0.001$ , A70) and were more likely to be reported ( $\chi^2 = 41.92$ , d.f = 4,  $P < 0.001$ , A71). As shown in Table 3.9, dogs that bit due to fear, pain or by accident were less likely to be destroyed than dogs that bit because of territorial defence or those for which a likely reason for the bite could not be identified. Bites by pit bull terriers were more likely to be reported than bites by other breeds ( $\chi^2 = 21.12$ , d.f = 1,  $P < 0.001$ , A72). 27.4% of bites by all other breeds were reported but 64.7% of bites by pit bull terriers were reported.

**Table 3.9. The top five reasons for dogs to bite compared to the fate of the dog ( $\chi^2 = 19.22$ , d.f = 4,  $P = 0.001$ , A73).**

Destroyed (%)	Reason for the bite					Total
	Protect territory	Unsure	Accident	Dog afraid	Dog in pain	
Yes	16.5	25.0	8.3	6.3	0.0	14.0
No/unsure	83.5	75.0	91.7	93.8	100.0	86.0
N	164	84	84	48	33	413

### Opinions on dog-control legislation

Participants were asked to rate how likely it was that three pieces of legislation could have prevented their bite. 15.0% said that it was very likely that the bite could have been prevented had the dog been on a lead in a public place. 9.7% said it was somewhat likely and 74.8% said it was not at all likely. People bitten in urban areas were more likely to say that their bite could have been avoided if the dog was on a lead ( $\chi^2 = 10.71$ , d.f = 1,  $P = 0.001$ , A74). 68.9% of people who said it was either somewhat or very likely that this would have prevented their bite were from urban areas. 7.1% thought muzzling dangerous breeds in public would have prevented their bite while 14.4% said it was somewhat likely and 77.9% said this would not have made a difference. 28.8% said it was very likely that fencing houses so that visitors can access a door without coming into contact with a dog would have prevented the bite. 14.0% thought fencing was somewhat likely to help and 56.6% said it was not at all likely.

People bitten on the leg were more likely to say that their bite may have been prevented had the dog been on a lead in public than people not bitten on the leg ( $\chi^2 = 6.26$ , d.f = 1,  $P$

= 0.012, A75). People bitten on the leg were also more likely to say that fencing houses could have prevented their bite ( $\chi^2 = 25.70$ , d.f = 1,  $P < 0.001$ , A76).

When asked whether they thought certain items of legislation were a good idea, 77.0% agreed with having dogs on leads in public places and 80.6% said dangerous breeds should be muzzled in public. 58.7% thought owners should have to fence their houses so visitors can get to one of the doors, 49.7% said the maximum penalty for dog-related offences should be raised and 67.1% said dog control officers should be given the right to enter properties to seize dogs. 73.6% of participants said “fighting” breeds should be banned while 15.5% said they should not (10.1% unsure). When asked what should happen to dogs that injure a person severely, 41.3% said they should be euthanized regardless of why the dog attacked and 54.8% said the circumstances of the incident should be taken into account (3.4% unsure).

Most participants (62.8%) said fines were an appropriate penalty for owners of dogs that injure people. 42.2% said owners should be made to seek expert training for the dog, 59.3% said their ownership rights should be revoked, and 18.7% said imprisonment of the owner was appropriate. 4.3% said owners should not be penalised and 16.8% were recorded as “other”. Most respondents who chose “other” said that the penalty depends too much on the circumstances for them to make judgements as to which are appropriate, but many suggested that the owner should have to take a course on dog ownership skills. Men were more likely to say that owners should be made to serve time in jail ( $\chi^2 = 7.96$ , d.f = 1,  $P = 0.005$ , A77), with 23.5% of male respondents saying jail was appropriate, compared to 14.0% of females. In contrast, 49.4% of women said the owner should have to get training for the dog compared to 35.4% of men ( $\chi^2 = 10.67$ , d.f = 1,  $P = 0.001$ , A78).

67.4% of respondents reported that media coverage of dog attacks has affected the way they view dogs. 20.0% are more wary of unfamiliar dogs, 18.3% are more wary of certain breeds and 24.8% are now more wary of all dogs. 0.8% were unsure and 31.9% reported that the media had had no impact on them. 4.2% were recorded as “other”. Men were more likely to say that media had not affected them and less likely to say they were wary of all dogs ( $\chi^2 = 26.17$ , d.f = 5,  $P < 0.001$ , A79). 41.0% of men said that the media had not

affected them compared to only 22.8% of women. 31.6% of women said they are more wary of all dogs (18.0% for men).

## **Discussion**

The response rate for this study was 29.5%. Because the sample was drawn from claims made in 2002, this response rate may be lower than would be expected if the sample had been drawn from more recent claims. The surveys were posted in August 2004, so it is likely that many of the addresses in the ACC records were out of date. Indeed, the ACC received 160 surveys returned due to wrong addresses and it is possible that there were many more that were not returned. In addition, the researcher received around 30 surveys from people saying that they had received surveys due to errors in the ACC records. Thus, 29.5% is a conservative estimate of responses received by the target population.

### **Respondent Characteristics**

Most studies of dog attacks find that males are bitten more often than females (Szpakowski et al., 1989; Podberscek et al., 1990; Avner and Baker, 1991; Wright, 1991; Langley, 1992; Brogan et al., 1995; Overall and Love, 2001; DIA, 2003; Marsh et al., 2004; Wake et al., 2005) so the fact that equal numbers of respondents in this study were male and female is unusual. This finding could be explained by the methods used in this study. It is possible that women are more likely to complete and return postal surveys which would artificially elevate their numbers. Alternatively, the lack of a difference in the proportion of men and women bitten in this study may be a result of the sample being made up of adults. A study of people requiring medical attention for dog bites in America found that, while boys under 15 were bitten more often than girls, the differences in bite rates for males and females aged 15 and older were not significantly different (Anonymous, 2003). The Department of Internal Affairs (2003) report that, between the ages of 15 and 40, men were more likely to be treated for dog bites in New Zealand hospitals but over the age of 40 the proportions of men and women were similar.

The age distribution of people in this survey is also likely to have been affected by the methods used. Only 12.8% of respondents were between the ages of 16 and 29 when they

were bitten. In contrast, Marsh et al (2004) found that people in this age range made up 37.5% of adults admitted to New Zealand hospitals because of dog bites from 1989 to 2001. Younger people in this study may be more likely to have moved house between the time their claims were made and the time the surveys were sent out, meaning they would be less likely to receive their surveys.

Compared to the numbers of respondents from rural and urban areas, people were more likely to be bitten in rural areas. This finding was also reported by Wake et al (2005). Dogs that had bitten respondents in rural areas were less likely to have been confined by fences and more likely to be unrestrained which may partially account for the increased chance of being bitten in rural areas. The higher dog-to-human ratio in rural areas of New Zealand may also contribute to this trend. Urban areas have a ratio of 86 to 87 registered dogs per 1000 people whereas rural/mixed areas have a ratio of between 237 and 245 registered dogs per 1000 people (Department of Internal Affairs, 2003).

### **Injuries**

Because the ACC excluded severe cases from the sample, data from this study on the severity of injuries caused by dog bites cannot be considered representative of all dog bite injuries. Nevertheless, some surveys were received from people who had sustained severe injuries (16 or 3.0%). Although the criteria used to define severity differed (here based on the degree of medical treatment required but in ACC records, based on the degree of financial assistance needed), the proportion of bites in this study rated severe or very severe (i.e. requiring hospitalisation) was similar to the proportion rated moderate to severe with the ACC in 2003. Fox (2004) reported that 233 (2.7%) of the 8677 dog-related ACC claims in 2003 were moderate to serious.

The anatomical distribution of bites in this study is somewhat different from those reported elsewhere (Spakowski et al, 1989; Avner and Baker, 1991; Brogan et al, 1995; Thomson, 1997; Anonymous, 2003; Wake et al, 2005), with fewer bites to the head area and more to the legs or feet. However, other studies included children in their samples (or concentrated entirely on bites to children) which will affect the distribution of bites to the different parts of the body. Children are more likely to be bitten in the head region (Avner and Baker, 1991; Write, 1991; Langley, 1992; Brogan et al., 1995; Thompson, 1997;

Overall and Love, 2001; Anonymous, 2003; Wake et al, 2005) whereas bites to the extremities are more common in older people (Anonymous, 2003).

### **The dogs**

36.2% of respondents had been bitten by a stranger's dog, which is somewhat lower than the 58% reported by Podberscek and Blackshaw (1993). 23.7% of bites in this study involved dogs living with the respondent (owned either by the bite victim, a family member in their household or a flatmate). Similarly, Spakowski et al (1989) found that 23.2% of bites reported in the city of Guelph, Canada, were bites to the owner of the dog. A further 19.7% of reported bites took place during a delivery operation (Spakowski et al., 1989). In this study, 11.0% of respondents had the owner of the dog recorded as "other" and almost all of these bites were to people going onto private property to service clients. 64.9% of people bitten by a client's dog were male which is similar to the 69% reported by Spakowski et al (1989) for people bitten during delivery operations. The finding that men were more likely to report the dog's owner as "other" probably reflects a tendency for men to hold jobs that require them to enter private properties. Most people who listed the dog's owner as "other" said they worked as meter readers, couriers, plumbers or lawn mowing professionals and were on client's properties at the time of the bite, so the category "other" in this study covers a much wider range of jobs than simply those involving delivery operations.

Most studies on dog aggression find male dogs are more aggressive than females (Borchelt, 1983; Wright and Nesselwrote, 1987; Spakowski et al, 1989; Landsberg, 1991; Shewell and Nancarrow, 1991; Beaver, 1993; Podberscek and Blackshaw, 1993; Lund et al., 1996; Tacheuchi et al., 2001; Wake et al, 2005) and more entire males bite people or are treated for aggression problems than neutered males (Borchelt, 1983; Wright and Nesselwrote, 1987; Spakowski et al, 1989; Beaver, 1993; Guy et al., 2001). Both these findings were repeated here. Many studies have found that neutered females are more aggressive than intact females (Beaver, 1993; Borchelt, 1983; Wright and Nesselwrote, 1987; Guy et al., 2001; Wake et al, 2005). Similar proportions of female dogs were reported to be neutered and intact (41.6% neutered, 38.4% intact), but when compared to male dogs, female dogs were more likely to be neutered (26% of male dogs were neutered). This was also reported by Wake et al (2005).

Findings regarding sex and, in particular, neuter status in this and other studies may simply reflect the numbers of each category in the total dog population. Two studies have compared percentages of aggressive intact and neutered males and females with a wider population (Wright and Nesselwrote, 1987; Gershman et al, 1994). Wright and Nesselwrote (1987) found that 57% of dogs referred by veterinarians for treatment of aggression problems were intact males, 9% were neutered males, 5% were intact females and 30% were neutered females. In contrast, only 34% of all dogs seen by the referring veterinary practices were intact males, 9% were neutered males, 36% were intact females and 21% were neutered females. This suggests that intact males and neutered females are more likely to develop aggression problems than neutered males or intact females. Similarly, in a case-controlled study in Denver, Colorado, Gershman et al (1994) found that dogs that had bitten a non-household member were more likely to be male and less likely to be neutered compared to non-biting dogs. Overall and Love (2001) suggest that males (and particularly intact males) are more aggressive because of the effect that testosterone has on their behaviour. They state that testosterone influences a dog's behaviour by making it react more quickly and intensely to a stimulus and by prolonging the behaviour.

People bitten on the hand were less likely to be unsure of the dog's sex and more likely to have been bitten by a female dog. These respondents may have been less likely to be unsure of the dog's sex because people bitten on the hand tended to be familiar with the dog. This is reflected in the finding that people bitten by a dog living in their home were more likely to have been bitten on the hand. It is probably also related to the reason behind the bite, as dogs that bit due to fear, pain or by accident were more likely to bite the hand and dogs that bit for these reasons were more likely to be female and less likely to be of unknown sex. People bitten on the legs or feet were more likely to be unsure of the dog's sex and this may be because they were more likely to have been bitten by an unfamiliar dog. In addition, these people were less likely to have been bitten by a female dog. Female dogs were less likely to bite due to territory protection and dogs that attacked for this reason were more likely to target the legs or feet.

While only 26.6% of respondents were unsure if they had identified the breed of dog correctly, data on biting breeds based on victim identification must be interpreted with caution. There were a few obvious mistakes in breed identification here. Most notable of

these were two cases where respondents said they were “very sure” they had been bitten by pit bull terriers then recorded the size of the dog as “small (less than 40cm at the shoulder)”. This suggests that these respondents were not bitten by pit bull terriers but perhaps by dogs of a smaller, related breed such as Staffordshire or bull terriers.

The finding that Labrador retrievers and pit bull terriers were more likely to be of unknown sex can probably be attributed to their greater tendency to bite due to territory protection compared to other breeds. Dogs that bit due to territory protection were more likely to be of unknown sex. Jack Russell terriers were more likely to be neutered and less likely to be of unknown sex. This breed was more likely to bite people it was living with which would explain why the number of Jack Russell terriers of unknown sex was low.

Rottweilers were more likely to bite on the arm than other breeds and were less likely to bite the legs or feet. The reason for this does not appear to be related to the reason for the attack but may be partially explained by the tendency for large dogs to bite the arms. German shepherds, which are a similar size, were also more likely to bite the arms. The large proportion of attacks by German shepherds that involved multiple bites (26.2%, compared to just 9.9% for dogs of other breeds) is difficult to explain.

Rottweilers and pit bull terriers were more likely to be destroyed as a result of attacks on respondents and bites by pit bull terriers were more likely to be reported. Psychological effects associated with bites by rottweilers tended to be rated as more severe, which may partially account for the increased chance that they will be destroyed. Bites by pit bull terriers, however, were not associated with more severe physical or psychological injuries. Pit bull terriers, in particular, have received a great deal of negative attention in the media and the finding that bites by this breed are more likely to be reported may be a reflection of the stigma attached to this breed. The high reporting rate for bites involving pit bull terriers, regardless of the severity of any injuries they cause, suggests that any data on the number of reported bites by this breed could be artificially high.

The findings of the ACC study concerning the size of dogs involved in bites are possibly more important than understanding the relationship between breed and aggression. Large dogs in this study were likely to produce more severe physical and psychological injuries in their victims and were also more likely to inflict injuries to multiple parts of the body.

Some breeds considered to be very aggressive, such as the corgi or Chihuahua, are small (Stafford, 1996) but, while inappropriate aggression in any dog is a serious issue, larger dogs have the potential to do much more damage when they react aggressively and this should be considered by people wishing to purchase a dog.

Smaller dogs in this study were more likely to bite the hand which may be explained by the higher percentage of small dogs that bit while in pain compared to medium or large dogs. Dogs that were in pain were more likely to bite the hand. It is unclear why larger dogs were more likely to bite the arms. This may simply be because the arm is a more accessible target for a larger dog. Larger dogs were more likely to injure multiple parts of the bite victim's body, possibly because larger dogs may be more difficult to fend off in an attack or because they have greater access to the upper extremities than a smaller dog (which may only be able to reach the legs) would, by virtue of their size.

### **Circumstances**

In most cases, the ranking of the different areas where people were bitten follows the order published by Statistics New Zealand for populations in the various regions for 2001. However, Otago/Dunedin appears to have a slightly lower risk for dog bites, with the seventh largest population (Statistics New Zealand) but the ninth highest number of dog bites. In contrast, Northland had the sixth highest number of dog bites but the ninth largest population (Statistics New Zealand). More people were bitten in rural areas than would be expected from the number living in rural areas, a finding also obtained by Wake et al (2005).

Public streets or walkways were the most common locations for dog bites in this study (25.9%). Spakowski et al (1989) found that 14.4% of reported dog bites took place in the street and 42.4% of bitten respondents in a survey by Podberscek and Blackshaw (1993) were bitten in the street. However, only 6% of people hospitalised because of dog bites in New Zealand said they were bitten in the street (Marsh et al, 2004). Marsh et al (2004) also report that 30% of bites took place in the home (not necessarily the home of the bite victim) and 1% of people were bitten on the farm. 20% of bite victims in Podberscek and Blackshaws' (1993) study were bitten at a friend's home and 15% were bitten in their own home, compared to 12.5% and 20.8% respectively, for people in this survey.

11.6% of dogs in this study were loose and unsupervised in a public place when they attacked. This is high compared to the 4.6% reported by Brogan et al (1995) for dogs causing severe injuries to children. However, Thomson (1997) reported that over half of all biting dogs were free and uncontrolled in public places. While the proportion of dogs that were fenced on private property was high (23.9%) compared to the 16% reported by Brogan et al (1995) and 10% reported by Avner and Baker (1991), almost 30% of biting dogs in this study were on private property but not confined in any way.

Respondents said their attack was unprovoked in 70% of cases. This is much higher than the 41% reported by Spakowski et al (1989) and 33% reported by Podberscek and Blackshaw (1993). Podberscek and Blackshaw (1993) found that 33% of bites were unprovoked, 21.7% were unintentionally provoked and 3.5% were intentionally provoked. However, it has been suggested that, while canine aggression is often said to be unprovoked, on closer inspection of the circumstances of the bite there is almost always an identifiable eliciting stimulus (Borchelt, 1983). Indeed, many respondents in this study said their bite was unprovoked, but most respondents (78.5%) were able to give a possible reason for the dog to bite them and the researcher was able to give a reason for 84% of bites. For most of the remaining 16% of cases the respondents' descriptions of the bite incident were either too vague for the researcher to make a judgment on the reason for the bite or a description was not given at all.

Territory defence was the most common reason for dogs to bite respondents, followed by accidental bites (most inflicted while respondents were breaking up dog fights), fear, and pain. Very few other studies on dog bites have looked at what caused the dogs to bite. Spakowski et al (1989) report that protective behaviour could explain 45.5% of reported bites in Guelph (compared to 41.2% of bites in this study). Dominance aggression was the likely cause of 27.5% of cases, while fear and pain were attributed to roughly 6% of cases each. Play and re-directed aggression could explain 3.7% of incidents each and predatory aggression, 2.6%. By contrast, 19.8% of bites in a study by Podberscek and Blackshaw (1993) were said to be predatory attacks and only 15.3% were attributed to the dog defending a resource or territory. In the present study, predatory bites were put under the category "other" (6.0%). The differences between the percentage of bites attributable to predatory and protective aggression probably reflect differences in the ways aggression was categorized in each study. Podberscek and Blackshaw (1993) classed attacks as

predatory if the person was running, walking or riding past the dog before it attacked. This classification seems somewhat simplistic, however. While a bite by a dog chasing a fast-moving object (such as a person on a bike) could be said to be predatory, it seems unlikely that merely walking past a dog would trigger a predatory response. In this study, bites to people walking past a dog would probably have been attributed to territorial or protective aggression, although the overall situation would have been taken into account.

Dogs that bit the face or head were more likely to bite due to fear or pain. People bitten for these reasons often reported that they were in a situation where their faces were close to the dog's. For example, many people bitten by dogs that were in pain were bending over to help an injured dog or were in the process of carrying it to another location. People bitten on the hand were likely to have been bitten by accident or due to pain or fear. Bites attributed to these causes typically involved situations where the respondent was breaking up a dog fight, tending to an injured dog or patting an unfamiliar dog. In these situations, where the bite victim is actively interacting with the dog, the hand would be an obvious target.

Dogs that bit by accident or when in pain were more likely to be female compared to dogs that bit for other reasons. It is not surprising that equal proportions of male and female dogs bit due to pain. Most dogs that were in pain were injured. Unless dogs of one sex were more likely to get injured, there would be no reason to suppose there would be any tendency for dogs of either sex to be more likely to bite due to pain. Even the most docile dog may bite in this situation. Most accidental bites occurred when the respondent was breaking up a dog fight. While this was a common reason for female dogs to bite, there were still more males biting for this reason (48.8% compared to 39.3%). Some studies find that males are more likely to fight with other dogs (Borchelt, 1983; Lund et al, 1996) but Sherman et al (1996) found the proportion of male and female dogs treated for aggression towards other dogs to be roughly equal.

Dogs that bit because they were in pain were more likely to be in rural areas. Many of the dogs that bit for this reason were farm dogs that had either had a leg caught while jumping off the back of a farm bike or been caught in electric or barbed wire fences while jumping over them.

While data on the causes of dog attacks are scarce, it is valuable information as it serves to highlight particularly high-risk situations and how they can be avoided. Most of the 84 accidental bites occurred when dog owners were attempting to break up fights between two dogs. There is an obvious risk of getting bitten in this situation and most dog owners probably know that getting between fighting dogs should be an absolute last resort after all other means of separating the dogs have been exhausted. Another situation that could be easily avoided is people getting bitten by dogs that are in pain. Typically, respondents bitten by dogs that were in pain were attempting to help (and in most cases were in the act of picking up) a dog that had been hit by car, caught in an electric or barbed wire fence or injured in a fight with another dog. In these situations it may be wise to cover the dog's eyes and secure its mouth with a towel or item of clothing. Alternatively, the person going to the dog's aid could pad their arms and hands with clothing or towels before touching the dog but this still leaves the face (a common part of the body to be bitten by dogs in pain) vulnerable. Finally, many people reported that they were bitten while patting unfamiliar dogs. The best way to prevent such bites would be to avoid approaching unfamiliar dogs, even if they appear friendly.

### **Opinions on dog control legislation**

Almost 90% of respondents said that legislation involving muzzling dangerous breeds, having dogs on leads, or re-fencing houses may have prevented their bite from taking place. In particular, 42.8% said that having dog owners fence their houses so visitors can safely access a door could have prevented their bite. However, while part of the initial draft legislation, this law did not come about in the final version of the Dog Control Amendment Act, 2004. 21.5% of respondents thought it was either somewhat likely or very likely that muzzling dangerous breeds in public would have prevented their bite. The only breed currently in New Zealand classified as dangerous under the new dog control legislation, however, is the pit bull terrier which was responsible for 6.5% of bites. Many respondents who said this legislation could have prevented their bite were bitten by other breeds such as German shepherds or rottweilers.

While re-fencing houses could potentially have the greatest effect of the number of dog bites that take place, fewer respondents agreed with this item of legislation. Just under 60% thought having dog owners re-fence their houses was a good idea, while 80% said muzzling dangerous breeds was a good idea and 77% agreed with having dogs on leads in

public. 74% of respondents thought fighting breeds should be banned which was much higher than the 14% reported in a survey of veterinary students (Wake et al, 2005). Opinions on appropriate penalties for owners of biting dogs were very similar to those of participants in the study by Wake et al (2005).

## References

- Anonymous.** Nonfatal dog bite-related injuries treated in hospital emergency departments – Unites States, 2001. *Morbidity and Mortality Weekly* 52, 605-610, 2003
- Avner JR, Baker MD.** Dog bites in urban children. *Pediatrics* 88, 55-57, 1991
- Beaver BV.** Profiles of dogs presented for aggression. *Journal of the American Animal Hospital Association* 29, 564-569, 1993
- Borchelt PL.** Aggressive behaviour of dogs kept as companion animals: classification and influence of sex, reproductive status. *Applied Animal Ethology* 10, 45-61, 1983
- Brogan TV, Bratton SL, Dowd D, Hegenbarth MA.** Severe dog bites in children. *Pediatrics* 96, 947-950, 1995
- Department of Internal Affairs (DIA).** Survey of territorial authorities on dog control issues – final report June 2003
- Fox S.** Tougher dog rules fail to cut injuries. *East and Bays Courier* 4 Feb. 2004
- Gershman KA, Sacks JJ, Wright JC.** Which dogs bite – a case-controlled study of risk factors. *Pediatrics* 93, 9131-917, 1994
- Guy NC, Luescher UA, Dohoo SE, Spangler E, Miller JB, Dohoo, IR, Bate LA.** A case series of biting dogs: characteristics of the dogs, their behaviour, and their victims. *Applied Animal Behaviour* 74, 43-57, 2001
- Landsberg GM.** The distribution of canine behaviour cases at three behaviour referral practices. *Veterinary Medicine* 86, 1011-1018, 1991
- Langley J.** The incidence of dog bites in New Zealand. *New Zealand Medical Journal* 105, 33-35, 1992
- Line S, Voith VL.** Dominance aggression of dogs towards people: behaviour and response to treatment. *Applied Animal Behaviour Science* 16, 17-83, 1986

- Lund JD, Agger JF, Vestergaard KS.** Reported behaviour problems in pet dogs in Denmark: age distribution and influence of breed and gender. *Preventative Veterinary Medicine* 22, 33-48, 1996
- Marsh L, Langley J, Gauld R.** Dog bite injuries. *The New Zealand Medical Journal* 17, 1-6, 2004
- Overall KL, Love M.** Dog bites to humans – demography, epidemiology, injury and risk. *Journal of the American Veterinary Medical Association* 218, 1923-1934, 2001
- Podberscek AL, Blackshaw JK.** A survey of dog bites in Brisbane, Australia. *Australian Veterinary Practitioner* 23, 178-183, 1993
- Podberscek AL, Blackshaw JK, Nixon JW.** The incidence of dog attacks on children treated at a city hospital. *Australian Veterinary Journal* 67, 79-80, 1990
- Sherman CK, Reisner IR, Taliaferro LA, Houpt KA.** Characteristics, treatment and outcome of 99 cases of aggression between dogs. *Applied Animal Behaviour Science* 47, 91-108, 1996
- Shewell PG, Nancarrow JD.** Dogs that bite. *British Medical Journal* 303, 1512-1513, 1991
- Stafford KJ.** Opinions of veterinarians regarding aggression in different breeds of dog. *New Zealand Veterinary Journal* 44, 138-141, 1996
- Szpakowski NM, Bonnett BN, Martin SW.** An epidemiological investigation into the reported incidents of dog biting in the city of Guelph. *Canadian Veterinary Journal* 30, 937-942, 1989
- Takeuchi Y, Ogata N, Houpt KA, Scarlett JM.** Differences in background and outcome of three behaviour problems of dogs. *Applied Animal Behaviour Science* 70, 297-308, 2001.
- Thompson PG.** The public health impact of dog attacks in a major Australian city. *Medical Journal of Australia* 167, 129-132, 1997
- Wake AAF, Stafford KJ, Minot EO.** Dog bites in New Zealand: A survey of veterinary students. In prep (to be submitted to the New Zealand Veterinary Journal)
- Wright JC, Nesselwrote MS.** Classification of behaviour problems in dogs. *Applied Animal Behaviour Science* 19, 169-178, 1987
- Wright JC.** Canine aggression towards people: bite scenarios and prevention. *Veterinary Clinics of North America: Small Animal Practice* 21, 299-314, 1991



## Discussion and recommendations

This research consists of two studies. The first is based on a survey of veterinary students at Massey University, Palmerston North, in 2003. 228 valid responses to the survey were received. These provided information on the proportion of people bitten by a dog, their opinions on dog control issues, the characteristics of the respondents and the dogs that had bitten them, and the circumstances of the bites.

The second study is an analysis of a survey of people who made claims to the Accident Compensation Corporation (ACC) as a result of dog bites. 2000 questionnaires were sent out in 2004 to people who had made claims to the ACC in 2002 as a result of dog bites. The ACC restricted the sample to people who were 16 or older at the time of the claim and excluded those with severe injuries. 535 valid responses were received. Adjusting for surveys returned due to incorrect addresses or mistakes in the ACC records, the response rate was 29.5%. This study provides information similar to that from the student study but, because all people surveyed had been bitten, does not provide additional information on the proportion of New Zealanders bitten by a dog. It does, however, provide data on more severe dog bites than those experienced by the students.

### **Concordance between the two studies**

The first study is based on a very specific sample of respondents (veterinary students who were predominantly female and in their early twenties), and the results of this study could be biased in some respects. In particular, it was anticipated that rates of dog ownership and ability to identify breeds would be higher than average. In other respects, particularly demographics, the respondents in the two studies were very similar. The proportion of respondents from cities, towns and rural properties were similar. Slightly fewer respondents in the ACC study were from cities (49.9% compared to 59.6% in the student study) and more were from small towns or villages (22.2% in the ACC study, 9.7% of the student sample) but the percentages of respondents from rural properties and large towns were almost identical. 80.9% of people in the ACC study and 81.1% of people in the student study had lived with or owned a dog. 48.8% of ACC respondents were very sure

they had correctly identified the breed of dog, which was similar to the 55.2% for bitten respondents in the student study.

Many of the discrepancies between the results of the two studies (e.g. most common reasons for dogs to bite, breeds involved in bites, percentage of bites reported) can be explained by the fact that the student study generally concerned less severe bites than the ACC study.

## **Recommendations**

The findings of these two studies generally support each other as well as past research on dog bites and are probably the most comprehensive studies of dog attacks carried out in New Zealand to date. Despite this, gaps in our knowledge remain. These are discussed below.

Past studies have found that children are more likely to be bitten than adults (Blackshaw, 1991; Wright, 1991; Langley, 1992; Sacks and Lockwood, 1996; Marsh et al., 2004), a finding that is echoed here in the student study. Because the ACC sample consisted of people who were at least 16 when bitten and the sample for the student study was relatively small, it would be valuable to have further data on the aetiology of bites in children in New Zealand. Any information that could help lower the high rate of dog bites in children would be beneficial.

The ACC study found that male dogs were less likely to be neutered, which is consistent with past research on dog aggression (Borchelt, 1983; Wright and Nesselwrote, 1987; Spakowski et al, 1989; Beaver, 1993; Guy et al., 2001). Both studies also support research indicating that neutered females may be more aggressive than intact females (Beaver, 1993; Borchelt, 1983; Wright and Nesselwrote, 1987; Guy et al., 2001). These findings have important implications for dog owners considering neutering their dogs. Castration is often recommended as a means of reducing aggressive tendencies (Borchelt, 1983; Sherman et al, 1996) and has been shown to reduce aggression in male dogs (Neilson et al, 1997). However, the results of studies on dog aggression suggest this could have the opposite effect on female dogs. Overall (1995) looked at the behavioural effects of de-sexing on bitches and obtained results that suggest that spaying bitches before the age of 11 months may strengthen aggressive tendencies.

If these findings regarding aggression in neutered bitches are accurate, it may be worthwhile promoting other means of contraception for bitches as a means of reducing the incidence of dog bites. More research is needed, however, to further our understanding of the relationship between neutering and aggression in dogs, particularly for female dogs. Ideally, case controlled studies looking at the incidence and development of aggression problems in intact and neutered male and female dogs should be carried out. Alternatively, if accurate information on the proportions of intact and neutered male and female dogs in New Zealand were available, comparisons could be made between the numbers of neutered and intact male and female biting dogs in these studies. This could be done by collecting data from veterinary surgeries or as part of the information collected when dogs are registered. While neither of these methods would necessarily give actual numbers of dogs of each sex and neuter status, they could at least serve as a guide.

In accordance with past research on dog aggression, the breeds most often involved in attacks were mixed-breed dogs and German shepherds. Biting breeds must be compared with the numbers of each breed present in the dog population as a whole for any judgment to be made concerning relative levels of aggression in the various breeds. This is frequently done by comparing the proportions of aggressive dogs in aggression studies with the proportion of the registered dog population each breed comprises. This control group, however, is not likely to be representative of the actual dog population as some breeds are less likely to be registered and the proportions of each breed will vary with time and place (Wright, 1991; Langley, 1992). Some studies (Lund et al, 1995; Guy et al, 2001) use dogs presented to veterinary clinics as general veterinary patients as control groups but this also has its drawbacks. Veterinary control groups may only represent the specific dog population in the town or city (or even suburb) in which the clinics are located. In addition, some breeds may be more likely to be taken to the vet than others (Lund et al, 1995) due to differences in owner characteristics, the purpose of the dog (e.g. working dogs versus pets) and illnesses that are more prevalent in, or specific to, certain breeds or breed types. Thus, it is likely that the true distribution of breeds in the dog population of New Zealand will never be accurately understood.

One way to get more information on breeds in New Zealand would be to conduct a survey (perhaps via random telephone interviews) asking participants whether they own dogs and, if so, what breed their dogs are. This method would have the drawback of having to rely on the owner's report on the breeding of their dog. This is a problem in common with data based on veterinary clients or registrations, although perhaps not to the same extent. A survey, however, would have the added advantage of gaining information on registration – both the proportion of dogs not registered and any differences in the tendency for owners of different breeds to register their dogs. In future, the nature and extent of aggressive tendencies in different breeds of dog should be taken into account by prospective owners when selecting a new dog, particularly when vulnerable parties (such as children) are present in the household. This information is also important in formulating breed-specific dog control legislation.

These studies highlight the importance of gaining information on the circumstances surrounding dog bites. Data on the nature of injuries sustained in dog attacks, characteristics of people bitten by dogs, and the dogs responsible for bites are relatively abundant, yet data on the circumstances surrounding dog bites is not. This is unfortunate as it is this information that has the greatest potential to be of use in formulating recommendations aimed at reducing the number of people bitten by dogs.

## References

- Beaver BV.** Profiles of dogs presented for aggression. *Journal of the American Animal Hospital Association* 29, 564-569, 1993
- Blackshaw JK.** An overview of types of aggressive behaviour in dogs and methods of treatment. *Applied Animal Behaviour Science* 30, 351-361, 1991
- Borchelt PL.** Aggressive behaviour of dogs kept as companion animals: classification and influence of sex, reproductive status. *Applied Animal Ethology* 10, 45-61, 1983
- Guy, NC, Luescher UA, Dohoo SE, Spangler E, Miller JB, Dohoo IR, Bate LA.** Demographics and aggressive characteristics of dogs in a general veterinary caseload. *Applied Animal Behaviour Science* 74, 15-28, 2001

- Sherman CK, Reisner IR, Taliaferro LA, Houpt KA.** Characteristics, treatment and outcome of 99 cases of aggression between dogs. *Applied Animal Behaviour Science* 47, 91-108, 1996
- Langley J.** The incidence of dog bites in New Zealand. *New Zealand Medical Journal* 105, 33-35, 1992
- Lund JD, Agger JF, Vestergaard KS.** Reported behaviour problems in pet dogs in Denmark: age distribution and influence of breed and gender. *Preventative Veterinary Medicine* 22, 33-48, 1996
- Marsh L, Langley J, Gauld R.** Dog bite injuries. *The New Zealand Medical Journal* 117, 1042-1047, 2004
- Neilson JC, Eckstein RA, Hart BL.** Effects of castration on problem behaviours in male dogs with reference to age and duration of behavior. *Journal of the American Veterinary Medical Association* 211, 180-182, 1997
- Overall KL.** Sex and aggression. *Canine Practitioner* 20, 16-18, 1995
- Sacks JJ, Lockwood R.** Fatal dog attacks, 1989-1994. *Paediatrics* 97, 891-897, 1996.
- Sherman CK, Reisner IR, Taliaferro LA, Houpt KA.** Characteristics, treatment and outcome of 99 cases of aggression between dogs. *Applied Animal Behaviour Science* 47, 91-108, 1996
- Szpakowski NM, Bonnet BN, Martin SW.** An epidemiological investigation into the reported incidents of dog biting in the City of Guelph. *Canadian Veterinary Journal* 30, 937-942, 1989
- Wright JC, Nesselwrote MS.** Classification of behaviour problems in dogs. *Applied Animal Behaviour Science* 19, 169-178, 1987
- Wright JC.** Canine aggression towards people: bite scenarios and prevention. *Veterinary Clinics of North America: Small Animal Practice* 21, 299-314, 1991

# Appendix 1

## Questionnaire for veterinary student survey

### PUBLIC EXPERIENCE OF DOG ATTACKS

1) Have you or your immediate family ever owned a dog?

yes                       no

**If yes, what breed(s)**

.....

2) For how many years in total have you lived with or owned a dog?

0                               less than 1 year                       1-5 years  
 6-10 years                       11-15 years                       more than 15 years

3) Was there a dog living in your household when you were a child (**less than 13 years old**)?

yes                       no

4) On how many occasions have you been bitten by a dog? .....

**(If you have never been bitten by a dog, go to question 24)**

---

**Please choose the worst attack if you were bitten on more than one occasion.**

5) What age were you when you were bitten?.....

6) What part(s) of your body were injured? (**you may tick more than one box**)

face/head       arms                       hands                       legs/feet                       torso

other (**please specify**) .....

7) How severe were your physical injuries?

very minor  
 minor (little/no blood drawn)  
 moderate (required medical treatment)  
 severe (requiring hospitalisation)  
 very severe (requiring surgery and/or lengthy rehabilitation)

8) How severe were the psychological or emotional effects of this attack on you?

there were none  
 minor  
 moderate  
 severe  
 very severe

9) How has this attack most affected the way you view dogs?

more wary of all unfamiliar dogs                       more wary of all dogs in general  
 more wary of dogs of certain breeds                       has not affected my views  
 unsure  
 other (**please specify**).....

10) Who owned the dog(s)?

you                       family member (living in same house as the you)  
 flatmate                       family member (not living in same house as you)  
 neighbour                       stranger  
 friend                       other (**Please specify**).....

11) What sex was the dog?  
 male             female             unsure

12) Was the dog neutered?  
 yes             no             unsure

13) What breed was the dog?.....

14) How sure are you that you correctly identified the breed of dog that bit you?  
 very unsure     unsure     reasonably sure     sure     very sure

15) Roughly how big was the dog?  
 small (less than about 40cm tall at the shoulder)  
 medium (between 40 and 60 cm tall)  
 large (over 60cm at the shoulder)

16) What happened to the dog following the attack? **(tick as many as apply)**  
 voluntarily destroyed by owner(s)             owners were ordered to destroy it  
 was re-homed             received behaviour modification training  
 received obedience training             nothing             unsure  
 other **(please specify)**.....

17) In what type of area did the attack occur?  
 rural property  
 village (under 2,000 people)  
 small town (2,000-9,000 people)  
 large town (10,000-29,999 people)  
 city (more than 30,000 people)

18) Where did the attack occur? **(please tick one box only)**  
 your home             friend's property             family member's property             public park  
 neighbour's property     stranger's property     public street/walkway  
 other public area **(please specify)**.....  
 other private property **(please specify)** .....

19) What is the name of the city/town/district where the attack occurred (e.g. Auckland, rural Southland)?  
.....

20) Briefly describe the circumstances leading to the attack.....  
.....  
.....  
.....

21) What do you believe was the main reason the dog bit you? **(please tick one box only)**  
 protection of home     protection of item(s) e.g. food     protection of puppies  
 play             fear             rough handling/pain  
 accidental (e.g. while you were breaking up a dog fight)     unsure  
 protection of a person  
 other **(please specify)**.....

22) Was the attack reported?             yes             no             unsure

**If yes**, who was it reported to? .....

23) In your opinion, how likely is it that the following proposed legislation changes could have prevented this attack? (please tick one box for each of the pieces of legislation).

Keeping all dogs on leads in public places

not at all likely       somewhat likely       very likely

Muzzling particular breeds (e.g. pit bull terriers) in public places

not at all likely       somewhat likely       very likely

Having houses fenced so that a person can access the front door without coming into contact with any dogs living there  not at all likely       somewhat likely       very likely

---

**The following questions relate to your opinions on dog control issues**

24) Do you think the following proposed legislation changes relating to dogs and their owners are a good idea?

(please tick those with which you agree)

keeping all dogs on leads in public places

muzzling particular breeds (e.g. pit bull terriers) in public places

having houses fenced so visitors can access the front door without coming into contact with any dogs living there

raising the maximum penalties for owners of dogs that seriously injure someone from \$5,000 to \$20,000.

giving dog control officers the right to enter private properties to seize dogs

25) Do you think particular breeds (e.g. Pit Bull Terriers) should be banned?

yes       no       unsure

26) What should happen to dogs that injure a person severely? .....

.....

27) How do you think owners should be penalised if their dog bites someone severely?

(tick as many boxes as necessary)

fines       jail-time       compulsory retraining for the dog

ownership rights revoked       owners should not be penalised

other (please specify).....

28) How has the recent media coverage regarding dogs most affected the way you view them?

(Please tick one box only)

more wary of all unfamiliar dogs       more wary of all dogs in general

more wary of dogs of certain breeds       has not affected my views

unsure

other (please specify).....

---

**About yourself**

29) What is your age? (.....years)

30) Are you:       Male       Female

31) What size city, town or place do you live in?

rural property       village 2,000 people)

small town (2,000-9,000 people)       large town (10,000-29,999 people)

city (more than 30,000 people)

32) What year are you in your veterinary or veterinary nursing programme?.....

Please feel free to add any further comments on topics raised in this questionnaire

.....  
.....  
.....  
.....  
.....  
.....

**Thank you for your participation.**

## Appendix 2 Questionnaire for ACC survey

### PUBLIC EXPERIENCE OF DOG ATTACKS

**Participation in this study is completely voluntary and anonymous. Completion and return of the questionnaire implies consent.**

1) For how many years in total have you lived with or owned a dog?

- 0                       16-20 years  
 less than 1 year     21-25 years  
 1-5 years             26-30 years  
 6-10 years           more than 30 years  
 11-15 years

2) Was there a dog living in the household when you were a child (**less than 13 years old**)?

- yes  
 no

3) On how many occasions have you been bitten by a dog? .....

---

**The following questions relate to the dog attack for which the ACC claim was made**

4) What age were you at the time of the attack?.....

5) What part(s) of the body were injured? (**tick as many as apply**)

- face/head  
 arms  
 hands  
 legs/feet  
 torso  
 buttocks

6) How severe were your physical injuries? (**tick one box only**)

- minor (little/no blood drawn – treated at home)  
 moderate (required medical treatment)  
 severe (requiring hospitalisation)  
 very severe (requiring surgery and/or lengthy rehabilitation)

7) How severe were the psychological or emotional effects of this attack on you?

- there were none  
 minor (slightly shaken for a short time after the attack)  
 moderate (effects lasted up to one month)  
 severe (effects long-term but did not require counselling)  
 very severe (effects long-term, counselling required)

8) How has this attack most affected the way you view dogs? (**tick one box only**)

- has not affected my views  
 more wary of all unfamiliar dogs  
 more wary of dogs of certain breeds  
 more wary of all dogs in general  
 unsure  
 other (**please specify**).....

9) Who owned the dog?

- you
- family member (living in same house as you)
- family member (not living in same house as you)
- flatmate
- neighbour
- stranger
- friend
- other (**Please specify**).....

10) What sex was the dog?

- male
- female
- unsure

11) Was the dog neutered?

- yes
- no
- unsure

12) What breed was the dog?.....

13) How sure are you that the breed of dog was identified correctly? (**tick one box only**)

- very unsure
- unsure
- reasonably sure
- sure
- very sure

14) Roughly how big was the dog?

- small (less than about 40cm at the shoulder)
- medium (between 40 and 60cm at the shoulder)
- large (over about 60cm at the shoulder)

15) What happened to the dog following the attack? (**tick as many as apply**)

- voluntarily destroyed by owner(s)
- owners were ordered to destroy it
- was re-homed
- received behaviour modification training
- received obedience training
- nothing
- unsure
- other (**please specify**).....

16) How was the dog restrained prior to the attack?

- on a lead in a public place
- running free in a public place but supervised by the owner
- running free and unsupervised in a public place
- fenced on private property
- chained/tied on private property
- on private property but not fenced or tied
- unsure
- other (**please specify**) .....

17) Where did the attack occur?

- your home
- friend's property
- family member's property
- public park
- neighbour's property
- stranger's property
- public street/walkway
- other public area (**please specify**).....
- other private property (**please specify**) .....

18) In what type of area did the attack occur?

- rural property
- village (under 2,000 people)
- small town (2,000-9,000 people)
- large town (10,000-29,999 people)
- city (more than 30,000 people)

19) What is the name of the area/district where the attack took place? (e.g. Waikato, rural Southland)

.....

20) Briefly describe the circumstances leading to the

attack.....

.....

.....

.....

21) What do you think was the main reason the dog bit you? (**please tick one box only**)

- protection of home/territory
- protection of item(s) eg. food
- protection of puppies
- protection of a person
- play
- the dog was afraid
- rough handling/pain
- accidental (eg. while breaking up a dog fight)
- unsure
- other (**please specify**).....

22) Do you consider this attack to be unprovoked?

- Yes
- No
- unsure
- other (**please specify**).....

23) Was the attack reported to any authorities other than the ACC (e.g. Police, local council)?

- yes
- no
- unsure

**If yes**, who was it reported to? .....

**The following questions regard opinions on dog control issues**

24) Do you think the following legislation changes relating to dogs and their owners are a good idea?  
**(please tick those you agree with)**

- keeping dogs on leads in public places
- muzzling “dangerous” breeds (e.g. Pit Bull Terriers) in public places
- having houses fenced so that visitors can access the front door without coming into contact with any dogs living there
- raising the maximum penalty for owners of dogs that seriously injure someone from \$5000 to \$20,000
- giving dog control officers the right to enter private properties to seize dogs

25) In your opinion, how likely is it that the following legislation changes relating to dogs and their owners could have prevented this attack? **(please tick one box for each piece of legislation).**

Keeping dogs on leads in public places

- not at all likely
- somewhat likely
- very likely

Muzzling “dangerous” breeds (e.g. pit bull terriers) in public places

- not at all likely
- somewhat likely
- very likely

Having houses fenced so that a person can access the front door without coming into contact with any dogs living there

- not at all likely
- somewhat likely
- very likely

26) Do you think fighting breeds (eg. Pit Bull Terriers) should be banned?

- yes
- no
- unsure

27) What should happen to a dog that injures a person severely?

- they should be put down
- depends on the circumstances (e.g. whether or not the attack was provoked)
- unsure
- other **(please specify)**.....

28) How do you think owners should be penalised if their dog injures someone severely?  
**(tick as many boxes as necessary)**

- fines
- compulsory retraining for the dog
- ownership rights revoked
- jail-time
- owners should not be penalised
- other **(please specify)**.....

29) How has the recent press coverage regarding dog attacks most affected the way you personally view dogs?

**(Please tick one box only)** has not affected my views

- more wary of all unfamiliar dogs
- more wary of dogs of certain breeds
- more wary of all dogs in general
- unsure
- other **(please specify)**.....

**About you:**

30) What is your age: .....years

31) Are you:     Male             Female

32) What size city, town or place do you live in?

rural property

village (2,000 people)

small town (2,000-9,000 people)

large town (10,000-29,999 people)

city (more than 30,000 people)

**Thankyou for your participation**