

**Scottish Mountaineering Incidents**  
**(1996 – 2005)**

Research Report no. 109

A research study for **sportscotland**

by

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## **Acknowledgements**

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## Introduction

Although mountaineering in Scotland is highly popular, it is difficult to be precise about the exact number of people that take part (Aitken & Scott, 2000). Various surveys have attempted to provide estimates of for example, the number of mountaineers that visit Scotland each year (Highlands & Islands Enterprise, 1996), the number of people who visit particular mountain areas (e.g. Scottish Natural Heritage, 2000) and the overall number of annual trips to the mountains (e.g. Mintel, 1993). It would be useful to know exactly how many people take part in the various forms of mountaineering each year in order to contextualise the numbers involved in incidents, but only broad estimates are available. Davidson (1994) has estimated there are between 1 and 5 million 'participation days' in Scotland each year. **sportscotland** undertakes an annual survey, which reveals that around 5% of the Scottish population engages in hill walking, climbing and mountaineering every month of the year (**sportscotland**, unpublished data). Specifically, data from this survey suggests there are just over 6.5 million participation days each year<sup>1</sup>.

Given the popularity of mountaineering in Scotland, it is not surprising that many accidents take place each year. At the present time the average is just less than one per day. The Mountain Rescue Committee of Scotland (MRC of S), which is the representative body for the 28 mountain rescues teams in Scotland, records all accidents that require help from the emergency services. Each accident (normally referred to as an 'incident') is documented and provides a comprehensive source of information covering aspects such as location, weather conditions, contributory causes, types of injury, details of the casualty and the emergency services involved.

The starting point for the present study was an earlier examination of Scottish mountain incidents undertaken in 2001 (Sharp, 2001a). The intention of that study was to help create a framework for co-ordinating and developing strategies for promoting mountain safety. The key aim of the present study was to expand the earlier work by collating and summarising incident information over a ten year period (1996-2005). It was hoped that by providing a more robust database this would provide an understanding of the nature and causes of mountain incidents and also clarify those considered to be most 'at risk' in the Scottish mountains.

The availability of an accurate picture of mountain incidents and the 'typical' casualty is of value to a number of agencies and individuals. Firstly, a clear picture about the key problems for hill goers and who is most at risk provides an objective platform to develop safety promotion strategies. The Mountaineering Council of Scotland (MCofS), through the Mountain Safety Adviser, places great store in an 'evidence based' approach to mountain safety (Wild, 2006). Secondly, it is important for those involved in education and the training of mountain leaders to know the key problems so that information about hazards and relevant skills can be passed on to would-be leaders. Thirdly, this information is useful to a wide variety of groups such as insurance companies, press and media, national governing bodies such as MCofS and the BMC, and outdoor retailers who, from time to time, require accurate information about the risks involved in mountaineering.

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<sup>1</sup> It should be noted that the data will include those who walk regularly in lower hills

The present study is the fourth of its kind undertaken in the past 20 years. The first survey (Macgregor, 1988) was funded by the Scottish Sports Council (now **sportscotland**) and focused on the injuries sustained by people involved in climbing accidents. It reported on 190 incidents which took place between January 1985 and January 1986. The second study (Anderson, 1994) was more comprehensive and examined the work of the voluntary mountain rescue service, participation levels in Scotland and casualty profiles. It reported on 1348 incidents, which took place from 1989 to 1993, focusing particularly on people who were injured in mountaineering incidents. The third study (Sharp, 2001a) was the forerunner of the present one and examined over 1000 mountain incidents for the period 1996 to 1999. The present survey reports on the incidents which took place in the 10-year period from 1996 to 2005. It does not include incidents classified as 'non mountaineering'<sup>2</sup>. It focuses therefore only on mountaineering activities – hill walking (summer and winter), snow and ice climbing, scrambling and rock climbing. The resulting database describes 2446 incidents involving 3315 casualties. It is the most comprehensive survey of Scottish mountain incidents undertaken and the most exhaustive carried out in the UK (Feeney, 2007).

## The Database

The data was extracted from the incident reports which are completed by mountain rescue or police personnel at the time of the incident. These reports are not (at the time of writing) publicly accessible but were made available for the present study by the Statistician of the MRC of S. A copy of the current incident report form can be obtained from **sportscotland**.

A database was established using the Statistical Package for the Social Sciences. Information was recorded for people involved in incidents on the following variables - gender, age, address (living in/out of Scotland), level of experience, occupation, group affiliation, month of the year, injury sustained (e.g. fatal, limb), activity involved in (e.g. hill walking, abseiling), weather at the time, features of the terrain, contributory causes (e.g. poor planning), nature of the incident (e.g. lost, slipped). Each item of data was transcribed 'as seen' from each incident report, although the narratives accompanying each report were sometimes helpful in adding information otherwise not recorded. No information was recorded (such as names and addresses) that could trace individual people from information in the database. With regard to statistical significance, whenever the word 'significance' is used in regard to relationship or difference, the statistical use of the word is implied and the level of significance can be taken as .05 or less.

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<sup>2</sup> For example, horse riding, false alarms, stalking, fishing, missing persons with Alzheimer's, domestic incidents, flood alerts, stranded motorists, quad bike accidents, sledging, forestry workers, pony trekking, shepherding, camping incidents, suicides, swimming incidents, skiing, animal rescues, roadside incidents, off road cycling, alcoholics/drunks, armed siege, hoax calls, cliff incidents, caving, people never found, despondents, aircraft/hanglider/paragliding incidents.

## Limitations

### Completeness

An attempt was made to extract information on each variable from each incident report for the 10-year period. However, this was not completely possible as many reports omitted some details. It should be noted that the method of reporting incidents changed midway through 2002. At this time, mountain rescue teams were given the option to report on incidents using a revised questionnaire in either printed or electronic form. This resulted in delayed submissions from some teams as well as the absence of information on some key variables. The net result is that whilst information is available on all variables there is an incomplete dataset for some. This limitation does not undermine the overall integrity of the data or the conclusions of this study.

This report is based on information only for incidents reported to the police which involved the mountain rescue service in Scotland. It is known that incidents take place (e.g. people are lost or suffer minor injuries) without the knowledge or involvement of the emergency services. The MRC of S does not record these incidents and there is no way of quantifying the number. Hence, the conclusions reached in this report apply only to the subset of incidents that take place in the Scottish mountains each year which are documented and are serious enough to require help from the emergency services. It is assumed that the incidents, which are not reported to the police and hence omitted from this study, are mostly of a minor nature.

### Absolute and Relative Analysis

The present study is essentially a descriptive survey which focuses on people involved in mountain incidents. With a few exceptions, it makes no attempt to conclude who is 'at risk' within the wider framework of those who participate. Whilst it is desirable to comment on risk factors in relation to the wider population of participants (relative analysis), it is difficult to do this fully through the lack of detailed participation data. Consequently, the study focuses on risk within the population of those who are involved in mountain incidents (absolute analysis). To give an example of this distinction, suppose that within the population of those who are rescued, the age group 21 – 30 years contains more casualties than any other age category. It is concluded that people in this age group are most 'at risk'. But it may be that the majority of people who participate also fall into this age category. In this case it may be that people in the 21 – 30 years category are no more at risk than anyone else. This study focuses on absolute figures although where appropriate it uses data from **sportscotland** (unpublished data) to examine findings within a wider context.

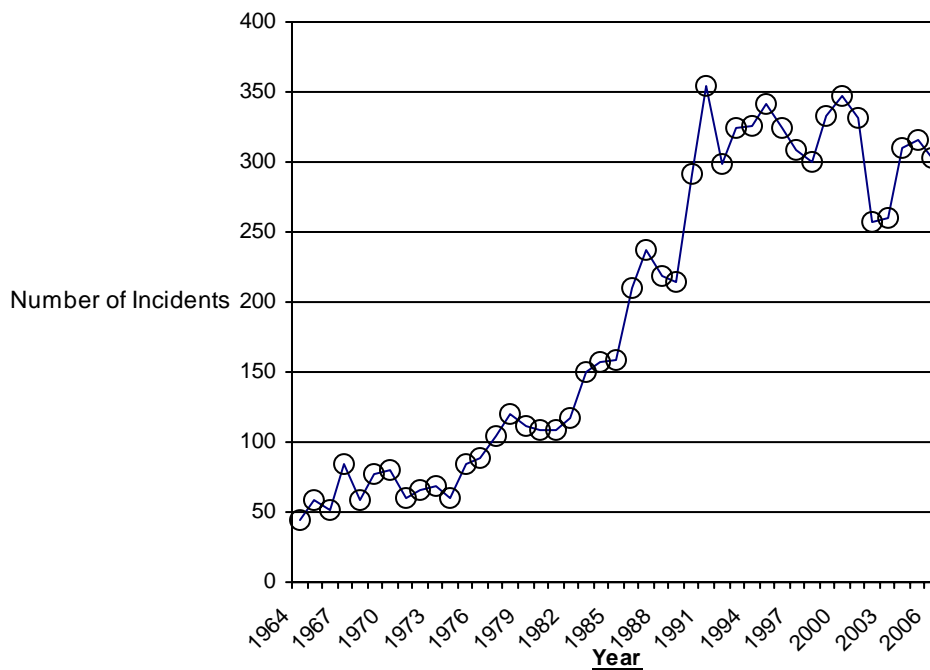
## Scope of the Problem

### Trends in Mountaineering Incidents

How many people are injured in the Scottish mountains each year? Figure 1 shows the annual number of incidents and indicates how the figure has changed across the years. The overall pattern shows a continuous rise from 1964 but there is a slowing down from around 1990. Since then, numbers have not increased but

have plateaued and currently show signs of falling. In the 10-year period 1996-2005 there has been an average of 308 incidents, 26 fatalities and 187 injured people each year. A similar pattern is noted in England and Wales. During the period 1992 – 2004 the average number of incidents was 628 with little change from one year to the next (Mountain Rescue Council, 2007). The stability in mountain incidents in recent years appears to be UK-wide.

**Figure 1: Annual number of Scottish mountaineering incidents**



**Source: annual summary of incidents published in the Scottish Mountaineering Club Journal**

It is interesting to examine why this should be. It could be argued that hill goers have become better educated, informed, clothed and equipped (and therefore safer/wiser) over this period and this has halted the rise in the number of incidents. It may also be that the number of people participating in mountaineering has evened out. Some anecdotal evidence suggests that the number of people taking part has risen over the same period (Sharp, 2001a) although recent data from **sportscotland** suggests there has been little change. If the number of incidents is falling and participation has not changed then one conclusion is that mountaineering has become ‘safer’ over the last few years. Conclusions like this should be treated with caution. Safety in the mountains is a function of many variables such as the weather, clothing, time of the year, preparation and planning, experience, technical skills and the activity engaged in. When things go wrong, it is not always possible to pinpoint the exact cause – there may be several contributory factors. This report makes an attempt to show why incidents take place and who is at risk, but it should be noted that answers to questions like cannot always be explained in simple terms.

## Location of Incidents

Every report notes the location of each incident, usually by description (e.g. Ben Nevis footpath) and sometimes with a grid reference. This level of detail is not presented in the present study, but Table 1 shows a broad description based on geographical areas. These are the regional areas devised by the Scottish Mountaineering Club and used in their District Guides. Table 1 is based on the 10-year period from 1992 to 2001 and shows the average number of rescues. Area information is not available for 2002 onwards but there is no reason to believe that geographical spread has changed.

**Table 1: Regional distribution of incidents (N=3190)**

Region	Average number of rescues per year	Percentage of total rescues per year
Cairngorms	65	20
Southern Highlands	48	15
Ben Nevis	36	11
Glencoe	34	11
Other Central Highlands	34	11
Northern Highlands	33	10
Skye	21	7
Western Highlands	18	6
Southern Uplands	17	5
Islands (other than Skye)	13	4
<b>ALL SCOTLAND</b>	<b>308</b>	<b>100</b>

It is clear that the busiest region is the Cairngorms and the least busy is the Islands (other than Skye). It should also be noted that the 'busiest' rescue teams over the same period are Lochaber, Glencoe and Cairngorm (taken from MRC of S annual reports). It is well known that these areas are highly regarded for their climbing and walking. There is likely to be a connection between the number of people walking and climbing in these popular areas and the number of incidents recorded each year in each area, together with the percentage of rescues.

## Casualty Details

This section describes the people involved in incidents, both injured and not injured. It should be observed that the large majority of incidents involve a single casualty but some involve two or more. This is reflected in the number of incidents (N=2466) and the total number of people rescued (N=3315) over the period examined. In the tables that follow the sample size may be less than 3315, reflecting missing information on some variables and/or the analysis of data subsets.

### Gender

Table 2 shows that the proportion of males and females is 3:1. In other words, for every woman that is rescued there are three men. A recent study of mountain incidents in North Wales showed the ratio to be 2:1 (Jones, 2006).

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**Table 2: Gender of people involved in mountain incidents (N=3233)**

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Gender	Percentage
Male	74
Female	26

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The question of whether this reflects the actual number of men and women who walk/climb was considered in an earlier meta analysis of the available evidence (Sharp, 2001) which suggested that the proportion of men/women involved in mountaineering activities is about 2:1. This is a broad brush figure and may mask differences in respect of the various forms of mountaineering. Recent research by **sportscotland** (unpublished data) provides a more reliable estimate of the number of people involved in hill walking and climbing activities.<sup>3</sup> The data shows that men are more likely to be involved compared to women in the proportion 5:3 ie there are five men for every three women who climb/walk. This is not too dissimilar to the figure found in the earlier study by Sharp (2001a) which used data from a wide variety of sources including interviews with mountaineering experts, studies of participation in particular mountain areas and Scottish wide surveys.<sup>4</sup> The data indicates that men are more likely to be involved in an incident than would be expected on the basis of participation figures alone. In other words, men are a higher risk group than women. It is well documented that men are generally higher risk takers compared to women (e.g., Byres, Miller and Schafer, 1999; Creyer, Ross and Evers, 2003), and, as this study shows later, men may also be involved in higher risk activities compared to women.

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<sup>3</sup> **sportscotland** carries out an annual survey, with interviews every second month throughout mainland Scotland, which includes questions on whether respondents have climbed/walked (and how many times) in the previous four weeks.

<sup>4</sup> It should be noted that the **sportscotland** figure is based on people living in Scotland. The figure of 3:1 found in the present study is based on all people involved in an incident whether they live in Scotland or elsewhere. When the figure is re-calculated to include only those living in Scotland, there is very little difference.

## Age

The age profile of all those involved in incidents is shown in Table 3. The mean age is 38 years (sd = 16 yrs) and the modal age group is 21 – 30 years. This is the same as found in the study of Welsh mountain incidents (Jones, 2006). The age spread is such that almost 50% lie between 20 and 40 years.

**Table 3: Age profile of all those involved in incidents**  
(N=2716)

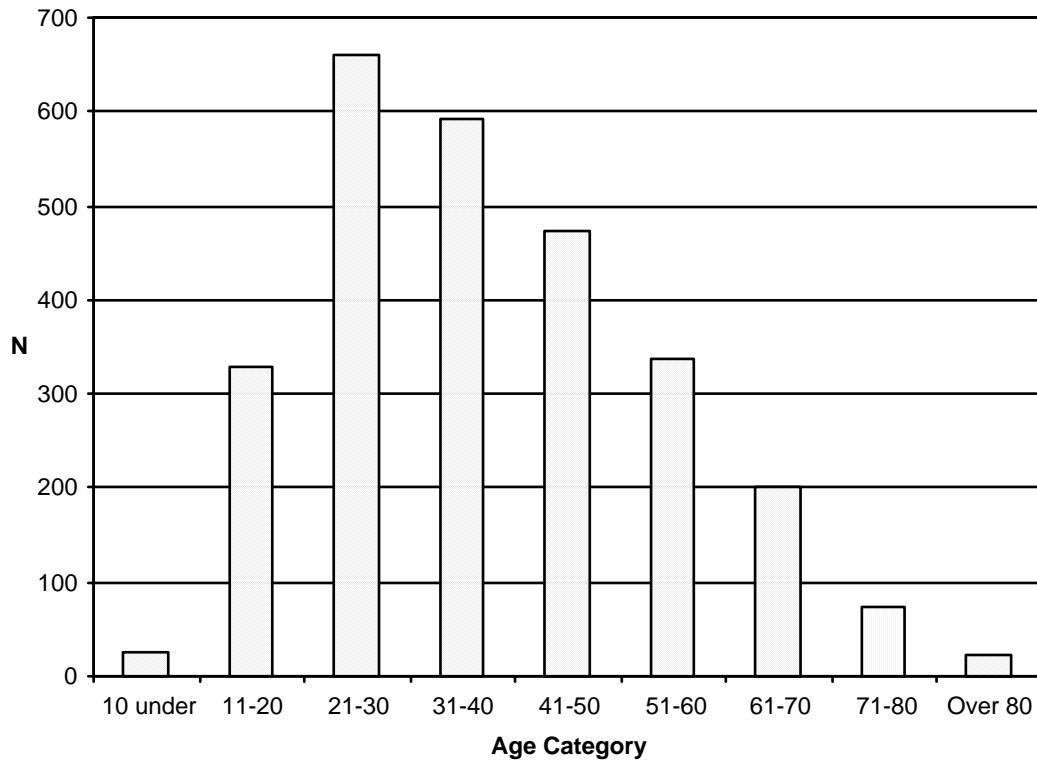
Age category	Number	Percentage of total incidents
10 and under	26	1
11 - 20 yrs	330	12
21 - 30 yrs	659	24
31 - 40 yrs	592	22
41 - 50 yrs	474	18
51 - 60 yrs	338	12
61 - 70 yrs	200	7
71 - 80 yrs	73	3
81 and over	24	1
	2716	100

The same data is presented in graphical form in Figure 2 where it can be seen there is a continuous increase in the number of incidents up to the category 21–30 years followed by a continuous (almost linear) decrease thereafter. Again, this is identical to the Welsh study. Figure 3 shows participation data taken from **sportscotland** (unpublished data). The two figures are not directly comparable since the age categories differ. It is notable that both figures show the same continuous rise and fall. However, the 'peak' occurs later with the participation data, indicating that the younger age groups tend to be more likely to be involved in mountain accidents. It is well documented that younger people tend to be greater risk takers than older people (e.g., Turner and McClure, 2003).

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Figure 2: Age profile of all those involved in incidents (N=2716)

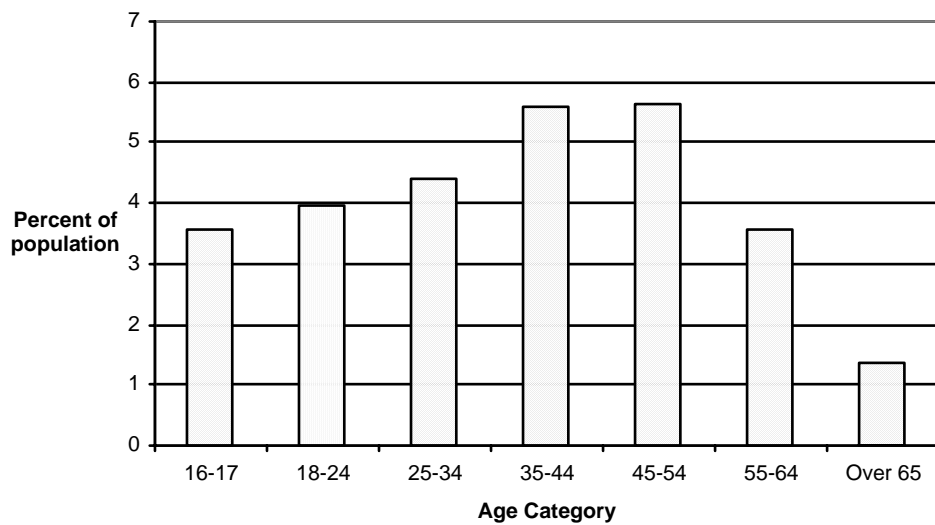
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Figure 3: Estimated percentage of Scottish population that climb/walk by age

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It should be noted that there is no difference in the mean age of men and women involved in mountain accidents although the age distribution of both groups is different. Table 4 reveals these differences. The youngest and oldest groups are more biased towards males while the 11-20 and 51-70 age groups are biased towards women. The relative increase in female casualties in the 51-70 age bracket may reflect the fact that women (relative to men) are increasingly prone to slips and stumbles with age (e.g. Kuo, 1990).

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**Table 4: Age profile for men and women involved in mountain incidents (N=2716)**

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Age category	Men	Women	Ratio of Men to Women
10 yrs and under	21	5	4:1
11 - 20 yrs	224	106	2:1
21 - 30 yrs	481	178	3:1
31 - 40 yrs	443	149	3:1
41 - 50 yrs	361	113	3:1
51 - 60 yrs	223	115	2:1
61 - 70 yrs	137	63	2:1
71 - 80 yrs	56	17	3:1
81 yrs and over	19	5	4:1

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## Level of Experience

An assessment is made at the time of an incident about whether or not the casualty is experienced. This is an attempt to measure whether the individual was competent to cope with the circumstances in which they found themselves. It is a subjective judgement made by the person responsible for completing the report at the time of the incident<sup>5</sup>. Table 5 shows that almost two thirds (62%) of casualties are considered to be experienced, a finding which goes against the popular belief (often promoted by the press/media) that people who are rescued are typically incompetent.

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<sup>5</sup> This judgement is not made against established criteria, which may therefore differ between those completing the report form. This is a matter which is currently being investigated as a wider review of incident reporting, by a sub-committee of the MRC of S

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**Table 5: Level of experience of casualties (N=2340)**

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	Experienced	Not experienced
All casualties	62%	38%

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It is interesting to question why so many experienced people are involved in mountain incidents. There are at least two explanations. In the first place, it is possible that - all other things being equal - experienced hill goers tend to be involved in more hazardous activities (e.g. snow/ice climbing, rock climbing).

They might also be more inclined to participate when the weather is poor. Under these conditions, objective dangers are greater (e.g. avalanche, holds giving way, cornice collapse) and the skills required are more exacting (e.g. navigation in poor weather, movement on steep ground). Therefore, one might expect these circumstances to lead to a higher incidence of accidents. There is some support for this. This study shows (see later) that a greater proportion of casualties classified as experienced are involved in technical activities such as rock climbing, scrambling and snow/ice climbing compared to those involved in hill walking.

Another reason may lie in the complacency, which sometimes accompanies experience. It is well known that whilst wisdom and skill grow with experience, so does confidence, familiarity and occasionally complacency. In an environment where there are many potential hazards, those who show complacency place themselves at greater risk.

A comparison was made between the experience of men and women. Table 6 shows clear differences in levels of experience.

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**Table 6: Experience and gender as a percentage of all casualties (N=2339)**

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	Experienced	Inexperienced
Male	48%	25%
Female	14%	13%

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Amongst female casualties the number of those experienced and inexperienced is about the same. But with males, the proportion that is experienced is significantly greater. The table shows that experienced males are the highest risk group (just under 50%). A comparison of experience with age shows an interesting trend. Table 7 shows the proportion of experienced to inexperienced people. Noting that the overall ratio is 1.6 to 1 (from Table 5), the table shows that younger people tend to be inexperienced whilst older ones tend to be experienced. The proportion of experienced people increases with age up to 41-50 years then it declines. The youngest age category is the one that contains the highest proportion of inexperienced people – as would be expected – but it is notable that the age category which contains the second highest proportion of inexperienced people is

the same as the one which contains the most casualties, i.e., 21-30 yrs (see Table 3).

**Table 7: Experience by age group (N=1969)**

Age Category	Ratio of Experienced/Inexperienced
11 – 20 yrs	0.3 to 1
21 – 30 yrs	1.7 to 1
31 – 40 yrs	2.6 to 1
41 – 50 yrs	3.0 to 1
51 – 60 yrs	2.7 to 1
61 – 70 yrs	2.5 to 1
71 – 80 yrs	2.0 to 1

The proportion of experienced people is slightly greater for those living in Scotland compared to those living elsewhere, but the difference is not significant.

## Affiliation

The incident report provides for a comment about whether or not the casualty belongs to an organisation such as a hill walking club or school party. This makes it possible to examine whether affiliation to any group has a bearing on the nature or frequency of particular kinds of incidents. Table 8 shows the major categories. The category 'Guided' includes youth groups (Scouts, Boy's Brigade), Duke of Edinburgh, Outward Bound, school parties and groups led by guides, instructors and leaders.

**Table 8: Affiliated status of all those involved in incidents (N=1924)**

Organisation	Percentage
Unaffiliated	85
Club	5
Guided	4
Military	2
Charity	2
Others	2

It is clear that the majority of people are not participating as part of any kind of organised group (although some may be a member of a recognised group such as a hill walking club). Those involved in incidents generally walk or climb with friends, colleagues or simply go alone. Differences between these groups in terms of causes and types of activity are considered later.

## Occupation

The occupation data collected from casualties is reported in this section;<sup>6</sup> Table 9 shows the breakdown for each group.

**Table 9: Casualties by occupation (N=1231)**

	Number	Percentage
Students/Scholars	339	20
Professional	316	19
Associate Professional & Technical	248	15
Retired	193	11
Personal/Protective	119	7
Managers/Administrators	112	7
Sales	70	4
Craft Related	68	4
Plant/Machine	63	4
Clerical/Secretarial	53	3
Unemployed	48	3
Other Occupations	33	2
Housewives	29	2
<b>TOTAL</b>	<b>1691</b>	<b>100</b>

<sup>6</sup> For the purposes of the present study the Standard Occupational Classification adopted by the Office of Population Censuses and Surveys was used to group people. Examples of occupations in each group are shown in Appendix 2. Categories were also included for students, unemployed persons, retired persons and housewives.

The largest category is that of students, which includes people at all levels of education. It is notable that students are a current ‘target’ group for safety initiatives promoted by the Mountaineering Council of Scotland (Mountaineering Council of Scotland, 2007). It can be seen by taking together the second and third ranked categories that people from professional occupations make up one third of all casualties. **sportscotland** participation data indicates that hill walkers and climbers include a disproportionate percentage of those in higher social groupings.

The average age of most groups centres on the mid 30’s although the retired and student/scholar groups are much older/younger as expected.

The small number of cases where occupation was recorded (N = 1321) limits the analysis of this variable. However the data indicates that compared to the overall figures, managers/administrators tend to be more involved in rock climbing and scrambling. People in professional and sales occupations tend to be more involved in rock climbing and less involved in hill walking. People employed as clerks/secretaries are almost wholly involved in hill walking. Those in personal/protective and craft occupations tend towards snow/ice climbing. People in plant/machine occupations are less involved in hill walking and more involved in rock climbing, scrambling and snow/ice climbing. Students and people who are unemployed tend towards rock and snow/ice climbing. Housewives and retired people are almost wholly involved in hill walking.

When occupation is considered in relation to experience we see that the more experienced groups tend to be managers/administrators, professionals, craft, personal/protective, sales and retired. Clerks/secretaries, plant/machine, unemployed and students are less experienced than the average. The more experienced occupational groups tend to be involved in technical activities, although these activities are also undertaken to a large extent by students who are generally less experienced, as shown earlier.

## Country of Domicile

The address of each casualty is recorded in the incident report, which makes it possible to break down incidents in terms of country of domicile. For the present study it was noted only whether the casualty was living in Scotland or outwith Scotland. Table 10 shows that more than half of those rescued in Scotland do not live in Scotland.

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**Table 10: Country of domicile of those involved in incidents (N=2624)**

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Scotland	Outwith Scotland
48%	52%

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The study of Welsh incidents referred to before showed that the majority of people rescued in Snowdonia are visitors from England with the greatest proportion from the south of England. The earlier study of Scottish incidents by Anderson (1994)

also showed more than half of casualties do not live in Scotland. It is possible these figures reflect the number of walkers and climbers who visit Scotland. A study of walking and climbing in the Highlands and Islands area carried out in 2002/03 by George Street Research found that 42% were from Scotland and 57% from elsewhere (George Street Research, 2004).

The ratio of people involved in incidents living in Scotland/elsewhere varies with age (Table 11). Those casualties younger than 60 years are more likely to live outside Scotland, particularly the age group 21-40 years, whereas people over 60 tend to reside in Scotland.

**Table 11: Percentage of casualties who are Scottish domiciled by age (N=2533)**

Age Category	Percentage of those involved in incidents who are domiciled in Scotland
11 – 20 yrs	50
21 – 30 yrs	42
31 – 40 yrs	43
41 – 50 yrs	50
51 – 60 yrs	52
61 – 70 yrs	55
71 – 80 yrs	58
Over 81 yrs	67
All involved in incidents	48

There is no difference with regard to the gender balance in those resident in Scotland compared with those casualties from outwith Scotland.

## Summary

- Men are more at risk than women, possibly due higher participation in activities which are inherently more risky and possibly due to a greater tendency to take risks in any given situation.
- The age group 21-30 appears to be a higher risk group.
- Almost two-thirds of those involved in mountain accidents are considered to be “experienced” although the proportion varies with the activity. Eighty-five percent of those involved in climbing incidents (rock climbing, snow/ice

climbing and scrambling) are experienced whereas the proportion falls to 55% for hillwalking incidents.

- 85% of those involved in mountain accidents are not participating as part of a club or other organised group.
- 20% of all those involved in mountain incidents are students.
- 35% are employed in professional occupations.
- 52% of all those rescued do not live in Scotland, possibly due to the high number of people visiting Scotland to take part in these activities and possibly due to a tendency for those from outwith Scotland to be younger and more likely to be involved in technical activities.

## Month of the Year

The number of mountaineering incidents varies with the month of the year. Table 12 uses monthly data aggregated over the ten year period and shows that there is an increase in incidents May to September and there is also a peak in February.

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**Table 12: Number of incidents by month (N=2466)**

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Month	Percentage
January	7
February	9
March	7
April	6
May	11
June	10
July	10
August	12
September	11
October	7
November	4
December	5

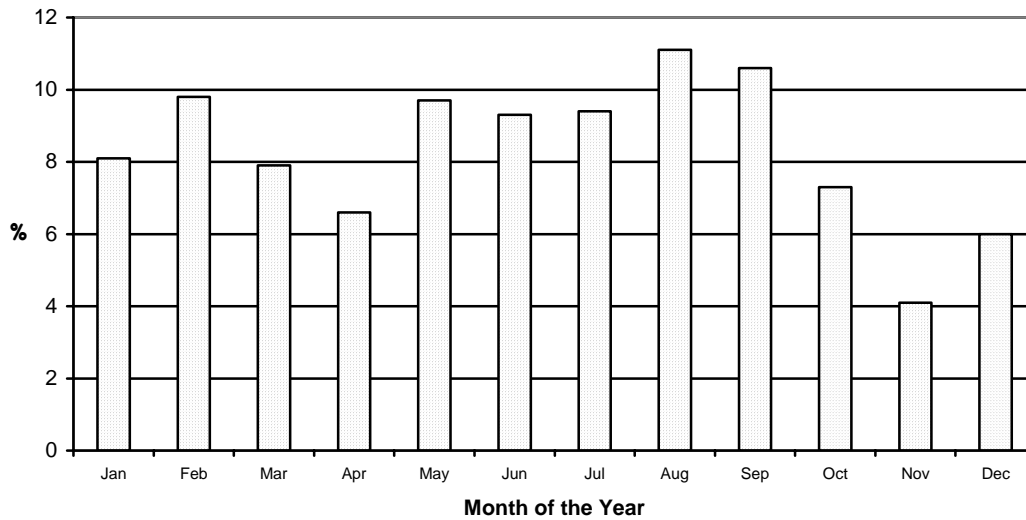
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This tends to reflect the most popular months for summer hill walking and winter mountaineering. Figure 4 shows the data by numbers of people rather than incidents and demonstrates the same pattern, with peaks in February and August and troughs in April and November.

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Figure 4: Percentage of people involved in incidents for each month of the year (N=3315)

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The low points may reflect the generally poor weather conditions, which mark the transition from one mountaineering season to the next. Anderson (1994) found similar spread of incidents across the summer months, and clear low points in April and November. A recent study describing the monthly pattern of incidents in North Wales over a seven year period (Jones, 2006) reveals similar summer high points and November/December low points however the Welsh study showed a low point in February and a high point in April in contrast to the Scottish findings.

Data on monthly participation in Scotland for 2003-2004 are shown in Figure 5.

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Figure 5: Percentage of the Scottish population who walk/climb at least once each month (n=25,711)

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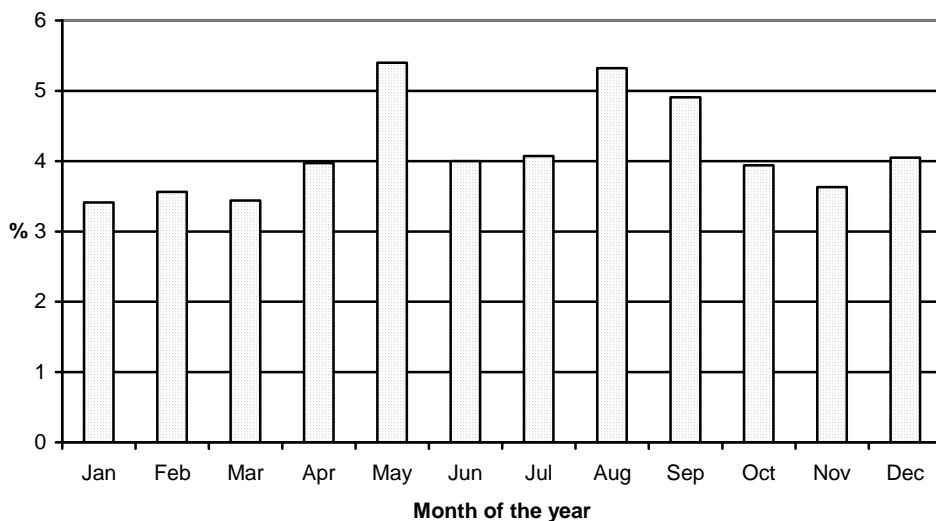
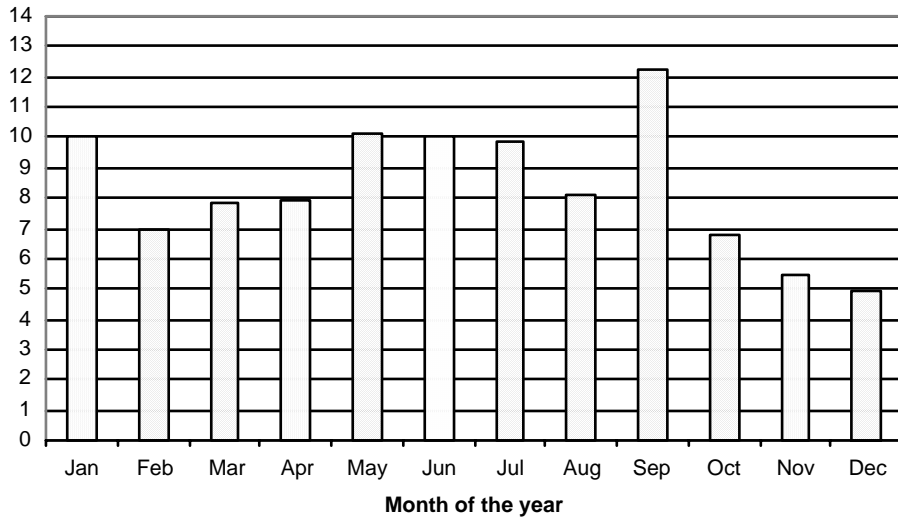


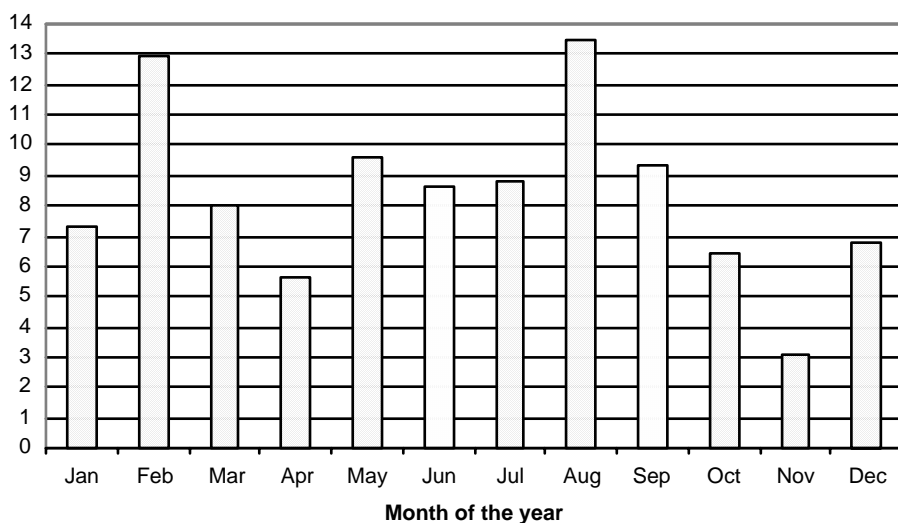
Figure 6 shows the monthly profile of incidents for those living in Scotland for 2003-2004. There is little correlation between the two, suggesting that accidents are not simply proportionate to numbers participating at different times of year.

**Figure 6: Percentage of people (living in Scotland) involved in incidents for each month of the year (N=1256)**



The monthly accident profiles for people living in Scotland and those living outside Scotland are significantly different (note Figures 6 and 7). The monthly pattern for those living in Scotland is relatively stable across the year compared to those who visit Scotland.

**Figure 7: Percentage of people (living outside Scotland) involved in incidents for each month of the year (N=1368)**



This might reflect the relative ease of access for Scottish walkers/climbers as well as the likelihood that those who travel from elsewhere tend to do so during holiday

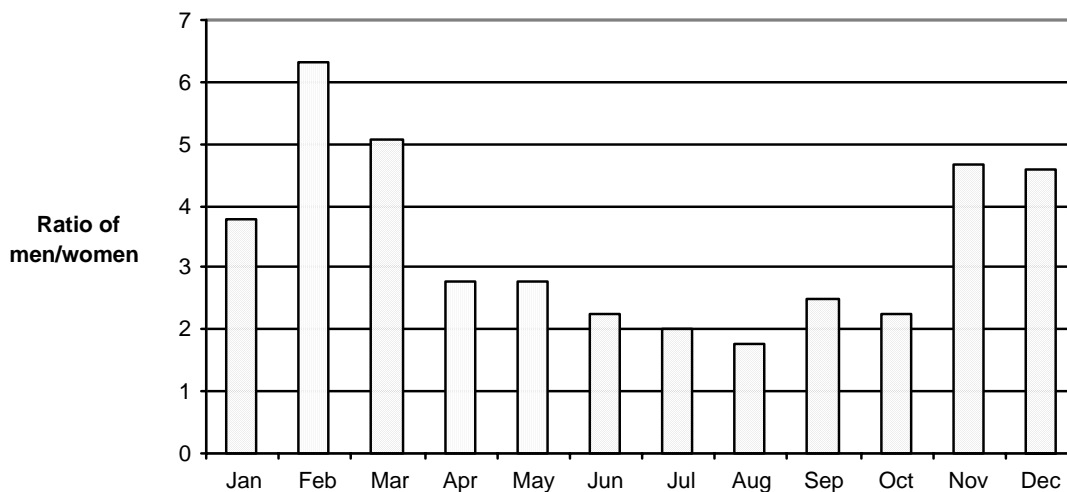
periods or periods when weather conditions are favourable. The latter might account for the high percentage of incidents in February when conditions for snow/ice climbing in Scotland tend to be good. And it might explain the low point in November when (generally) poor weather discourages visitors.

The monthly pattern shows significant differences between men and women. Figure 8 shows the proportion of men/women across the year for each monthly interval. As noted earlier the overall ratio of men to women is almost 3 to 1. If the ratio of men/women were constant across the year then each bar in the figure would be the same height at a value of 3. Instead, the ratio falls and rises about this figure. Broadly, the ratio is greater in the winter months and less in the summer months.

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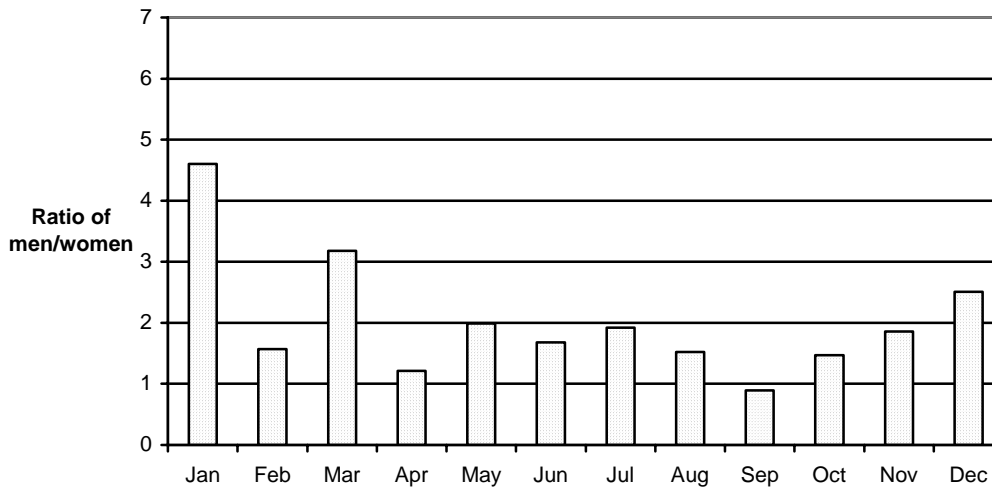
**Figure 8: Proportion of men/women rescued across the year**  
(N=3315)

---



In particular, February is a particularly ‘bad’ month for men and August for women. In other words, women have more accidents than would be expected in the summer months and men more in the winter months. One explanation is that this reflects the relative proportions of men/women engaged in mountain activities across the year. That is, more men are involved in winter activities and more women in summer hill walking (although there are still many more men than women in the hills in summer). Figure 9 shows data taken from the **sportscotland** survey indicating the ratio of men/women who climb/walk at least once per month. As might be predicted, the general pattern for male/female participation seen in Figure 9 is similar to the incident pattern shown in Figure 8; men tend to be more active in winter mountaineering months.

**Figure 9: Ratio of male/female participation across the year**  
(n=25,711)



## Summary

- February and August show a relatively high number of accidents, possibly reflecting the number of participants at these times (to engage in winter mountaineering and summer hill walking respectively).
- The two low points in March and November may be related to numbers in the hills at these times when weather conditions are generally poor, often the transition times from one season to the next.
- Women make up a relatively high proportion of summer casualties and men make up a relatively high proportion of casualties in the winter months, probably reflecting their relative participation at these times.

## Type of Activity

Each incident report records the activity engaged in by the casualty/s at the time of the incident. Table 13 shows the proportion of people involved in the four mountaineering categories.

**Table 13: Activities engaged in by casualties (N=3306)**

Activity	Percentage
Hill walking	77
Snow/ice climbing	12
Rock climbing	6
Scrambling	3
<b>TOTAL</b>	<b>98</b>

It is clear that the large majority of incidents involve hill walkers. The study of incidents in North Wales showed a similar finding (Jones, 2006). Snow and ice climbing is the next most frequent category followed by rock climbing (non-winter conditions) and scrambling. The relative proportions of all these activities are similar to those found by Anderson (1994). If hill walking incidents are compared to climbing incidents (scrambling + rock climbing + snow/ice climbing) the ratio is just over 3:1. **sportscotland** participation data show that the ratio of people who hill walk at least once a month compared to those who climb (outdoor) at least once a month is just over 7:1. So, it is possible that the relative proportions shown in Table 14 are largely explained through participation figures.

An important difference in the kind of activity being undertaken at the time of the incident is found when activity is broken down according to gender. Table 14 shows that incidents in rock climbing, snow and ice climbing and scrambling involve more men than overall (ratio > 3:1), whilst incidents in hill walking involve more women than overall (ratio < 3:1). **sportscotland** data show that women are proportionately more likely to walk than climb by a ratio of almost 11:1. Greene (1996) also noted that women are more likely to walk and men more likely to climb.

A broad conclusion is that the figures shown in Table 14 reflect activity preferences (i.e. more men climb and more women walk). This accords with the previously reported finding that women tend to participate in summer months and men in winter months (see Figure 8).

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**Table 14: Proportion of male and female casualties by activity (N=3233)**

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Activity	Ratio
Rock climbing	9:1
Snow/ice climbing	9:1
Scrambling	7:1
Hill walking	2:1

---

There is a further difference in activity profile in regard to the casualty's experience. One would expect that technical activities such as ice climbing and rock climbing would attract people with a greater depth of experience; these activities require time and experience to master. And it might be expected that hill walking, which can be engaged in with little practice or prior knowledge would, in general, attract people with lesser experience. Table 15 shows each activity broken down in relation to experience for those involved in mountain incidents. Given that the overall ratio of experienced to inexperienced people is about 2:1 (taken from Table 5), the ratio for hill walking incidents is less than the average whilst the ratio for rock climbing and snow/ice climbing incidents is greater. Scrambling is about average. Thus those involved in hill walking incidents are generally less experienced than those involved in climbing incidents.

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**Table 15: Experience of casualties by activity (n=2340)**

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Activity	Ratio of experienced to inexperienced casualties
Hill walking	1:1
Scrambling	2:1
Snow/ice climbing	7:1
Rock climbing	14:1

---

## Summary

- Hill walking results in almost three quarters of all mountain incidents and snow/ice climbing a further 12%.
- Incidents in rock climbing, snow and ice climbing and scrambling involve more men and more experienced people than overall.
- Incidents in hill walking involve more women and more inexperienced people than overall.

## Injuries

Just over 50% of rescues involve searching for people who are lost or overdue. In most cases the people involved are not injured. This section only looks at those who are injured. Table 16 lists the types of injuries sustained by those who are injured (casualties).

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**Table 16: Types of injury sustained by casualties (N=1673)**

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Injury	Percentage
Limb injuries	44
Fatal	14
Multiple injuries	11
Medical	11
Hypothermia	8
Head injury	5
Minor bruising	4
Spinal/back	3

---

Limb injuries are the most common (lower leg/foot injuries (83%) followed by upper leg (9%) and arm/hand (8%)). This mirrors that found in other sports such as football, skiing, tennis and volleyball (Steinbruck, 1999). Fatal injuries account for almost 14% of all casualties. Of these, 25% are medically related (e.g., heart attack). This is less than the figure for fatalities of 18% noted by Anderson (1994) and reflects the downward trend in fatal incidents since the early 1990's. A possible factor here is the increased speed of response by mountain rescue teams. Anecdotal evidence from the mountain rescue fraternity suggests that calls for assistance by people using mobile phones has bought a much speedier response by teams and consequent first aid treatment of casualties (Gunn, 2007; Wild, 2007).

When the injury figures are broken down according to gender, some differences emerge. Table 17 shows the proportion of males/females according to injury type. The figures show that men are more likely than women to suffer serious injury (fatal, multiple or spinal) whereas women are more likely to suffer less serious limb injuries or medical problems. Again this may be related to activities undertaken.

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**Table 17: Ratio of males/females by type of injury (N=1156)**

---

Injury	Ratio of male/female
Fatal injury	8:1
Multiple injuries	5:1
Head injury	3:1
Medical	3:1
Hypothermia	2:1
Limb injury	1:1
Minor bruising	3:1
Spinal injury	4:1

---

The fact that men suffer more serious injuries would indicate they tend to be involved in activities where mistakes and unexpected hazards have more serious consequences (e.g. fall from an ice climb). That women tend to suffer less serious injuries - primarily limb fractures - suggests they are involved in activities where the risk of injury is less, or they are undertaking activities in a way which has less risk attached (eg seconding rather than leading when climbing), or they are taking less risks in the way they are undertaking the activity.

Table 18 shows a breakdown of injuries according to activity.

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**Table 18: Type of injury by activity (N=1601)**

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	Rock climbing (N = 80)	Snow/ice climbing (N = 197)	Scrambling (N = 61)	Hill walking (N = 1263)
	%	%	%	%
Limb injuries	33	34	23	48
Fatal	16	13	18	13
Multiple injuries	21	25	30	8
Medical	2	0	5	13
Hypothermia	1	5	3	10
Head injury	10	5	1	4
Minor injuries	8	15	16	3
Spinal/back	9	5	3	2

The pattern for each activity tends to mirror the overall pattern seen in Table 16, but there are some key differences. Most of the differences might be expected, for example, hill walking incidents result in a higher proportion of limb injuries and a lower proportion of multiple injuries while rock climbing incidents result in more head, multiple and spinal injuries compared to hill walking, but fewer limb and medical problems. Snow and ice climbing incidents result in proportionately more fatal, multiple and spinal injuries. Scrambling results in the highest proportion of fatal and multiple injuries of all the activities identified. In fact, those involved in a scrambling incident have a 50% chance of suffering fatal or multiple injuries. It is also worth noting that whilst hill walking might be considered a 'safe' activity, there is a 13% chance that the injuries sustained by someone in a hill walking incident will be fatal!

## Summary

- Of those who are injured, limb injuries are the most common followed by fatal injuries, multiple injuries and medical problems.
- Men are more likely to suffer serious injuries (fatal, multiple and spinal) whereas women are proportionately more likely to experience lesser injuries and medical problems.
- Scrambling results in the highest proportion of fatal and multiple injuries.
- Limb injuries in hill walking are most common and spinal injuries in rock climbing are most common.
- Overall, injuries tend to reflect the activity undertaken by the casualty.

## Terrain

The terrain is described briefly in each incident report. This variable is not well defined; there is often a fine line between what could be described as a rough path, scree covered hillside or rocky terrain and interpretations may differ between rescue team reporters. A description of the terrain where incidents take place is given in Table 19. The figures sum to over 100% since in many cases two or more factors were indicated at the same time. For example, it is not uncommon for an accident to take place on ground that is both rocky and wet.

Table 19: Incidents as function of the terrain (N=2466)

Terrain	Percentage	Ratio of male/female
Icy/névé	10	6:1
Snow covered	18	6:1
Rocky	34	4:1
Scree	15	2:1
Open hillside	18	2:1
Wet	27	2:1
Hill path	23	2:1

A large proportion of incidents take place on hill paths (23%). It is reasonable to assume this figure reflects the popularity of paths for walking. Over one fifth of all incidents take place on the open hillside where the terrain is generally mixed, uneven and unreliable. Again, this would be expected since it is not always possible to climb Scottish mountains by staying paths all the time and some people choose not to use paths.

Figures on gender differences show that men are less likely to be involved in an incident on a footpath or on the open hillside or when the ground is wet (ratio less than 3:1) but more likely to be involved when the terrain is rocky or covered in snow or ice.

The data relating to terrain varies according to activities along fairly predictable lines, as follows. A greater proportion of hill walking incidents take place on the open hillside (33%) but fewer take place when the ground is snow covered (13%) or ice/névé covered (5%). The majority of rock climbing incidents take place on rocky terrain (95%) and the majority of snow/ice climbing incidents take place when the terrain is reported as snow covered (70%) or icy (54%). Scrambling incidents also tend to take place on rocky terrain (91%).

## Weather

Table 20 shows the weather data recorded by rescuers at the time of the incidents.<sup>7</sup>

**Table 20: Weather at the time of each incident (N=2466)**

Weather	Percentage of incidents	Ratio of male/female Overall ratio is 3:1
Windy	46	3:1
Cloudy	29	3:1
Raining	25	2:1
Freezing	18	4:1
Snowing	12	8:1

Nearly half of all incidents take place on windy days. In a way, this conflicts with the high proportion of navigation related incidents (described in more detail later) when it would be expected that cloud cover would be the prominent weather variable. However, it is well known that high wind can compromise accurate navigation by making difficult to walk on a straight bearing. High winds can also cause walkers and climbers to lose balance.

The figures on gender differences show that men are less likely to be involved in an incident when it is raining or windy, but more likely to be involved when it is freezing or snowing (see Table 20). This ties in with greater participation by men than women in activities such as snow and ice climbing.

The weather profile is slightly different for different types of incident as shown in Table 21.

**Table 21: Weather profile for each mountaineering activity (percentages) (N = 2466)**

Weather	Hill walking	Rock Climbing	Snow/Ice Climbing	Scrambling
Windy	40	38	62	45
Cloudy	27	14	28	16
Raining	25	16	10	21
Freezing	13	6	52	8
Snowing	9	3	29	2

<sup>7</sup> The figures sum to over 100% since in many cases two or more weather types may be present at the same time. For example, it is not uncommon for the weather at the time of an incident to be cloudy, raining and windy.

Hill walking incidents tend to follow the overall pattern shown in Table 20 although there are fewer occasions when the weather is freezing/snowing. Rock climbing incidents tend to take place when the weather is more favourable overall – as would be expected. Snow and ice climbing incidents tend to occur when the wind is more common and when it is more likely to be cold. The weather pattern accompanying scrambling incidents is similar to rock climbing although there are more windy days compared to rock climbing. Overall, the differences in weather patterns seem to reflect differences in the nature of the various activities.

## Summary

- The weather variable that accompanies more incidents than any other is wind.
- In almost a quarter of all incidents there is no wind, rain, snow or cloud. Many incidents therefore take place when the weather is otherwise fine.

## Causes and Outcomes of Incidents

For the purpose of this study a distinction is made between the ‘cause’ of an incident and the ‘outcome’ of an incident. An ‘outcome’ is what happens to someone. For example, they may slip, fall or become lost. A ‘cause’ is a factor which led to the incident taking place. For example, someone slips because their footwear is poor or they fall because a rock handhold gives way. It is not always easy to define the causes of an incident. In some cases there may be several factors involved and in others it is impossible to ascertain cause. For example, someone may be benighted because they didn’t possess a head torch. It could be argued the cause of the incident was the lack of vital equipment or absent-mindedness (forgot to pack the torch) or even incompetence (didn’t feel there was a need for a torch). This level of detail is not recorded at the time of the incident. It should be said that mountain rescue teams are interested primarily in incident outcomes (e.g. a party is overdue or lost) as this enables them to mobilise resources to deal with the incident. The exact cause (e.g. the party navigated incorrectly) is normally of secondary importance because it has little value in assisting the rescue operation. Knowledge of causes is more important for those involved in promoting mountain safety or mountain skills education. In the present study the word cause is used in a general sense simply to identify factors that contribute to or are associated with an incident.

## Causes of Incidents

Table 22 lists the causes identified in incident reports. It is clear that two stand out from the rest, namely poor navigation and bad planning. Anderson (1994) also identified navigation as the key problem in her report which used accident report data for the period 1989 to 1993. Greene (1996) noted that many walkers were not confident in their own navigation skills and Sharp’s survey of outdoor course providers also revealed navigation to be the central concern. They suggested that weak navigation and the inability to apply basic map and compass skills was a problem for wide variety of groups and that there was a need for improved education in the subject (Sharp, 2001b; 2002).

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**Table 22: Causes of mountain incidents (N=2466)**

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Cause	Percentage of incidents
Poor navigation	23
Bad planning	18
Inadequate equipment	11
Medical	11
Poor timing	8
Group separation	7
Inadequate footwear	5
Inadequate clothing	4
Rockfall/handhold give	3
Poor level of fitness	3
Inadequate skill	2
Avalanche	2
River crossing problem	2

---

The Welsh study noted earlier (Jones, 2006) also identified poor navigation as a key factor behind mountain incidents.

It is logical to reason that navigation and planning are linked together. If a walker gives little thought to preparing a route, particularly to deciding on bad weather alternatives, then if the weather is poor, navigation may be compromised which results in route finding problems and often delays in completing the route on time. Many incidents (25%) cite weak navigation, poor planning and timing as contributing to the incident. When these factors are examined in regard to level of experience the data show that those who are experienced are significantly less likely to make navigation, timing or planning errors. When these factors are examined in relation to gender it appears that women are proportionately more likely to make navigation and planning errors.

Table 22 shows that some causes are relatively unlikely. It is noteworthy that inadequate clothing and footwear are ranked low in the list of causes. This accords with anecdotal evidence that walkers and climbers are generally well equipped/clothed/shod. A small number of incidents are due to medical problems of various kinds (e.g. heart attack, headaches, exhaustion). It should be noted that 25% of all such incidents are fatal. Women are proportionately more likely to suffer a medical condition or poor fitness.

Just over 11% of incidents are caused through equipment which is inadequate or missing. A substantial number of hill walkers fail to take head torches, spare bulbs and batteries, or map and compass. Others don't possess an ice or crampons or they use technical gear which is inappropriate for the task. In some cases, there is insufficient emergency gear or key items are shared between party members and when the group divides, some people are left without important items. There are only a very small number of cases where equipment fails (e.g. crampon breakage). The majority of equipment problems are ones of omission and are therefore avoidable. It is noteworthy that in many cases (48%) those responsible for 'inadequate equipment' are experienced people, which supports the point made previously about experience and complacency. In a small number of incidents (almost 6%) group separation is cited as a contributory cause. In most of these cases, party members are inexperienced hill walkers. Group separation tends to be accompanied by poor planning and navigation, which results in party members becoming lost and overdue, sometimes with fatal consequences.

A number of interesting findings are revealed when causes are looked at in regard to occupation and organisation. Those belonging to clubs and charitable organisations are proportionately more likely to be involved in group separation than any other group. It would be expected that group separation is more likely in bigger groups. Military groups do not often make navigation or planning errors, but their timing is often in error. Navigation errors are more likely with clubs and school groups. Charity groups are also proportionately more likely to suffer medical problems. This is possibly due to an increased likelihood of those involved being less fit than regular hill goers. Students are significantly worse in terms of planning and timing and retired walkers make fewer planning errors but are more prone to medical problems.

## **Summary**

- Navigation is the most commonly cited cause of all incidents (23%), closely followed by bad planning (18%) and inadequate equipment (11%).
- Experienced people are less likely to make navigation and planning errors, but 48% of incidents involving inadequate equipment are experienced.
- Women are proportionately more likely to make navigation and planning errors.
- 11% of all incidents are caused through equipment which is inadequate or missing.
- 11% are the result of medical/health problems.
- Poor clothing or footwear are rarely contributing factors.
- Women are more likely to be involved where the cause has a medical or fitness basis.

## Outcomes of Incidents

Table 23 lists the variety of outcomes. The total exceeds 100% as in some cases more than a single outcome applies. For example, it is possible that a walker who slips is also overdue. And a climber who falls might also become cragfast. From this analysis it can be seen that there are a small number of key factors. Just over a quarter require assistance because they have slipped. This ties in with the high incidence of lower leg injuries (see Table 16). Almost one third of all casualties are overdue and 21% are lost. This relates to the key problem of navigation (see Table 22).

It should be noted that the category 'Slips' is different from the category 'Falls'. The former includes trips, slips or stumbles where the casualty does not change their location. In contrast, people included in the 'Falls' category have moved a considerable distance. Falls may result from a simple slip on steep or icy ground or from a climbing accident where one or more climbers fall a considerable distance. Falls happen to people who walk, climb or scramble. It can be seen that falls make up over 16% of all incidents. It follows that the large bulk of incidents attended by the mountain rescue service involve people who have slipped/fallen or who are lost/overdue. The same pattern was noted in the Welsh study.

It is worth noting here that, contrary to popular belief, not all slips take place when moving downhill. Sharp (2001a) showed that around 45% of all slips occur when walker are travelling uphill or on the flat.

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**Table 23: Outcomes and their frequency of occurrence**  
(N=3315)

Outcome	Percentage	Ratio of male/female (Overall = 3:1)	Ratio of experienced to inexperienced (Overall = 2:1)
Slips	27	2:1	3:1
Overdue	29	3:1	1:1
Lost	21	3:1	1:1
Falls	16	5:1	4:1
Cragfast	14	5:1	1:1
Avalanched	2	10:1	7:1
River crossing	1	6:1	1:1

---

When the outcomes are examined in regard to gender, experience and group affiliation, a number of statistically significant, but not unexpected findings appear. Ratios showing gender and level of experience are included in Table 23. It shows that women are proportionately more likely to slip compared to men. In contrast, men are more likely to fall, be cragfast, fall or avalanched. The table also reveals

differences according to level of experience. Experienced people are proportionately more likely to fall or be avalanched. In contrast, people who are overdue, lost or cragfast tend to be inexperienced.

In regard to group affiliation, there are a number of significant differences. People who belong to clubs are proportionately less likely to slip or fall but they do become lost and are overdue more than other groups. In contrast, military groups are proportionately less likely to get lost or be overdue but they are more likely to fall. Youth groups have more incidents of getting lost but fewer of falls. School groups are also overdue more frequently than overall. Incidents involving charity groups are more likely to involve getting lost but these groups are less likely to need rescued due to slips and falls. Again, none of these descriptions appear to be unusual or unexpected because they tend to reflect the activity being undertaken at the time of the incident.

An analysis of outcomes with regard to activity undertaken shows that more hill walkers are lost than the overall figure but fewer fall or are avalanched. It is notable that 11% of all hill walking incidents result in people becoming cragfast. These tend to be walkers who make a navigation error which leads them to steep ground. Rock climbers tend not to get lost but a substantial number are overdue/benighted (28%). They tend not to slip but do fall more (36%) and become cragfast (27%). Snow and ice climbers similarly tend not to get lost or slip but do fall (34%), become cragfast (21%) or avalanched (14%). Those who scramble are rarely lost or overdue/benighted. They also slip less than average. But they tend to fall (33%) and become cragfast (44%). Again, the nature of the outcome seems to reflect the activity.

## Summary

- The vast majority of mountain incidents are associated with people who slip/fall or lost/overdue.
- 27% of all incidents involve slips, trips and stumbles.
- Women are proportionately more likely to slip or be lost whereas men are more likely to fall or be cragfast.
- Members of clubs, youth group and charity groups are lost proportionately more than any other group.

## Ten Year Trends

This section looks at the ten year period of the study (1996 – 2005) to identify whether there are any changes in key variables such as the type of activity, casualty details, causes and outcomes. In all the figures presented in this section, data is given as percentages in order to offset differences in the number of incidents from one year to the next. Further, a linear trend line is included to highlight changes across the period.

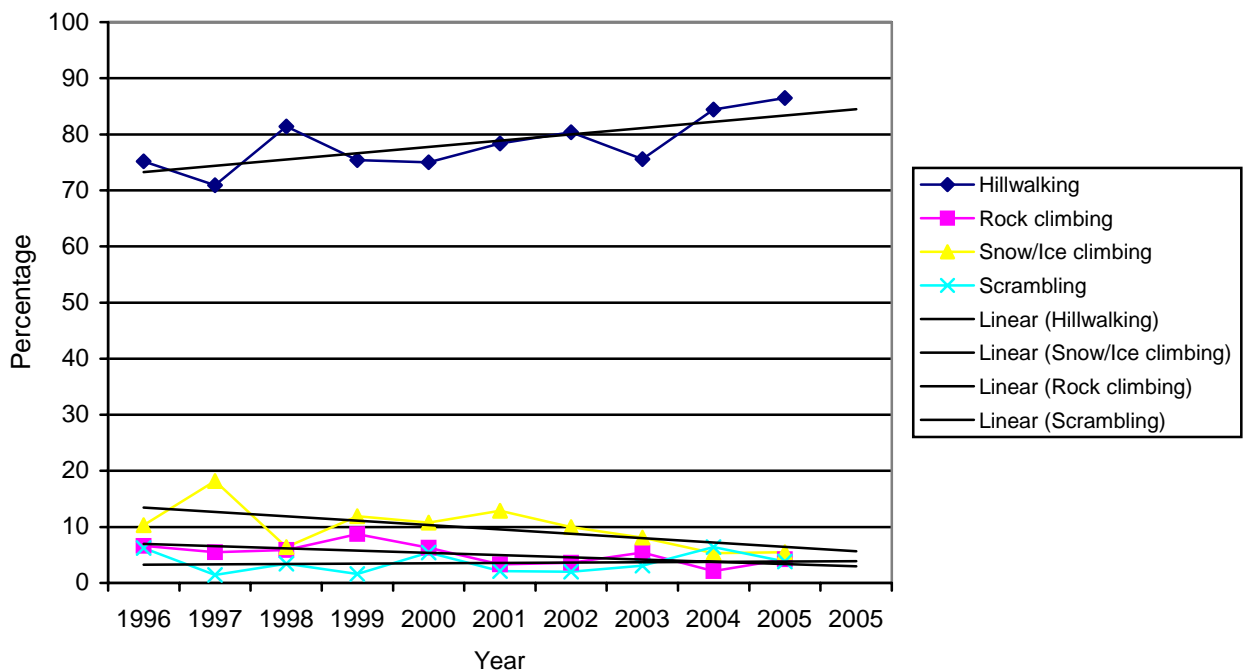
### Type of Activity

Figure 10 shows how the relative proportion of incidents for each of the four mountaineering activities has altered across the years. It can be seen that the

number of hill walking incidents has increased whilst the number of rock climbing and snow/ice climbing incidents has decreased. The present study provides no evidence as to why this is the case but a suggestion is that the decline in climbing incidents reflects the changing focus from outdoor to indoor climbing (Sharp, 2005). The decline in snow/ice climbing incidents may reflect increasingly warmer winters which have compromised winter mountaineering. It is worth noting that if these declines continue at the same rate then in 10 years time there will be no incidents involving those who rock climb or snow/ice climb!

This may have implications for the way mountain rescue teams respond (and perhaps train) as well the relative emphasis placed on these activities by safety promotion agencies.

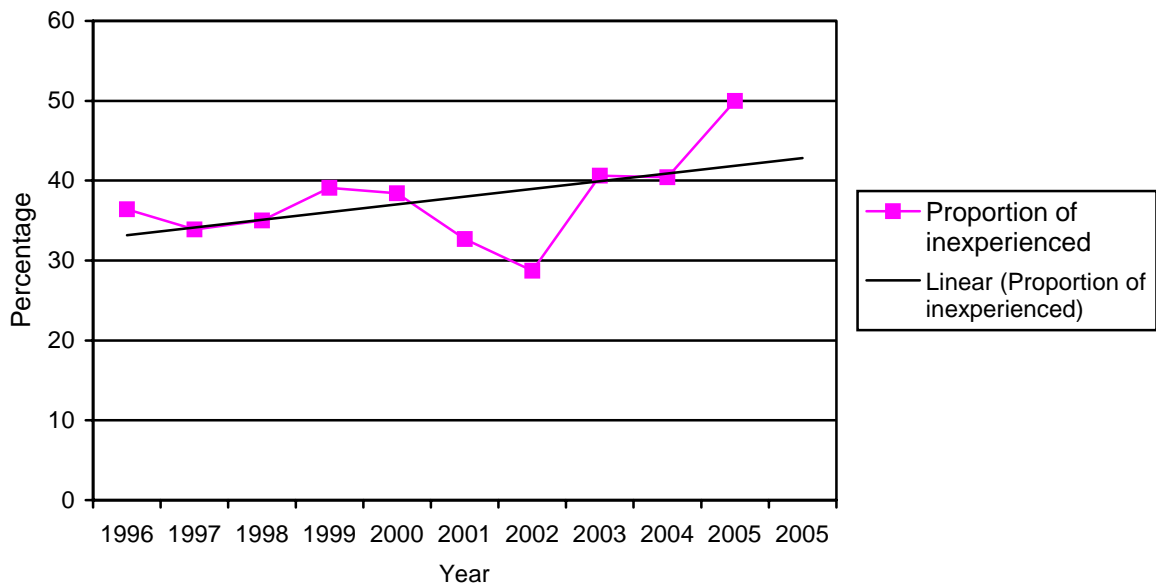
Figure 10: Incidents by activity, 1996-2005



## Casualty Variables

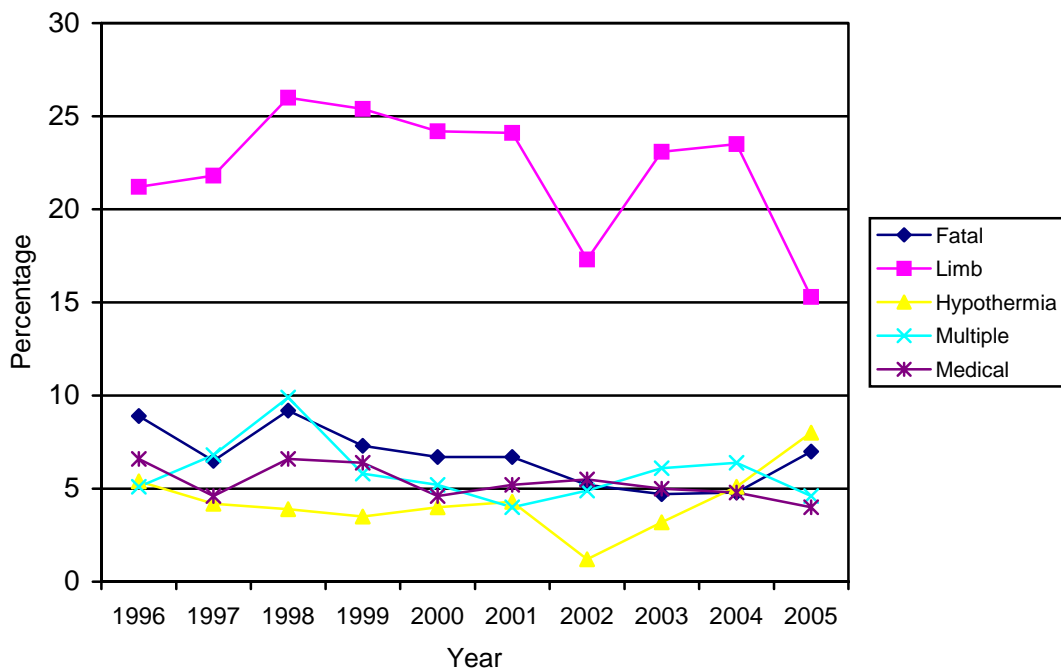
Figure 11 shows how the ratio of inexperienced to experienced people varies across the 10 year period. It shows that even though the number of incidents has stabilised, the proportion of inexperienced people rescued has increased. The trend line shows the proportion has risen from 33% to 43%. Again, whilst the present study does not offer an explanation, it may be that the increasing number of inexperienced people is symptomatic of the current “Go for it” culture, the relative ease with which people can access adventure activities (eg Loynes, 1998) and the suggested erosion of self reliance in mountaineering (Sharp, 2007). It should be said that this trend applies primarily to hill walkers. In contrast, the proportion of inexperienced climbers has remained stable with the exception of snow and ice climbing where the number has fallen.

Figure 11: Incidents by experience, 1996-2005



The proportion of incidents involving males has risen marginally over the ten year period and the proportion of people who live outside Scotland has remained the same. There are some changes in the overall injury profile of casualties (Figure 12). The trend lines have been excluded from this figure to avoid confusion.

Figure 12: Incidents by type of injury, 1996-2005



It should be noted that the numbers in each category do not total to 100% since, for most years, around 50% of all those rescued are not injured. The figure shows falls in fatal injuries (from 9% to 5%), limb injuries (from 25% to 20%), multiple injuries (from 7% to 5%) and medical problems (from 6% to 4%) and an increase

in hypothermia cases (from 4% to 5%). These trends reflect the overall decrease in number of people injured (from 57% to 44%). This in turn is a reflection of changes in the kind of work undertaken by some mountain rescue teams (Gunn, 2007) which are called upon less to deal with climbing incidents.

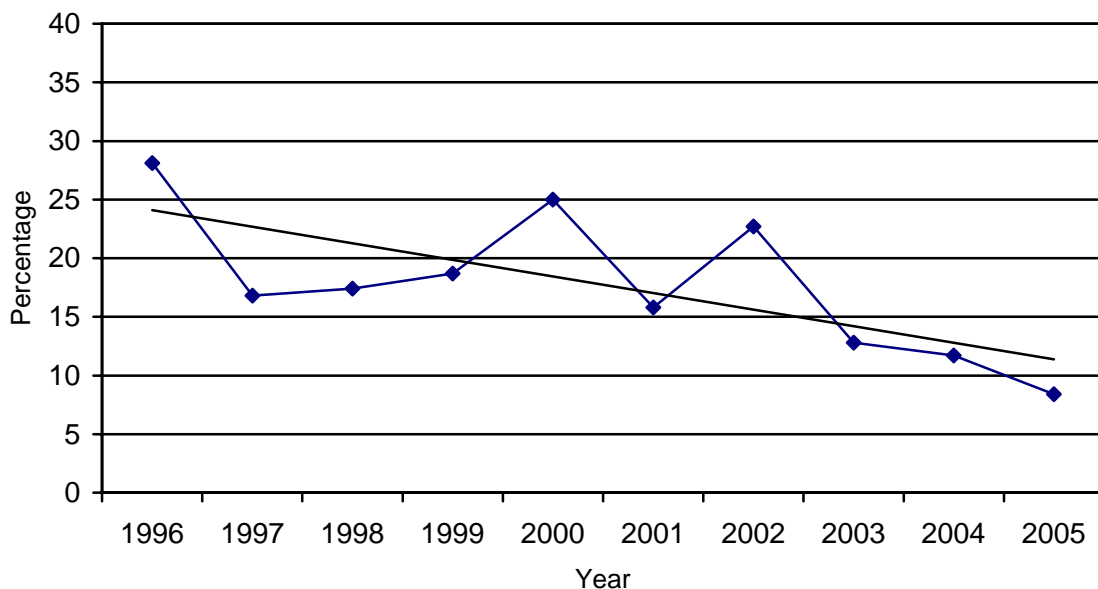
## Causes

The top ranked causes (see Table 22) have shown some change over the period. There has been no change in the number of navigation or medical related incidents over the ten year period but there has been a decline in incidents where poor planning is a contributory cause (from 24% to 12%) - see Figure 13. This is clearly a good sign.

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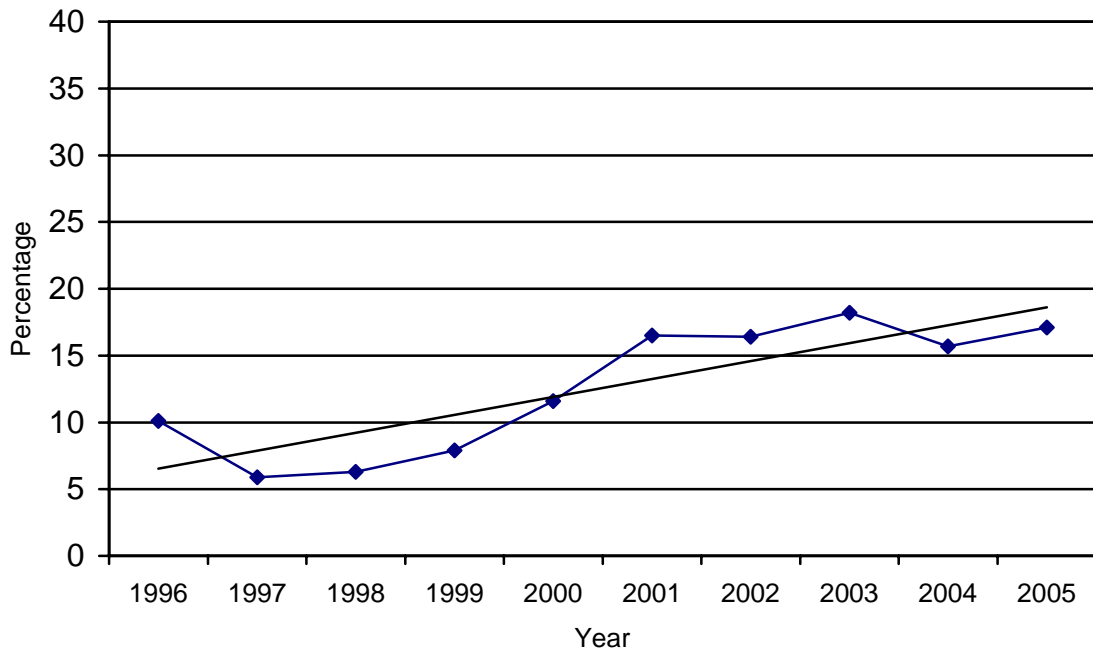
Figure 13: Incidents involving poor planning, 1996-2005

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However, there has been an increase in the number of incidents where the incorrect use or absence of equipment is a contributory cause (Figure 14). The trend line shows that the proportion of equipment related incidents has risen from 7% to 17%.

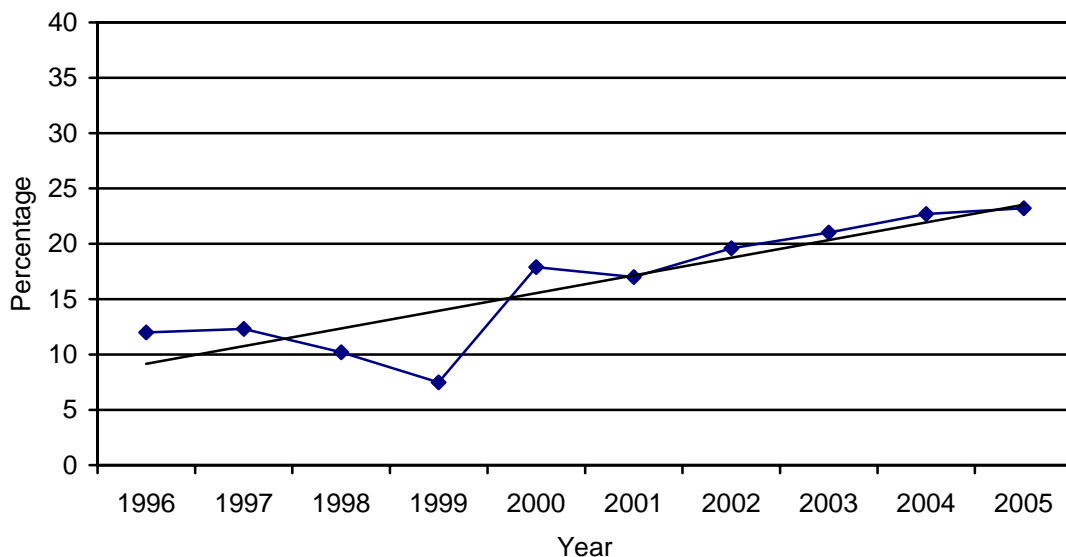
Figure 14: Equipment problem incidents, 1996-2005



## Outcomes

The top ranked incident outcomes (see Table 23), show some change over the ten year period. Figure 15 shows there has been an increase in the proportion of people who are lost.

Figure 15: Incidents involving people who are lost, 1996-2005



The trend line indicates a rise in those lost from 9% to 23%. This finding ties in with the rising problem of poor planning (Figure 13) but it is not explained by the lack of change in navigation errors. It might be expected that poor navigation and being lost are associated. A possible explanation lies in the reporting procedure.

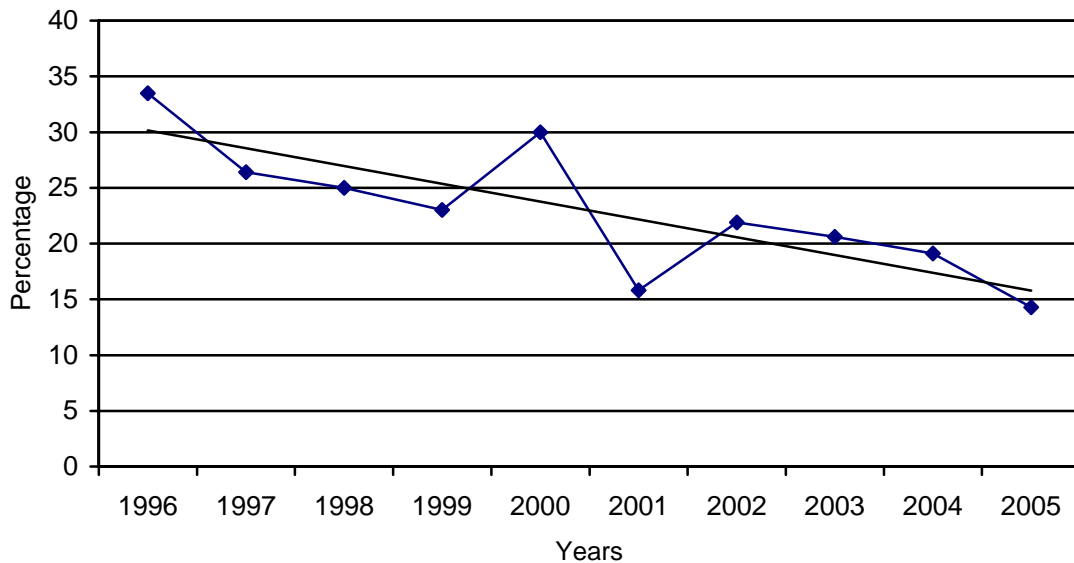
The transcription process provided some insight; in some cases of searches for missing people the description indicated a navigation fault (e.g. the party took an incorrect compass bearing or didn't possess a map) but 'equipment' was ticked rather than 'navigation'. It is possible that the problem of weak navigation is under-reported and is reflected to some extent in Figure 14.

The proportion of people reported as overdue shows a decline over the years (Figure 16). It is possible this represents a reduction in planning errors (see Figure 13). In other words, better planning results in better timing.

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Figure 16: Incidents where people are overdue, 1996-2005

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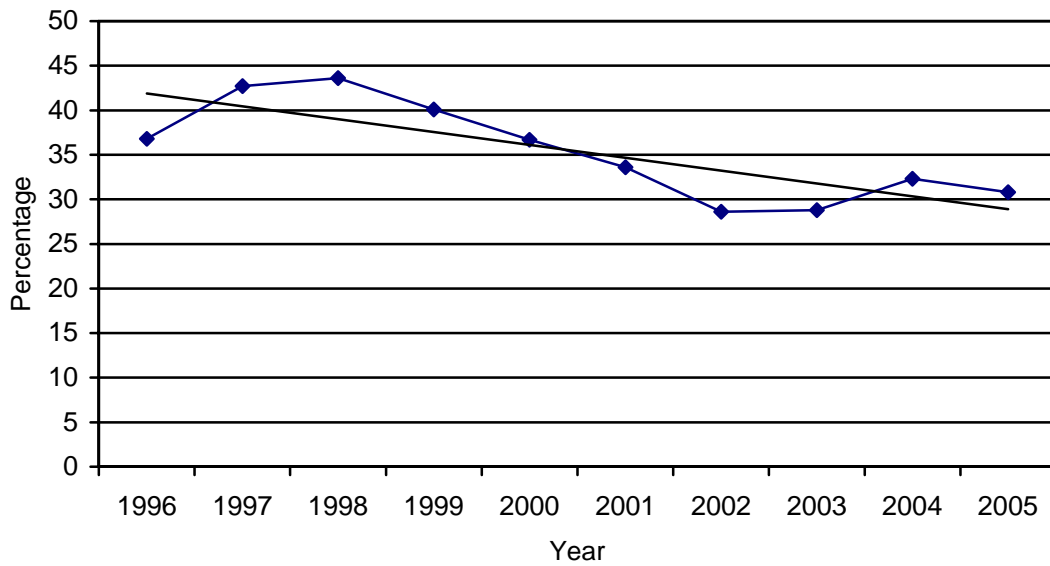


There is no change in the proportion of people who fall, but there is a decline in the numbers that slip (Figure 17).

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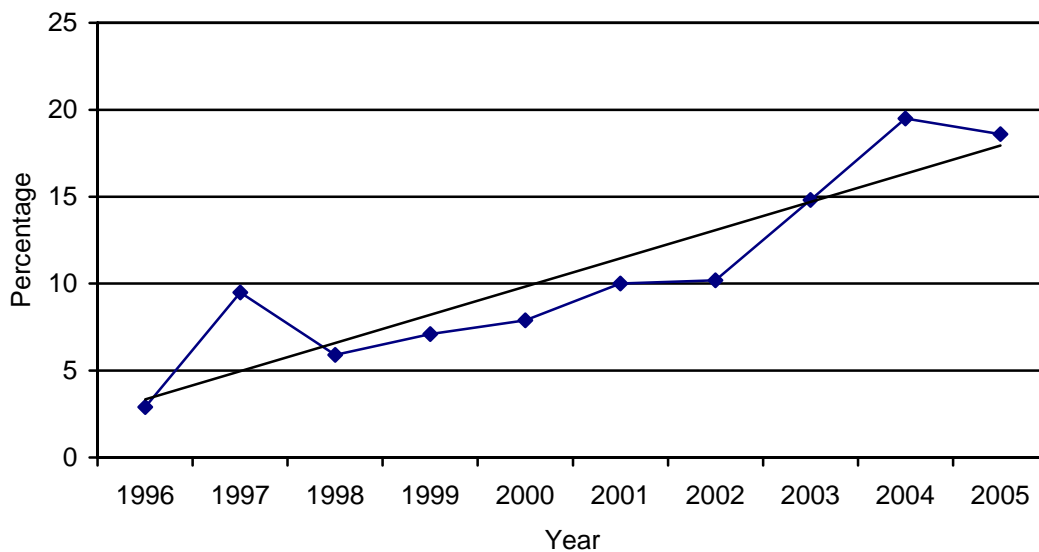
Figure 17: Incidents where people slip, 1996-2005

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Over the period there has been an increase in the percentage of people who become cragfast (Figure 18). It should be noted that 12% of all those who are lost end up becoming cragfast.

Figure 18: Cragfast incidents, 1996-2005



### Summary

- Over the ten year period of the study the proportion of hill walking incidents has increased and the proportion of climbing incidents has decreased.
- The proportion of inexperienced people has increased, but only amongst those involved in hill walking incidents.
- The proportion of people injured has decreased along with decreases in the proportion of people with medical problems, fatal, limb and multiple injuries.

- There has been an increase in the proportion of incidents where poor or absent items of equipment is a contributory cause, a fall in the proportion of cases of poor planning and no change in navigation or medical based incidents.
- The proportion of incidents where people are lost or cragfast has increased but the proportion has decreased in incidents where people slip or are overdue.

## Conclusions

The findings of this survey provide a current picture of the situation in Scotland and, as the most complete survey ever undertaken of mountain incidents in Scotland, it offers a comprehensive basis for future comparisons. The findings provide objective confirmation of many things expressed about mountain incidents, particularly by those involved in mountain training, safety promotion and rescue provision. It is vital to test hypotheses and speculations with empirical data and the present study provides an up-to-date and accurate basis for making informed comment about mountain incidents.

Specifically, the study gives a detailed description of those who are involved in mountain incidents and permits statements about who is at risk. There are a number of 'clues' contained in the data which suggest there may be clear activity preferences among men and women. The following points should be noted -

- More men compared to women are involved in incidents than would be expected on the basis of participation numbers alone.
- Incidents in rock climbing, snow/ice climbing and scrambling involve more men than overall, whilst incidents in hill walking involve relatively more women.
- Men are more likely to suffer serious injury (fatal or multiple) whereas women are more likely to suffer limb injuries or medical problems.
- Men are less likely to be involved in an incident on a footpath or on the open hillside, but more likely to be involved when the terrain is covered in snow or ice.
- Women are more likely to slip compared to men. However, men are more likely to slip when the terrain is rocky or snow/ice covered, whilst women are more likely to slip on hill paths.
- A greater proportion of women slip in the summer months whilst a greater proportion of men slip at other times of the year.

- The ratio of males/females involved in incidents is greater in the winter months and less in the summer months.

Taken together, these findings lead to the conclusion that men are involved in mountain activities, which are more hazardous and/or they undertake activities in a riskier way. This may be a point that should be taken on board by those who promote mountain safety.

In highlighting some of the key things that go wrong in the mountains, the study provides a number of pointers for those with responsibility for promoting safe practice and training mountain leaders. There are a number of messages -

- **Experience does not guarantee safety.** Over half of those involved in mountain incidents are experienced hill goers. There is a need to reinforce the message that experience does not make people infallible and that caution should prevail even when the risks are apparently low.
- **Hill walking is not without risks.** Most incidents happen to hill walkers and many hill walkers die in the mountains. There is a need to underline the importance especially of good navigation and thorough planning as key ingredients of safe practice.
- **Slips are central to many incidents.** They account for almost one third of all incidents. This common problem should be reinforced and the point should also be made that slips often have dire consequences, particularly in winter when a slip can result in a very long fall.
- Ensure all appropriate items of equipment are taken. By and large, few incidents result from equipment failure or misuse. However, a substantial (and increasing) number can be traced to a simple item such as a forgotten compass or low headlight battery. A few tragic accidents have resulted from people not wearing crampons or using an ice axe, or using walking poles instead of an axe (Sharp, 2001b). It is important to make the point that **the majority of incidents where equipment is a contributory cause are avoidable** ones.
- More than half of everyone involved in incidents live outside Scotland. It is a difficult task to convey safety messages to those who do not reside in Scotland. As Jones (2006) has suggested, **there is a need to target safety messages to visitors 'at source'**. This may be an area where information could be usefully distributed through the outdoor magazines, course providers, hostels, tourist boards, places of accommodation, car parks, etc.
- Poor navigation. The most commonly cited contributory cause of mountain incidents is poor navigation and the percentage of people becoming lost is increasing. **Poor navigation leads to people becoming overdue, exhausted, lost, benighted and cragfast, sometimes with fatal consequences.** There is a need to convey this message to all mountaineers including both climbers and walkers.
- **Preparation is fundamental.** There is scope for improvement in terms of planning, preparing and timing. Over a third of all incidents result from poor planning and underestimation of time. Inadequate planning is a problem not only for hill walkers but also those who scramble and climb in winter and summer. On a positive note, the evidence suggest this is becoming less of a problem.

The study provides some evidence to suggest that mountaineering in Scotland may be undergoing a change in the relative importance of the various activities that constitute mountaineering. The increase in hill walking incidents (and in the proportion of people lost) is mirrored by a decrease in rock climbing and snow/ice climbing incidents (accompanied by a decrease in the number of people with serious or fatal injuries). One conclusion is that more people are walking and less people climbing. This is supported by anecdotal evidence from those in the rescue service and other factors such as the increasing popularity of indoor climbing and changes in weather patterns which affect winter climbing. If this is a valid conclusion and if the divergence in participation between walking and climbing continues, then organisations with an interest in mountain safety, leadership and skills training will need to examine the ways in which the change impacts on their aims. It could also have an impact on the retailers and manufacturers of outdoor clothing/gear/footwear.

## **Recommendations**

It is recommended that the many organisations which have an interest in mountain safety, training, leadership, instruction and rescue, should study this report and respond to those findings which have direct relevance. In particular, the report should be examined by the Mountaineering Council of Scotland (Mountain Safety Committee), the Scottish Mountain Safety Forum and Mountain Leader Training (Scotland).

Throughout the process of recording information from the incident reports a number of uncertainties were encountered, viz., missing data, missing reports and ambiguities in meaning. There is a need to review the report form with a view to clarifying the meaning of several terms, eliminating irrelevant information and ensuring consistency in the amount of information provided. At the time of the writing, the MRC of S has established a sub-group to look into these and related matters.

There is a need for more comprehensive information on participation in mountaineering. The present study provides pointers to who is involved in mountaineering but there are risks in extrapolating from incident figures to participation data. In particular, if mountaineering is undergoing a significant change in the way it manifests itself it is important for national governing bodies, course providers, rescue teams and others to understand the nature of their 'client base'. It is recommended therefore that a specific survey is undertaken which focuses on the whole matter of participation and examines questions such as who takes part, how many and what activities are engaged in.

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## **Postscript**

This study has focused on the risks that people take when they go walking or climbing, the hazards encountered in the Scottish mountains and the many things that can go wrong. As a final comment, readers should note that people go to the mountains for enjoyment and the vast majority come to no harm at all – even after a lifetime of mountaineering. It is worth noting that when the number of annual incidents is set against the number of mountaineering participation days, the risks are minimal. In fact, the chances of requiring the services of a mountain rescue team are so slim that someone living in Scotland would need to walk/climb in the mountains non-stop every day for around 125 years before they had an accident!

## **Appendix: Occupational Categories used**

The following notes identify the major groups and some sample occupations within each group of the Standard Occupational Classification.

### Managers and Administrators

General managers in national and local government, Managers in building and contracting, Clerks of works, Advertising managers, Officers in the UK armed forces, Farm owners and managers, Publicans and sports managers.

### Professional Occupations

Chemists, Mechanical engineers, medical practitioners, University teachers, judges, Chartered accountants, Town planners, Librarians, Social workers

### Associate Professional and Technical Occupations

Quantity surveyors, Laboratory technicians, Building inspectors, Air traffic controllers, Chiropodists, Underwriters, Matrons, Youth workers, Authors and writers, Musicians.

### Clerical and Secretarial Occupations

Local government clerical officers, Rent collectors, Library assistants, Storekeepers, Legal secretaries, Receptionists, Computer operators.

### Craft and Related Occupations

Bricklayers, Painters and decorators, Tool makers, TV engineers, Tyre fitters, Knitters and weavers, Bookbinders, Butchers, Fishmongers.

### Personal and Protective Service Occupations

NCOs, Prison service officers, Chefs, Bar staff, Dental nurses, Educational assistants, Barbers, Caretakers, Undertakers.

### Sales Occupations

Buyers, Sales representatives, Petrol pump forecourt attendants, Scrap dealers, Window dressers, Telephone salespersons.

### Plant and Machine Operatives

Brewery operatives, textile processing operatives, Synthetic fibre makers, Electroplaters, Metal polishers, Line workers, Bus inspectors, Crane drivers.

### Other Occupations

Farm workers, Coal mine labourers, Road construction workers, Goods porters, Postal workers, Hotel porters, Road sweepers, Window cleaners.