# The Himalaya by the Numbers

## A Statistical Analysis of Mountaineering in the Nepal Himalaya

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# Contents

# Ascent Analysis

This chapter analyzes ascents of the principle peaks in the Nepal Himalaya, those peaks officially open for mountaineering and a few additional peaks with significant activity. Border peaks such as Everest, Cho Oyu, and Kangchenjunga are included for expeditions from the Nepalese, Chinese, and Indian sides of the border. The tables and charts cover the period from 1950 through 2009 unless specified otherwise.

Ascents are analyzed by several different categories: peak altitude, climbing season, day of year, time of day, historically over time, age, citizenship, and gender. Ascent rates are given for the most popular peaks. Ascents are also analyzed by team composition, that is, the number of members and hired personnel on an expedition and the ratio between the two.

Ascent rates are calculated only for members above base camp because ascent rates cannot be reasonably calculated for hired personnel as many of them went above base camp with no intention of attempting the summit, but only fulfilling their assigned roles of ferrying loads, establishing higher camps, or fixing ropes.

Disputed ascents, as marked in *The Himalayan Database*, are counted in the ascent totals. Claimed, but unrecognized ascents, and ascents of subpeaks are excluded from the ascent totals. Multiple ascents by the same climber on the same peak in the same season are only counted once.

Tables at the end of this chapter show the average duration and the minimum and maximum days to the summit for successful expeditions for many popular peaks.

### Ascents by Altitude Range

Table and Chart A-1 show member ascent rates from 1950 to 1989 and 1990 to 2009 for all peaks in altitude ranges from 6000m to 8850m in 500m increments.

| Peak Altitude | 1950-1989 All Peaks with All Routes | | | 1990-2009 All Peaks with All Routes | | | 1990-2009 All Peaks And Routes excluding Ama Dablam-Cho Oyu-Everest Commercial Rtes | | |
|---|---|---|---|---|---|---|---|---|---|
| | Above BC | Ascent Cnt | Ascent Rate | Above BC | Ascent Cnt | Ascent Rate | Above BC | Ascent Cnt | Ascent Rate |
| 6000-6499m | 573 | 270 | 47.1 | 690 | 361 | 52.3 | 690 | 361 | 52.3 |
| 6500-6999m | 1607 | 606 | 37.7 | 4469 | 2166 | 48.5 | 1090 | 328 | 30.1 |
| 7000-7499m | 2429 | 571 | 23.5 | 3654 | 997 | 27.3 | 3654 | 997 | 27.3 |
| 7500-7999m | 1804 | 294 | 16.3 | 789 | 92 | 11.7 | 789 | 92 | 11.7 |
| 8000-8499m | 3052 | 492 | 16.1 | 8854 | 2891 | 32.7 | 3834 | 875 | 22.8 |
| 8500-8850m | 3388 | 398 | 11.7 | 7817 | 2692 | 34.4 | 2075 | 470 | 22.7 |
| **Totals** | **12853** | **2631** | **20.5** | **26273** | **9199** | **35.0** | **12132** | **3123** | **25.7** |

**Table A-1: Member ascents for peak altitude ranges (6000-8850m)**

As shown in Chart A-1, member ascent rates for all peaks from 1950 to 1989 (the **blue** line) are the highest at 47.1% for the lower 6000m+ peaks and then drop steadily to 11.7% as peak height increases to 8500m+ suggesting as would be expected that the higher the peak, the more difficult it is to summit.

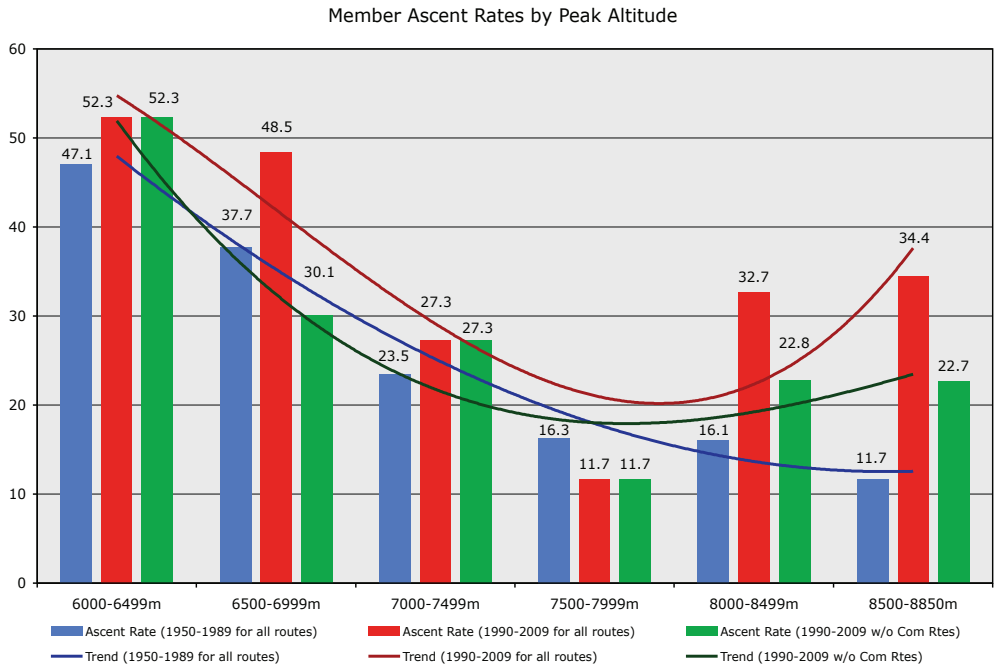


**Chart A-1: Member ascent rates by peak altitude between 1950-1989 and 1990-2009**

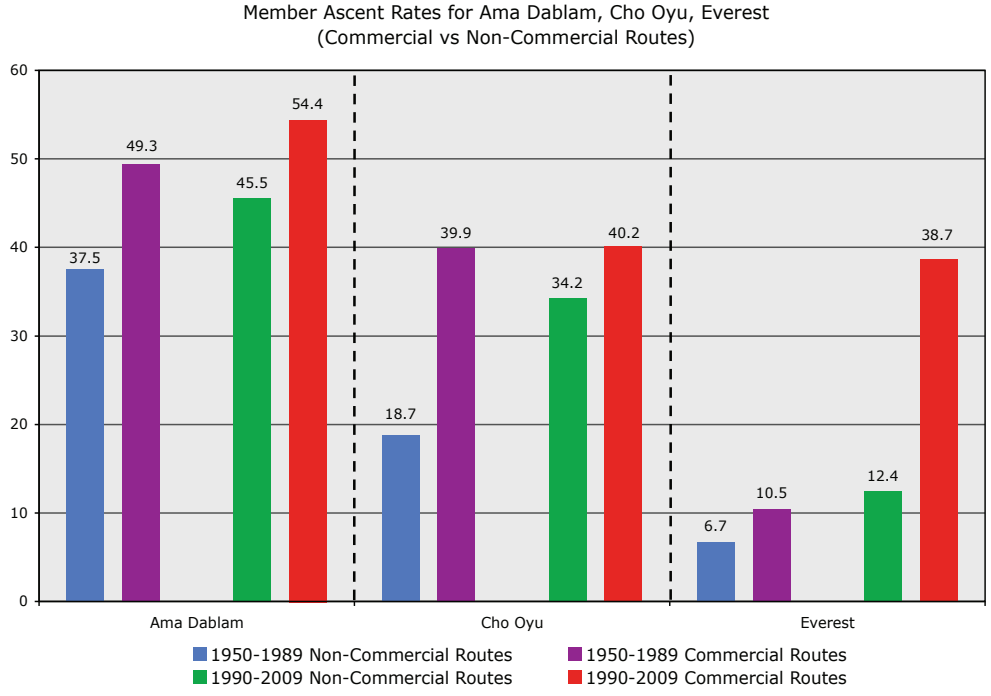


**Chart A-2: Member ascent rates for Ama Dablam, Cho Oyu, and Everest**

The ascent rates in the above and subsequent charts in this chapter represent the percentage of climbers that summited for each category in the chart.

The center and rightmost columns of Table A-1 show member ascent rates from 1990 to 2009 for all peaks including and excluding expeditions on the commercial routes of the three most popular peaks, Ama Dablam (southwest ridge), Cho Oyu (northwest ridge), and Everest (South Col-southeast ridge and North Col-northeast ridge).

In Chart A-1, the **red** columns and trend line show ascent rates during the 1990-2009 period for all peaks and routes, and the **green** columns and trend line show ascent rates during the 1990-2009 period factoring out the commercial routes on Ama Dablam, Cho Oyu, and Everest. The difference between the red and green trend lines illustrates the impact of commercial climbing after 1990 as the red trend line is substantially higher than the green trend line. Commercial climbing, which has become increasingly popular since 1990, has contributed significantly to the numbers of climbers going above base camp (nearly 54% of all climbers above base camp were on the commercial routes of one of these peaks from 1990 to 2009).

Table and Chart A-2 shows the member ascent rates for Ama Dablam, Cho Oyu, and Everest during the 1950-1989 and 1990-2009 periods. Segregating out the commercial routes for the 1950-1989 period does not substantially affect the member ascent rates during that earlier period because those expeditions did not concentrate so much on previously climbed routes, but were more eager to explore new unclimbed routes. Since 1990 many of the more skilled climbers are pursuing quests for the seven summits or the fourteen 8000ers and thus want to climb Everest and Cho Oyu as quickly and simply as possible, whereas most commercial clients do not have the skills for the more difficult non-commercial routes.

| | Non-Commercial Routes | | | Commercial Routes | | |
|---|---|---|---|---|---|---|
| 1950-1989 | Above BC | Ascent Cnt | Ascent Rate | Above BC | Ascent Cnt | Ascent Rate |
| Ama Dablam | 200 | 75 | 37.5 | 217 | 107 | 49.3 |
| Cho Oyu | 203 | 38 | 18.7 | 263 | 105 | 39.9 |
| Everest | 1307 | 88 | 6.7 | 1253 | 131 | 10.5 |
| 1990-2009 | | | | | | |
| Ama Dablam | 167 | 76 | 45.5 | 3379 | 1838 | 54.4 |
| Cho Oyu | 152 | 52 | 34.2 | 5020 | 2016 | 40.2 |
| Everest | 829 | 103 | 12.4 | 5742 | 2222 | 38.7 |

**Table A-2: Member ascents for Ama Dablam, Cho Oyu, and Everest**

The low ascent rate for the non-commercial routes on Cho Oyu during the 1950-1989 period is due to several failed attempts on the southeast face and along the east ridge from Ngojumba Kang. These routes were seldom attempted after the northwest ridge route opened up from Tibet in 1987. In fact, the last (and only successful) attempt along the east ridge was in 1991 by the Russians (see the inset box, *Cho Oyu by the East Ridge*, on pg. 62).

### Popular Peaks by Altitude Range

Chart A-3 gives member ascent rates for the most popular peaks in Nepal, those peaks with 750 or more members above base camp (roughly equivalent to 75+ expeditions).

Member ascent rates for two commercial peaks, Ama Dablam at 52.9% and Cho Oyu at 39.2%, are higher than the mean (average) of 30.2% for all peaks (in black), whereas the ascent rate for Everest is lower at 27.9%.

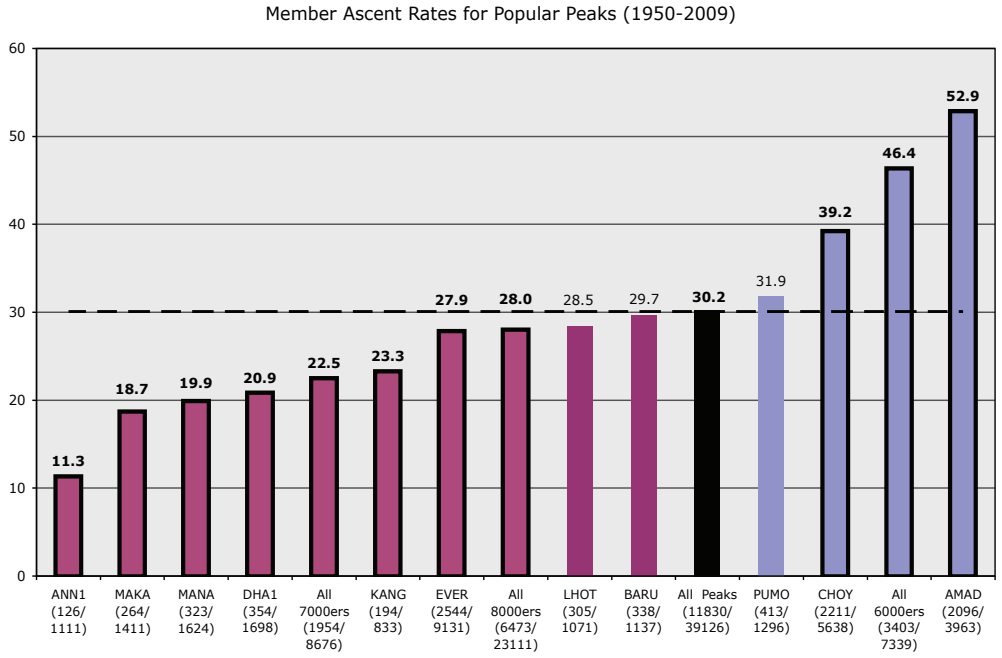


**Chart A-3: Member ascent rates for popular peaks from 1950-2009 with more than 750 members above base camp (the ascent rate is above the column bar; the ascent / above BC counts are below) (see Appendix A for the definitions of the peak symbols in this and subsequent charts)**

In the above chart and in the three charts that follow for the most popular 6000ers, 7000ers, and 8000ers for members, the columns outlined in black represent peaks or groups of peaks that statistically have either significantly higher (in **blue**) or lower (in **red**) ascent rates than the mean ascent rate for all peaks (in **black)**. Statistical significance means that there is less than a 5% probability that the result occurred by chance. For the non-outlined peaks, the ascent rates can be considered as only anecdotal evidence of higher or lower ascent rates than the mean rate for all peaks.

Member ascent rates for all of these peaks or groups are significantly higher or lower (statistically) than the 30.2% mean ascent rate for all peaks except for Lhotse, Baruntse, and Pumori that have rates very close to the mean ascent rate for all peaks.

The next group of charts shows member ascent rates grouped by 6000m, 7000m, and 8000m altitudes for the most popular peaks in Nepal. Ama Dablam, Cho Oyu, and Everest are further separated out by their commercial and non-commercial routes.

Chart A-4 shows the 6000m peaks with 50 or more members above base camp. The Ama Dablam southwest ridge commercial route accounts for 49.0% of the members above base camp and 57.2% of the member ascents for all 6000m peaks. If this route were omitted from the counts, the overall ascent rate for the other 6000ers would drop from 46.4% to 39.0%.

Two of the peaks in Chart A-4, Langshisa Ri and Cholatse, were reclassified as trekking peaks in 2002. Expeditions to those peaks after that date are not counted in the 6000m totals. Also expeditions to Dhampus (71.4% ascent rate) and Saribung (85.1%) are not included as they are no longer tracked in *The Himalayan Database* because these peaks are very easy and often climbed illegally by trekking groups.

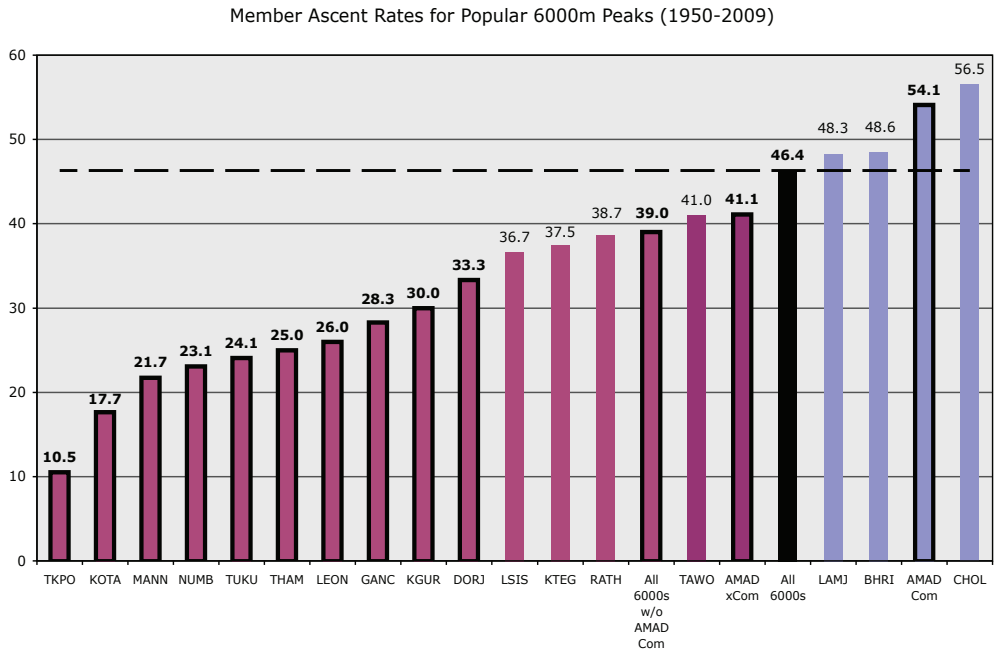


**Chart A-4: Member ascent rates for selected 6000m peaks with 50+ members above base camp from 1950-2009**

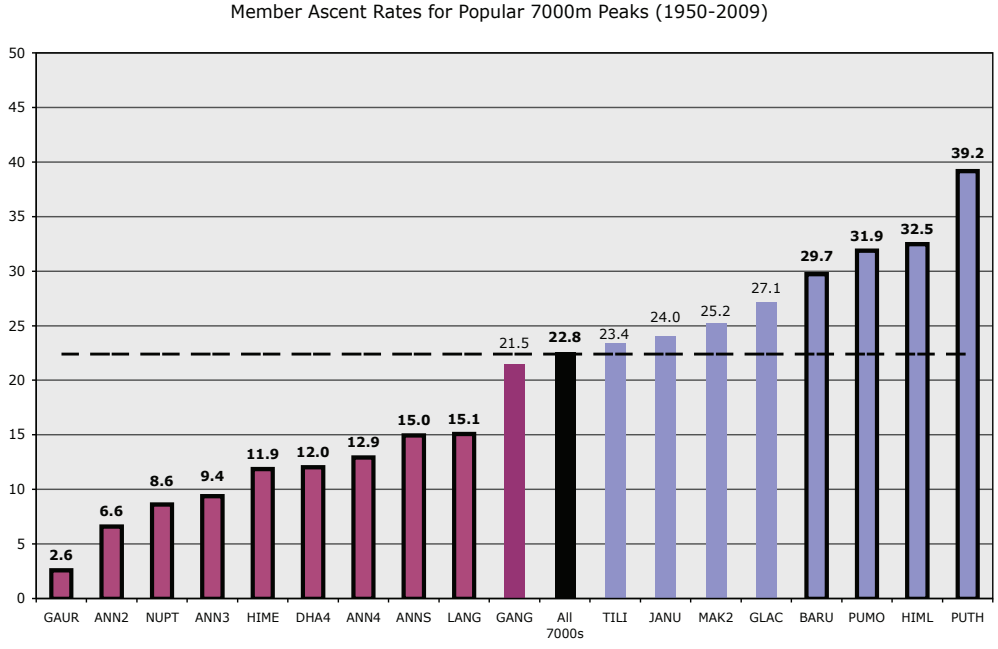


**Chart A-5: Member ascent rates for selected 7000m peaks with 100+ members above base camp from 1950-2009**

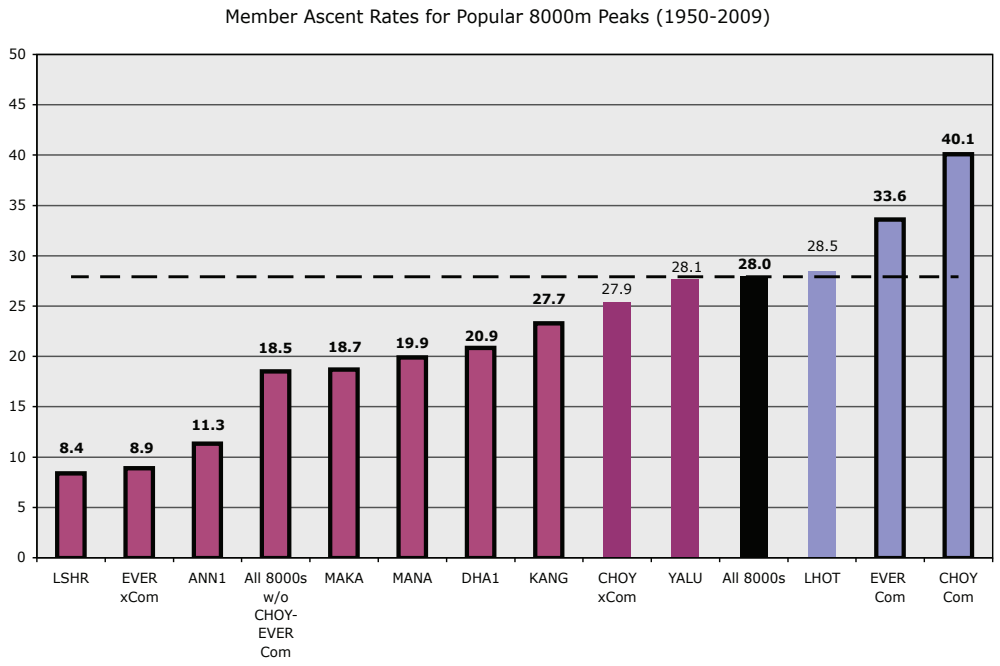


**Chart A-6a: Member ascent rates for selected 8000m peaks with 150+ members above base camp from 1950-2009**

Member ascent counts and ascent rates for Manaslu include ascents to both the true summit (8163m) and the fore-summit (8125m). The last pitch to the true summit is often extremely dangerous due to high winds and unstable ice cornices, hence many climbers have stopped at the fore-summit and have considered that a sufficient success and historically have reported their climbs as successful.

Tawoche, Lamjung, and Bhrikuti do not have significantly higher or lower ascent rates than the mean for all 6000ers because their rates are very close to the mean. Langshisa Ri, Kangtega, Rathong, and Cholatse with few members above base camp are still too close to the mean to be significant.

Chart A-5 shows the 7000m peaks with 100 or more members above base camp. Himlung and Pumori have the highest member ascent rates for the 7000ers and are often attempted by commercial expeditions with Himlung being especially popular for French groups. Many commercial groups also attempt Baruntse, Pumori, and Tilicho. Annapurna IV was also a target of commercial teams in the 1980s, but has not been since then due to its often heavy snow pack. Gangapurna, Tilicho, Jannu, Makalu II, and Glacier Dome do not have significantly higher or lower ascent rates than the mean for all 7000ers because their rates are very close to the mean.

At 2.6% Gaurishankar has one of the lowest ascent rates in the entire Nepal Himalaya with only 3 of 25 teams being successful, the last in 1985, and all by the southwest face. The peak requires very technical ice climbing skills and presents many hazards from falling ice and rocks. The American John Roskelley, the first summiter in 1979, returned with his son Jess in 2005 to try the northeast ridge from the Tibetan side; but they were defeated at only 5450m by a ridge of unstable rocks with huge icicles hanging from them—"like a house of cards" reported John, and "the difficulties got even worse as the ridge went higher."

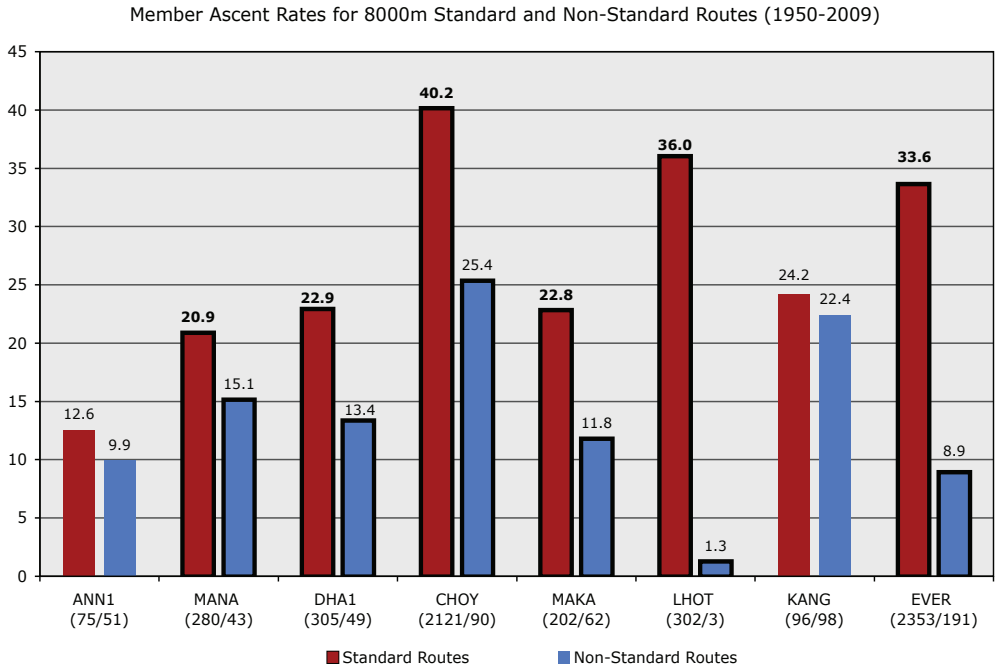


**Chart A-6b: Member ascent rates for 8000m standard and non-standard routes from 1950-2009 (the ascent rates are above the column bars; the ascent counts are below) (column pairs outlined in black indicate statistically significant differences in ascent rates between the standard and non-standard routes)**

**8000m Standard Routes:**

| | | |
|---|---|---|
| ANN1 – N Face | CHOY – NW Ridge | KANG – W Face |
| MANA – NE Face | MAKA – Makalu La-NW Ridge | EVER – S Col-SE Ridge, |
| DHA1 – NE Ridge | LHOT – W Face | N Col-NE Ridge |

Chart A-6a shows member ascent rates for the 8000m peaks with 150 or more members above base camp. The Cho Oyu and Everest commercial routes by far enjoy the highest member ascent rates (40.1% and 33.6%), whereas the lowest ascent rates are on Lhotse Shar (8.4%), the Everest non-commercial routes (8.9%), and Annapurna (11.3%). Interestingly for the 8000m peaks, Cho Oyu is also the safest, whereas Lhotse Shar and Annapurna are the most dangerous (see the *Death Analysis* chapter). Yalung Kang, Cho Oyu (non-commercial routes), and Lhotse are too close to the mean for all 8000ers to be statistically significant.

Chart A-6b shows member ascent rates for the standard and non-standard routes on the eight major 8000m peaks in Nepal. The standard routes are significantly easier on all of them except for Annapurna 1 and Kangchenjunga. For Annapurna I, all routes are very difficult (and dangerous); for Kangchenjunga, variations of the north face are nearly as popular and successful as the southwest face.

The member ascent rates for all peaks are given in Appendix A. However, most of those peaks that are not depicted in the previous charts do not have ascent and member above base camp counts high enough to be statistically significant when comparing them to the mean ascent rates for all peaks in their respective groups.

**Cho Oyu by the East Ridge**

From *The Seasonal Stories* of Elizabeth Hawley – Autumn 1991

In their own attack on an unclimbed route, a Soviet team of 14 Russians, one Ukrainian and one Bashkir led by Sergei Efimov succeeded on Cho Oyu where in previous years Japanese, British, Polish, American, and South Korean climbers had failed: they made the first successful climb of its formidable east ridge (just west of the summit of Ngojumba Kang), which has a 70m-deep, 80-degrees-steep rock gully at very high altitude. They overcame this great obstacle partly by making an extremely difficult traverse on a rock ledge on the Tibetan side.

On 20 October six members set out for the summit from their bivouac at 7900m on the western lip of the gully at 8:00 a.m. Climbing without artificial oxygen, three of them, Ivan Plotnikov, Evgeni Vinogradski, and Aleksander Yakovenko, gained the summit three hours later; two more, Valeri Pershin and Sergei Bogomolov, were there nearly two hours after that; while the sixth, Yuri Grebeniuk, turned back after reaching 8000m because his fingers were beginning to freeze and as a surgeon he wanted to keep them from being damaged. Tragically, next day during the party's descent from their bivouac, Grebeniuk was hit on the forehead by a falling stone while he was climbing up out of the gully; like all the summiters, he was not wearing a helmet. He received a deep wound and lived only a minute longer. It was impossible for his teammates to carry his body down as far as their highest fixed camp at 6950m – by just moving his body to place it in his sleeping bag, Pershin got frostbitten fingers – so it was left on a shelf in the gully.

## Ascents by Climbing Season

Chart A-7 shows member ascent rates by climbing season for all peaks.

The member ascent rates the autumn season of 30.7% and the winter season of 20.9% are statistically significantly higher and lower than the mean ascent rate of 30.2% for all seasons. The spring ascent rate of 28.5% is too close to the mean rate to be significant. But the summer ascent rate of 28.1% is insignificant in spite of the much lower ascent rate than the mean due to the small number of members above base camp. Most of the summer expeditions were either to Cho Oyu or Everest from the Tibetan side in the 1980s, or were summer explorations of northwest Nepal by Tamotsu Ohnishi. For these reasons, the summer season is excluded from the analyses in remainder of this section.

Table A-8 shows member ascent counts and rates for selected peaks and peak ranges for the spring, autumn, and winter climbing seasons.

The overall differences between spring and autumn season are small, but when examined on a peak by peak or region by region basis, they are more significant.

Chart A-8 compares member ascent rates for selected peaks and peaks ranges for the spring and autumn climbing seasons. Overall, the spring member ascent rates are higher for the 8000m peaks except for Cho Oyu, and lower for the 6000m and 7000m peaks.

Table and Chart A-9a show member ascent counts and rates by season broken out by geographic regions for all peaks.

## Ascents by Day of the Year

Chart A-20a shows member ascents by the day of the year for all peaks from 1990 to 2009 illustrating that the most successful periods are mid to late May and October through early November.

Charts A-20b-d show member ascents for the 6000ers, 7000ers, and 8000ers without the ACE commercial routes. The 6000ers are more spread out, whereas the 7000ers and 8000ers become more concentrated as the peak altitude range increases.

Charts A-20e-f show the members ascents for the Ama Dablam and Cho Oyu commercial routes. The most successful dates for the southwest ridge route of Ama Dablam are late October through early November with the main thrust occurring from October 20-25 and a secondary thrust occurring in the first week of November. The most successful dates for the northwest ridge route of Cho Oyu are from September 24 through October 2, before the colder northern winds from Tibet arrive.

Chart A-20g shows member ascents for the two commercial routes on Everest from 1990 to 2009. May 16-24 is the most successful time for both the north and south sides of Everest; few ascents are made before May 8 and after May 30. The patterns for both sides of Everest are very similar indicating that weather plays a significant role even though the teams on both sides are climbing independently of each other.

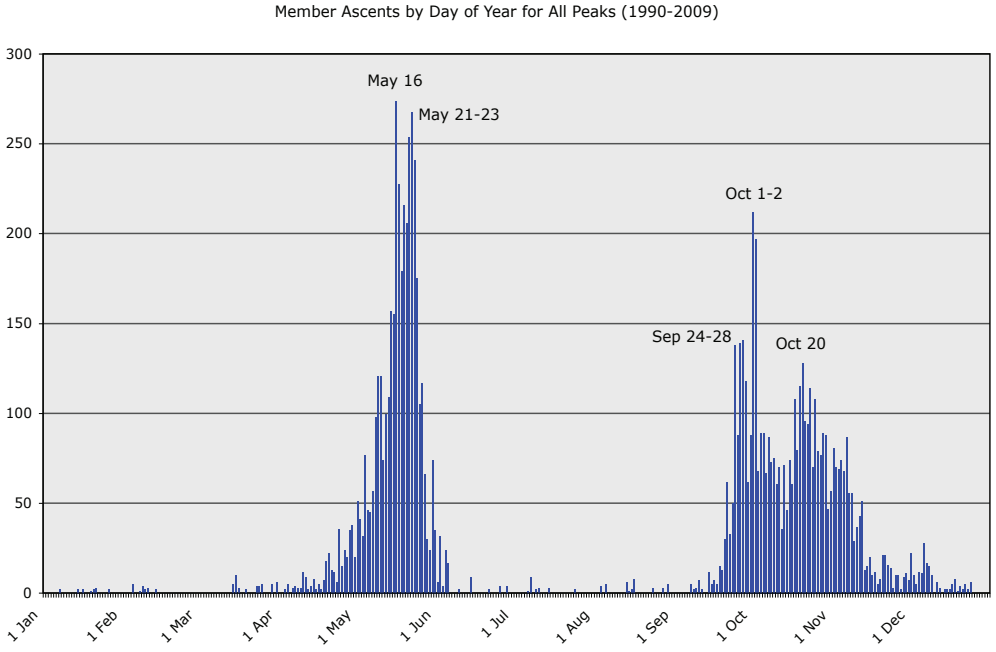


**Chart A-20a: Member ascents by day of year for all peaks and all routes from 1990-2009**

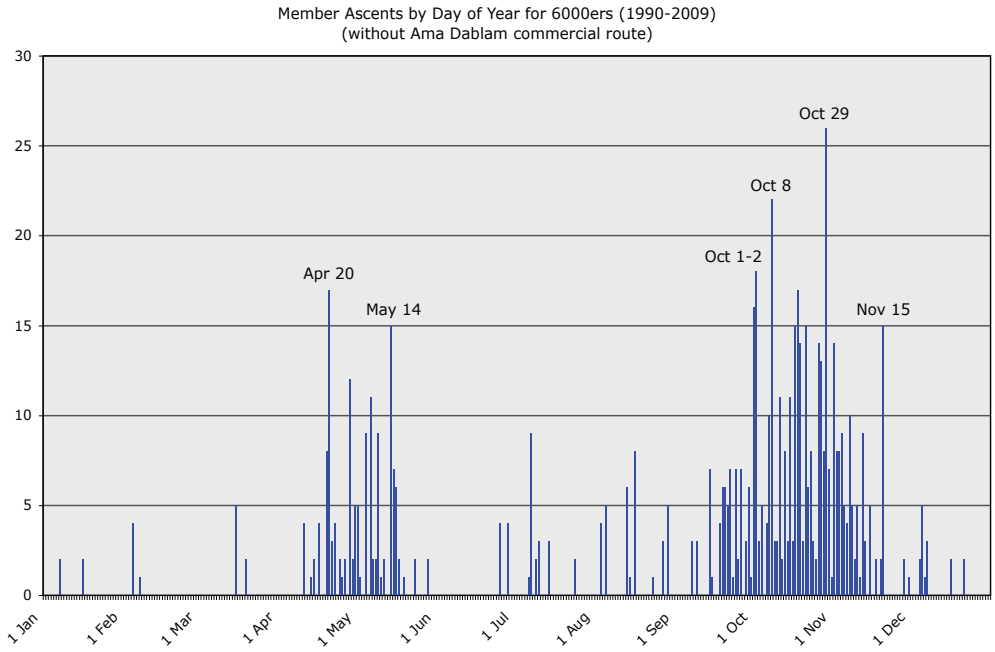


**Chart A-20b: Member ascents by day of year for 6000ers without Ama Dablam commercial route from 1990-2009**

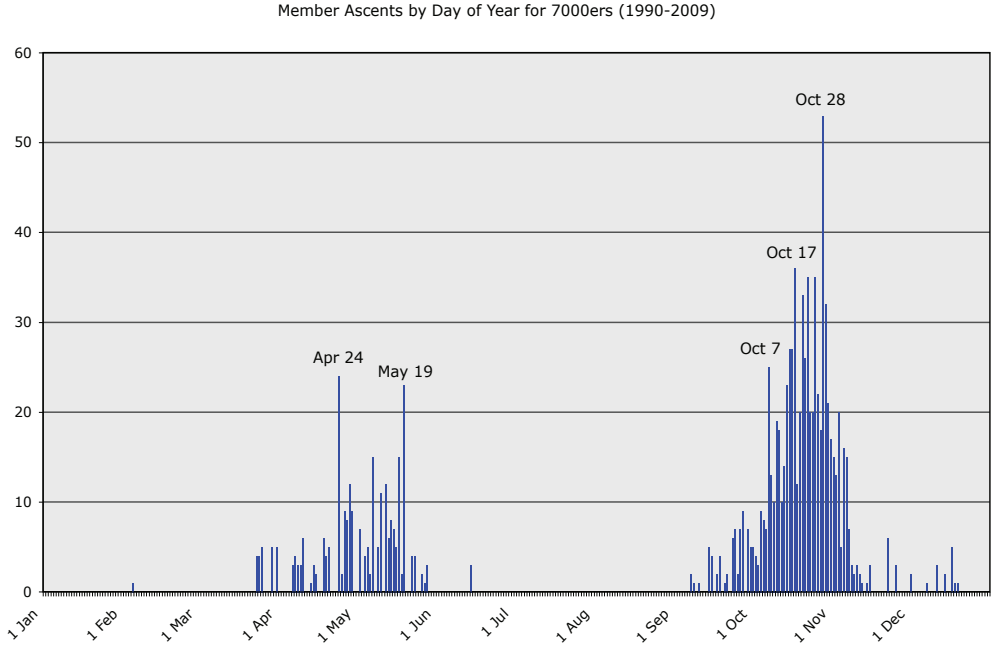


**Chart A-20c: Member ascents by day of year for 7000ers from 1990-2009**

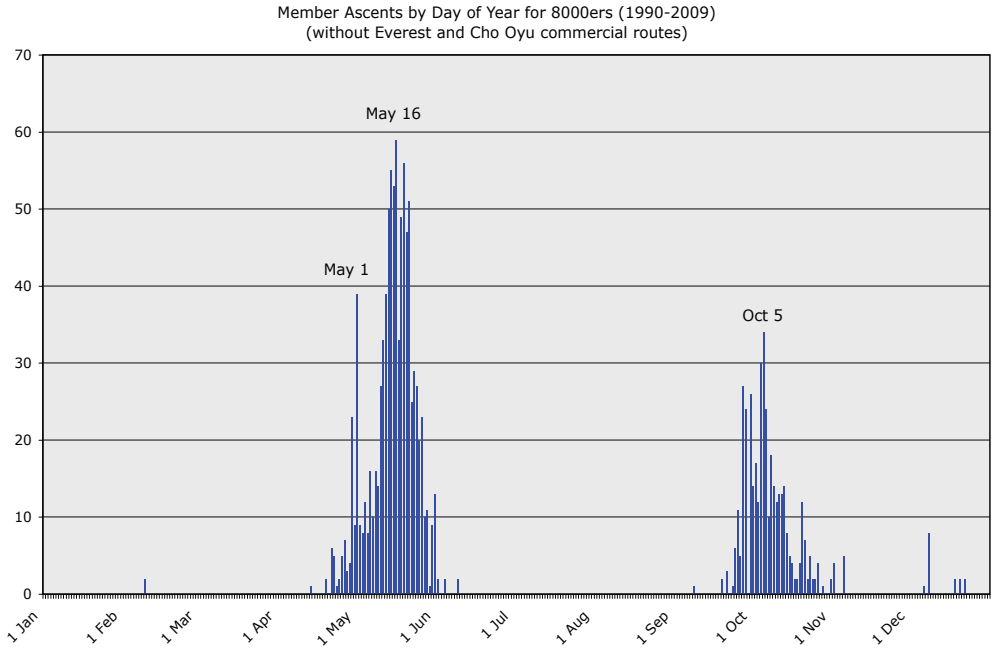


**Chart A-20d: Member ascents by day of year for 8000ers without Cho Oyu and Everest commercial routes from 1990-2009**

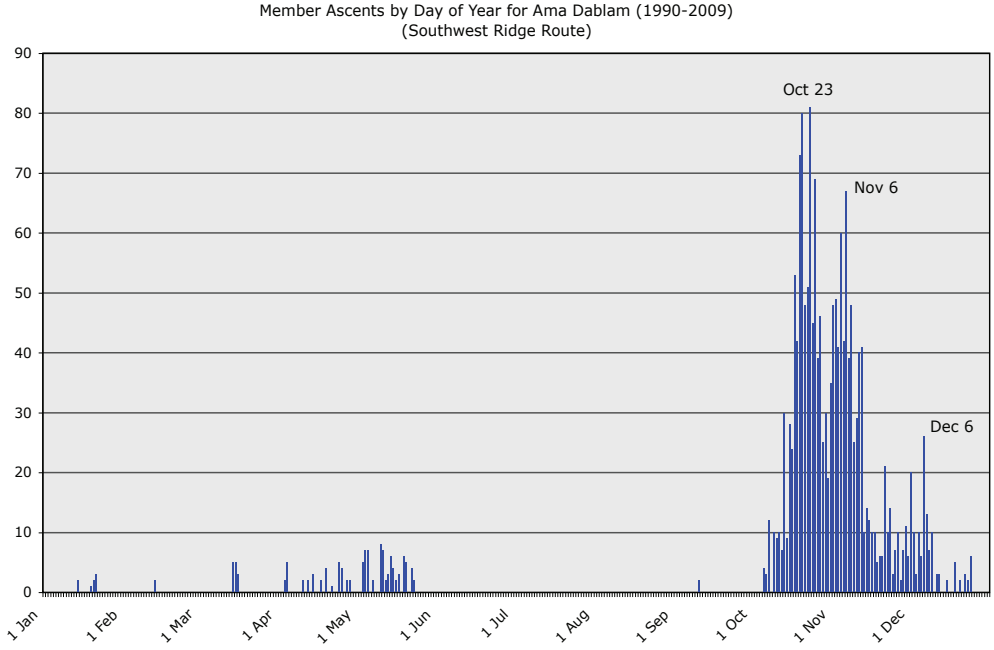


**Chart A-20e: Member ascents by day of year for Ama Dablam southwest ridge route from 1990-2009**

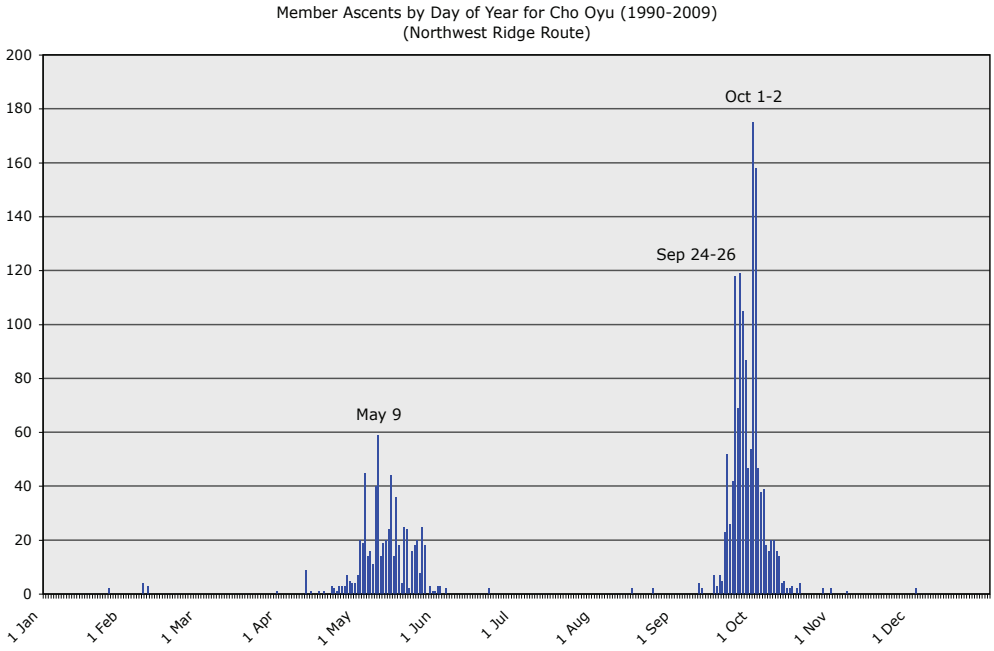


**Chart A-20f: Member ascents by day of year for Cho Oyu northwest ridge route from 1990-2009**

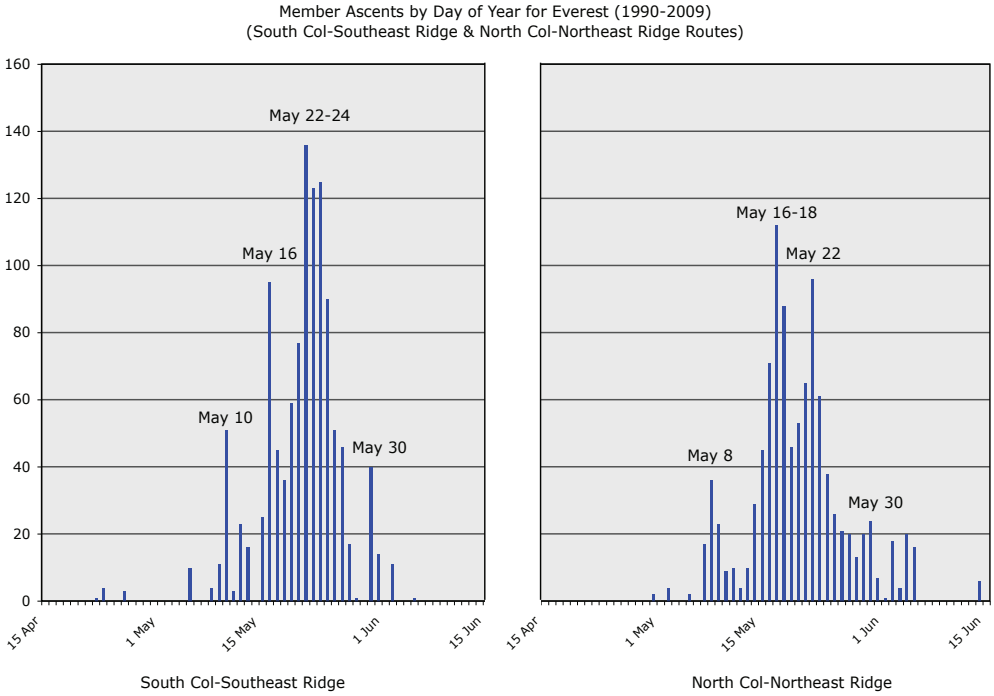


**Chart A-20g: Member ascents by day of year for Everest commercial routes from 1990-2009**

**Ascents by Time of Day**

Chart A-21 shows member ascents by the time of day for all peaks and all routes from 1990 to 2009. The mean ascent time is approximately 11 a.m. with the bulk of ascents occurring between 6 a.m. and 4 p.m.

Chart A-22 breaks out the ascent times for the 6000ers, 7000ers, and 8000ers without the ACE commercial routes. As expected, the lower altitude peaks have earlier mean ascent times than the higher peaks: about 11 a.m.-12 p.m. for the 6000ers and 12-1 p.m. for the 7000ers and 8000ers.

Charts A-23a-c show the ascent times for the ACE commercial routes. Ama Dablam has a slightly later ascent time than the other 6000ers possibly due to more congestion on the ascent route, whereas Cho Oyu and Everest have much earlier mean ascent times than the other 8000ers: 9-11 a.m. for Cho Oyu and 8-9 a.m. for Everest. Everest actually breaks down into two surges: an early surge from 6-7 a.m. and a later surge from 9-11 a.m., with the later surge reflecting the crowding that often occurs at the Hillary Step and the Second Step.

For Everest, the times of ascent directly affect the likelihood of survival during descent (see the section *Probability of Death on Everest* in the *Death Analysis* chapter).

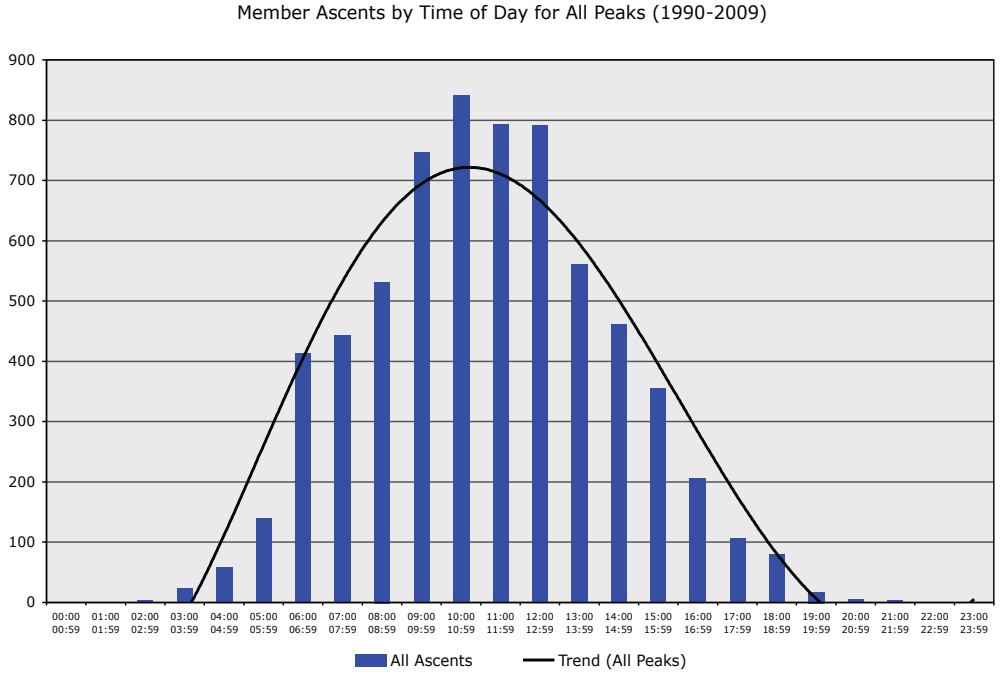


**Chart A-21: Member ascents by time of day for all peaks and all routes from 1990-2009**

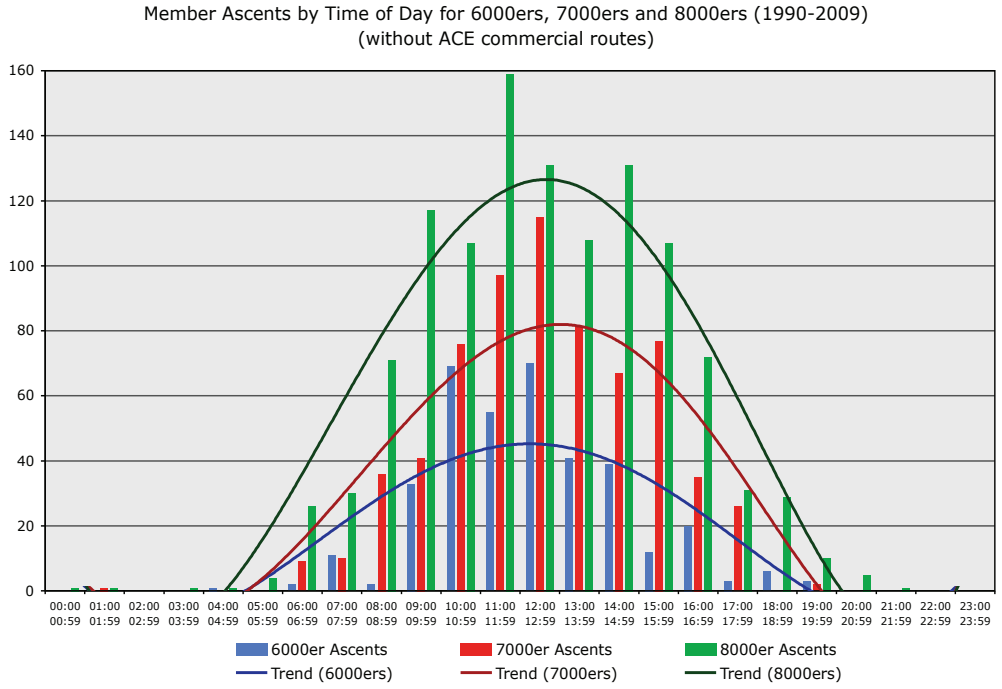


**Chart A-22: Member ascents by time of day for 6000ers, 7000ers, and 8000ers without ACE commercial routes from 1990-2009**

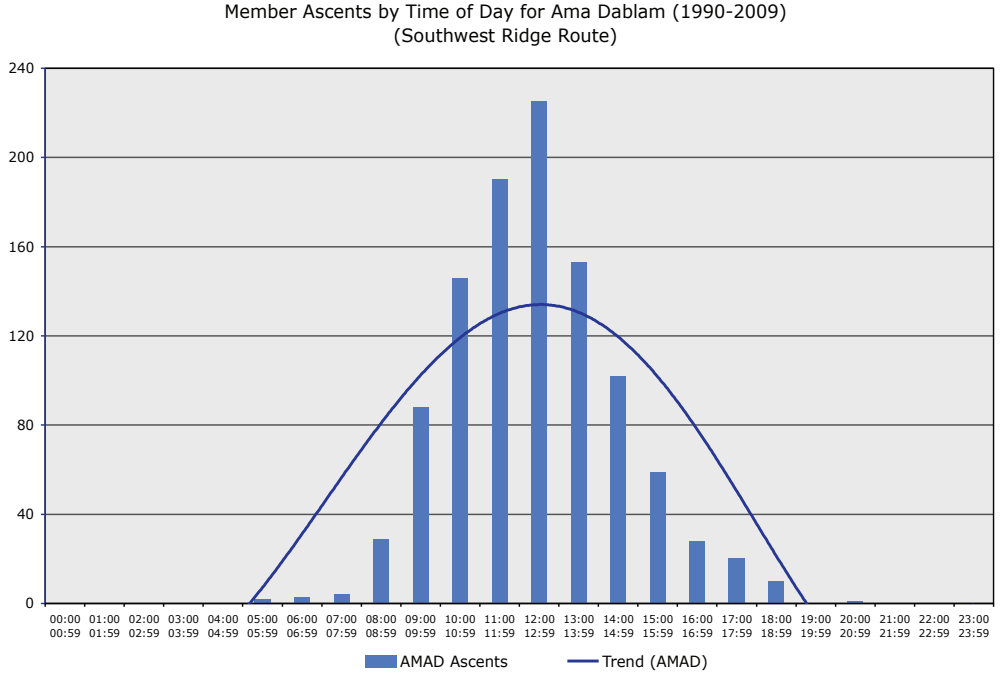


**Chart A-23a: Member ascents by time of day for Ama Dablam Southwest Ridge route from 1990-2009**

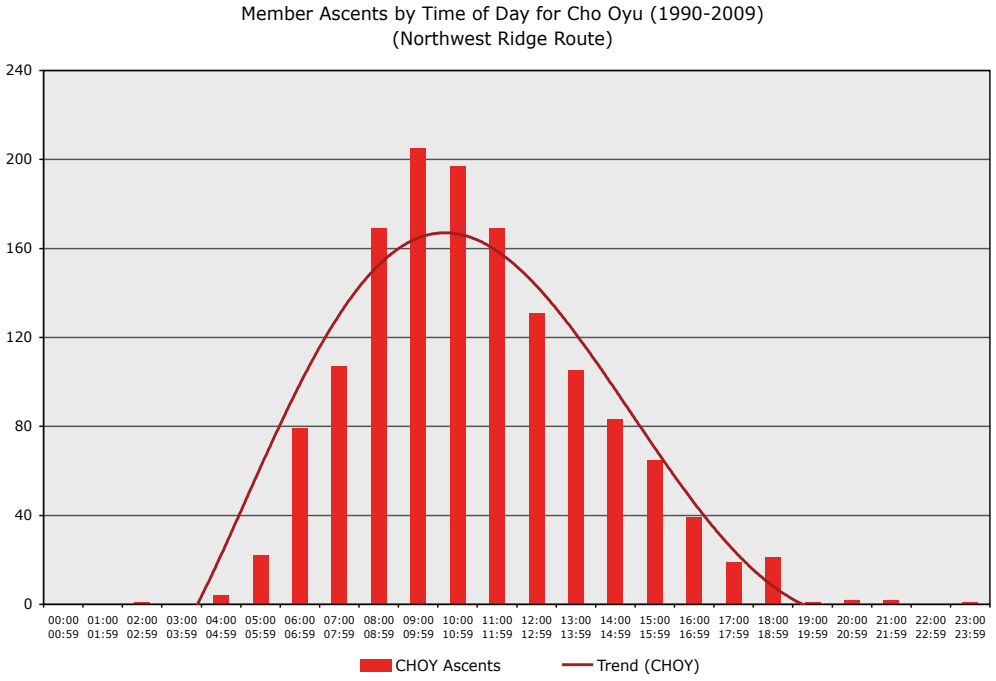


**Chart A-23b Member ascents by time of day for Cho Oyu Northwest Ridge route from 1990-2009**

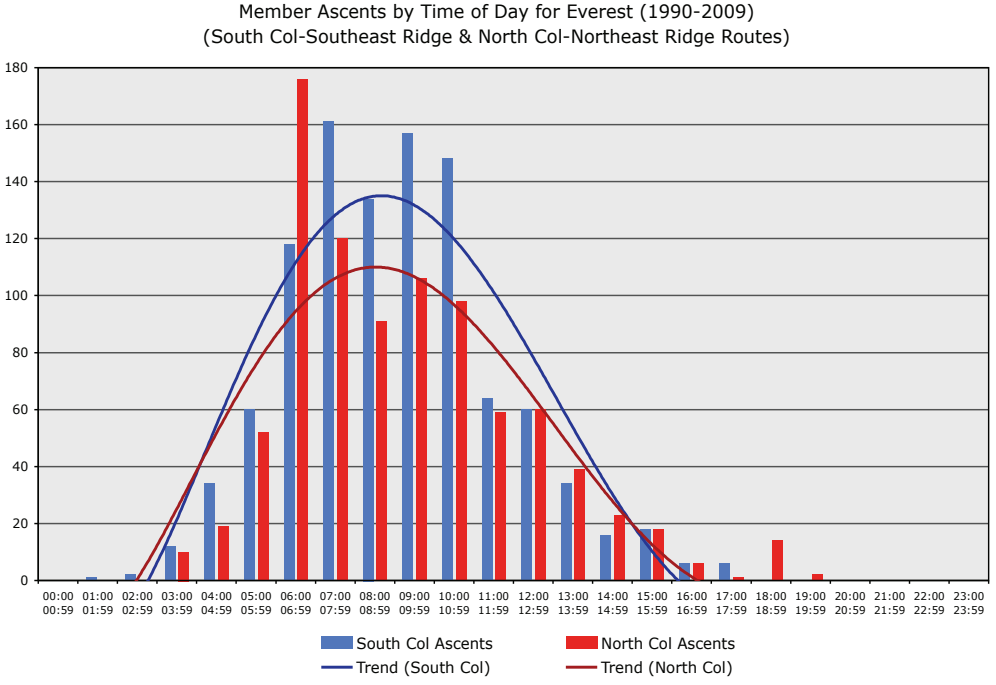


**Chart A-23c: Member ascents by time of day for Everest for South Col-Southeast Ridge & North Col-Northeast Ridge routes from 1990-2009**

**Winter Perserverence on Everest**

From *The Seasonal Stories* of Elizabeth Hawley – Winter 1991-92, 1993-94

The winter of 1991-92 saw three teams on Everest, two South Korean and one Japanese, who struggled against terrible winter winds at very high altitudes via three different routes, and were never able to climb all the way to its summit.

The 16 Japanese climbers who were on Everest with 25 Nepalese Sherpas to help them, led by the Himalayan climbing veteran Kuniaki Yagihara, had set as their goal the first winter ascent of their mountain's formidable, exposed southwest face. This vast wall rises approximately 2400m from its foot in the high valley known as the Western Cwm, and it has been successfully scaled only three times, by British, Nepalese, Soviet and Czechoslovak climbers from 1975 to 1988, all in milder spring and autumn weather.

"Before the expedition, I had three fears: the cold, the wind and falling stones, but only the wind was a big problem: not so much cold, not so much stonefall," said Yagihara on return to Kathmandu after his team had spent three long months on the mountain. Although the low temperatures and falling stones did cause some slight injury – three members and a Sherpa suffered mild frostbite, and one member received a three-centimeter (slightly more than one-inch) cut on his cheek from a stone – it was the wind that defeated them. How strong was this force that halted four summit-attack parties at altitudes of about 8350m? The answer of the deputy leader, Yoshio Ogata, was not expressed in words but by a sound imitating the whoosh of a jet engine in full blast.

When Ogata and teammate, Fumiaki Goto, made their expedition's first attempt to set up a tent for the fifth high-altitude camp at 8350m on 21 December, the wind broke their tent poles, forcing them to descend without having established the camp. They had managed to climb a small distance above the campsite to what turned out to be the team's highest point, 8370m, before retreating.

Camp 5 was at last pitched on 8 January, slept in that night and again on the 15th, and reached for the last time on 29 January by two out of five members who had set out from camp 4 that day. Each time the climbers were confronted by devastating winds forcing their retreat. A total of seven tents, including two down at base camp, were torn apart. Although the expedition had taken 14 tons of cargo to base, they were beginning to run out of tents, and, more seriously, the Sherpas were becoming sufficiently demoralized by the constant battering by the gales that they were unwilling to carry more supplies of oxygen up to camp 5 for still another summit attack, which the Japanese wanted to mount when the winds seemed to diminish on 9 February.

So instead of trying one last time for camp 5 and the summit, the expedition decided on 9 February to abandon their effort. They had been climbing since 16 November, when they began making their route immediately above base camp through the Khumbu Icefall, where seracs were frequently falling and four Sherpas had to be permanently assigned to the task of repairing the route every day. Will Yagihara and Ogata try again? "I cannot say," was the reply each man gave in Kathmandu.

But the Japanese did return in the winter 1993-94 with a highly organized, well-financed, and abundantly equipped team with experienced leadership and 28 climbing Sherpas to help the seven Japanese climbing members reach the top of the world via one of its most difficult climbing routes, the vast southwest face, despite bitterly cold winter winds, and in the unusually short climbing period of only three weeks. The Japanese leadership were three Himalayan veterans: Kuniaki Yagihara, plus deputy leader Yoshio Ogata and climbing leader Hideji Nazuka. They carefully planned their effort, which actually began last autumn with the ascent by all seven Everest climbing members, plus Yagihara, five more compatriots and five of their Sherpas, of nearby Cho Oyu, which is very high but not

very difficult by its normal route. Their successful climb of this mountain gave them good acclimatization to high altitudes; their use of artificial oxygen when they went to its summit minimized the likelihood of frostbite. They then spent three weeks resting in Kathmandu and southern lowland Nepal before returning to the high mountains.

When the Everest climbers arrived at base camp on 21 November, two of their Cho Oyu teammates had already established the camp and supervised the arrival of their 13 tons of food, tents and clothing for 50 people (seven Japanese climbers, leader and doctor at base camp, 28 high-altitude Sherpas, two head Sherpas and three Sherpa cooks at base and advance base, five kitchen helpers at base and three mail runners from and to base), plus all their equipment including a special light platform for their highest camp, 6000m of rope for fixing the route in the treacherous Khumbu Icefall and up much of the face, and 96 bottles of oxygen (65 were actually used).

Everest climbs usually take about six weeks. All seven of these Japanese climbers and their leader had experienced two grueling months of struggle in the winter of 1991-92 in their first attempt to scale the face. They were driven back then by fierce winds, and by the end of the two months, their Sherpas were no longer willing to continue the exertion to carry supplies to the highest camps. Now, this second time, the Japanese knew the route, which was the same line taken in the autumn of 1975 in the first successful ascent of the face by the British expedition led by Chris Bonington, and the one attempted by the Japanese themselves two years ago. They knew its problems, including what they needed to make a proper last camp at 8350m from which to make their final summit assault.

The Nepalese government's mountaineering regulations fix 1 December as the first day of the winter season. In the last half of November, the expedition's Sherpas made the route through the Khumbu Icefall with 50 ladders and 2000m of fixed rope, and carried supply loads to the top of it, the site of the first camp above base. At the same time the Japanese climbers made a quick climb of a small peak in the Everest region, Pokalde (5806m), which they all summited, and then they got down to their siege of Everest itself, well-acclimatized, fit and in good climbing condition. On 1 December, seven re-acclimatized members and a number of Sherpas moved up through the Icefall, and by that afternoon six of the Japanese were established in camp 2. Their epic climb had begun.

Winter is not usually a period of much snowfall, and for the Japanese there was only one day when new snow fell all day long. However on the face there was falling rock, which was blown loose from the mountain by the strong winds, and several climbers' headlamps and goggles were damaged, but no one was hurt. The problems were the wind and the cold. At base camp the temperature was minus 16 degrees Celsius; at 5:00 a.m. one day at the highest camp, camp 4 at 8350m, it was minus 36, and at the summit it probably was minus 45. The winds were especially fierce above the south summit – so fierce that the air was full of swirling snow blown off the mountain, making it impossible for the summiters to see Makalu not far away to the east.

Three pairs of Japanese reached the summit of Everest. "In winter the face is very easy to climb," says Ogata, "after route-making is finished." Between camp 2 at 6500m near the bottom of the face and the south summit (8750m), they had fixed their route with 3635m of rope. On the final difficult part of the entire climb, the Hillary Step on the southeast ridge, which they joined at the south summit, they had no need to fix any rope, for plenty had been left there by expeditions in previous seasons.

The successful summiters on the 18th, 20th and 22nd of December were Hideji Nazuka and Fumiaki Goto, Osamu Tanabe and Shinsuki Ezuka, Yoshio Ogata and Ryushi Hoshino. (The seventh climbing member had developed chest pains on reaching camp 4 on the 13th and was forced to abandon the climb.) With the use of bottled oxygen while sleeping and climbing at and above their two highest camps, the Japanese suffered no really serious damage from frostbite, although one member's fingers did get somewhat frostbitten. "We

could not climb Everest in winter without oxygen and not lose all our fingers and toes," Yagihara said.

His team had achieved the first Japanese ascent of the face as well as its first ascent in wintertime by anyone. Yagihara and Ogata attributed their success to four factors: they had made a proper, complete camp 4 at 8350m; they were in good health and were well-acclimatized from their Cho Oyu and Pokalde climbs; they knew the route from their 1991-92 attempt; and they were under considerable psychological pressure to succeed this time. "Now I can go back to Japan," said Yagihara, stressing the word "now," following their success. Clearly another important factor was generous financing.

### Ascents by Age Groups

Table and Chart A-24 show member ascent counts and rates by age groups in 5-year intervals. The table is divided into three sections: all peaks and routes from 1950 to 1989, and all peaks and routes from 1990 to 2009 including only and excluding the commercial routes on Ama Dablam, Cho Oyu, and Everest.

| Age Groups | 1950-1989 All Peaks with All Routes | | | 1990-2009 Ama Dablam-Cho Oyu-Everest Commercial Routes Only | | | 1990-2009 All Peaks and Routes excluding Ama Dablam-Cho Oyu-Everest Commercial Rtes | | |
|---|---|---|---|---|---|---|---|---|---|
| | Above BC | Ascent Cnt | Ascent Rate | Above BC | Ascent Cnt | Ascent Rate | Above BC | Ascent Cnt | Ascent Rate |
| Unknown | 1066 | 147 | 13.8 | 134 | 50 | 37.3 | 284 | 50 | 17.6 |
| 10-14 | 1 | 0 | 0.0 | 4 | 0 | 0.0 | 1 | 0 | 0.0 |
| 15-19 | 48 | 10 | 20.8 | 70 | 36 | 51.4 | 49 | 25 | 51.0 |
| 20-24 | 1288 | 271 | 21.0 | 614 | 284 | 46.3 | 705 | 174 | 24.7 |
| 25-29 | 3512 | 822 | 23.4 | 1799 | 809 | 45.0 | 1923 | 505 | 26.3 |
| 30-34 | 3016 | 662 | 22.0 | 2692 | 1244 | 46.2 | 2415 | 605 | 25.1 |
| 35-39 | 1932 | 386 | 20.0 | 2773 | 1275 | 46.0 | 2230 | 597 | 26.8 |
| 40-44 | 1105 | 207 | 18.7 | 2332 | 1016 | 43.6 | 1769 | 474 | 26.8 |
| 45-49 | 497 | 90 | 18.1 | 1653 | 656 | 39.7 | 1229 | 322 | 26.2 |
| 50-54 | 240 | 25 | 10.4 | 1066 | 381 | 35.7 | 728 | 187 | 25.7 |
| 55-59 | 95 | 8 | 8.4 | 570 | 183 | 32.1 | 448 | 101 | 22.5 |
| 60-64 | 35 | 2 | 5.7 | 295 | 101 | 34.2 | 228 | 44 | 19.3 |
| 65-69 | 13 | 0 | 0.0 | 95 | 29 | 30.5 | 91 | 27 | 29.7 |
| 70-74 | 3 | 0 | 0.0 | 38 | 10 | 26.3 | 28 | 10 | 35.7 |
| 75-79 | 2 | 1 | 50.0 | 6 | 2 | 33.3 | 4 | 2 | 50.0 |

**Table A-24: Member ascents by age groups**

Chart A-24 shows the difference between the 1950-1989 and 1990-2009 periods and the effects of commercial climbing when considering a climber's age.

During the 1950-1989 period (before commercial climbing), the optimal age for summiting was in the late 20s to early 30s as shown by the **blue** trend line in the chart. Above that age, the member ascent rate shows a slow steady decline as age increases into the 40s followed by a more rapid decline into the 50s and 60s. After age 65, no ascents were made.

During the 1990-2009 period for the ACE commercial routes (the **red** trend line), the optimal age shifts upward to the middle to late 30s with a slower decline as climbers age beyond 40. Also ascents were made by climbers in their late 60s and early 70s as shown by the red columns. There is also a very high ascent rate for very young climbers under age 20, but this is based on a relatively small sample size.

# Death Analysis

This chapter analyzes deaths on the principle peaks in the Nepal Himalaya, those peaks officially open for mountaineering and a few additional peaks with significant activity. Border peaks such as Everest, Cho Oyu, and Kangchenjunga are included for expeditions from the Nepalese, Chinese, and Indian sides of the border. The tables and charts cover the period from 1950 through 2009 unless specified otherwise.

Deaths for members and hired personnel are analyzed by several different categories: peak altitude, geographical region, climbing season, causes of death, time of day, age, historically over time, citizenship, and gender. Death rates are given for the most popular peaks. Deaths are also analyzed by team composition, that is, the number of members and hired personnel on an expedition and the ratio between the two. Particular attention is given to avalanches, falls, and physiological factors, the leading causes of death in the Himalaya.

## Deaths by Peak Altitude Ranges

Table D-1 shows death counts and rates for members and hired personnel for all peaks from 6000m to 8850m pooled in 500m increments from 1950 to 1989 and 1990 to 2009.

| Peak Altitude Range | Members | | | Hired | | |
|---|---|---|---|---|---|---|
| 1950-1989 | Above BC | Death Cnt | Death Rate | Above BC | Death Cnt | Death Rate |
| 6000-6499m | 573 | 5 | 0.87 | 223 | 0 | 0.00 |
| 6500-6999m | 1607 | 17 | 1.06 | 586 | 4 | 0.68 |
| 7000-7499m | 2429 | 66 | 2.72 | 883 | 14 | 1.59 |
| 7500-7999m | 1804 | 60 | 3.33 | 865 | 18 | 2.08 |
| 8000-8499m | 3052 | 104 | 3.41 | 1441 | 40 | 2.78 |
| 8500-8850m | 3388 | 75 | 2.21 | 2719 | 48 | 1.77 |
| Totals | 12853 | 327 | 2.54 | 6717 | 124 | 1.85 |
| 1990-2009 | | | | | | |
| 6000-6499m | 690 | 0 | 0.00 | 214 | 0 | 0.00 |
| 6500-6999m | 4469 | 24 | 0.54 | 1162 | 17 | 1.46 |
| 7000-7499m | 3654 | 34 | 0.93 | 934 | 18 | 1.93 |
| 7500-7999m | 789 | 11 | 1.39 | 241 | 1 | 0.42 |
| 8000-8499m | 8854 | 107 | 1.21 | 2711 | 31 | 1.14 |
| 8500-8850m | 7817 | 105 | 1.34 | 5738 | 33 | 0.58 |
| Totals | 26273 | 281 | 1.07 | 11000 | 100 | 0.91 |

**Table D-1: Member and hired deaths for peak altitude ranges (6000-8850m) from 1950-1989 and 1990-2009**

This table includes the effect of the catastrophic accident on Kang Guru (6981m) in 2005 that claimed the lives of 7 members and 11 hired (65% of the hired death count in the 6500-6999m range for the 1990-2009 period), which greatly affects hired death rates as illustrated in the charts that follow (see the inset box, *Worst Disaster in Nepalese Himalaya Wipes Out French Team*, on pg. 128).

Chart D-1a shows member and hired death rates from 1950 to 1989. The member death rates topped out in the 7500-7999m range at 3.33% and in the 8000-8499m range at 3.41% and then declined at the highest altitudes, whereas the hired death rates topped out at 2.78% in the 8000-8499m range, suggesting that the 8000-8499m peaks were the deadliest for both members and hired personnel during this period. Hired personnel also fared better than members in all altitude ranges.

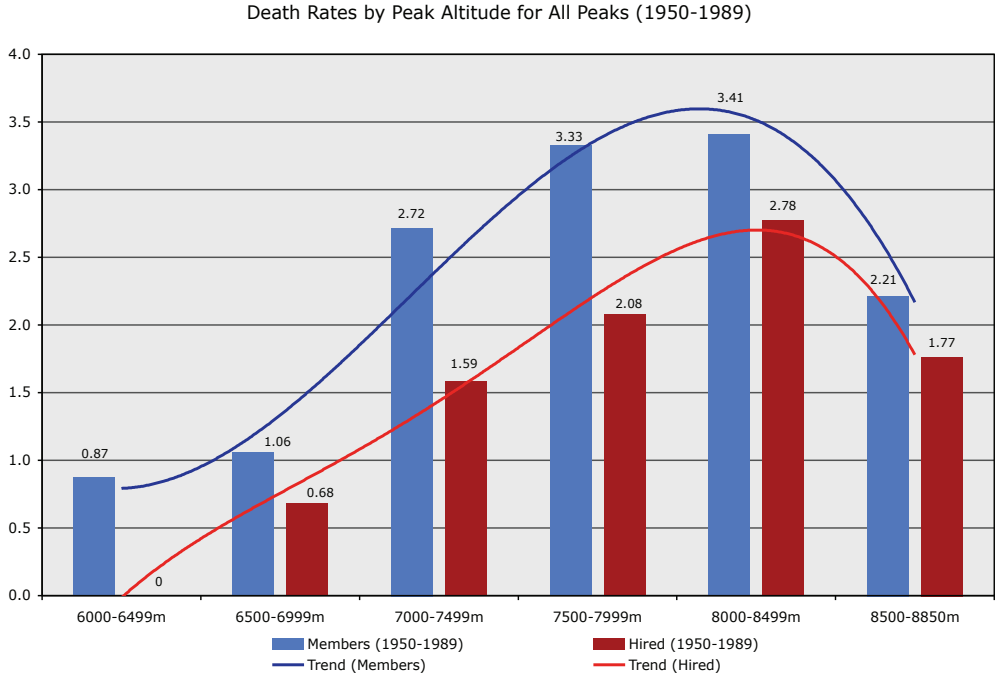


**Chart D-1a: Member and hired death rates for all peaks from 1950-1989**

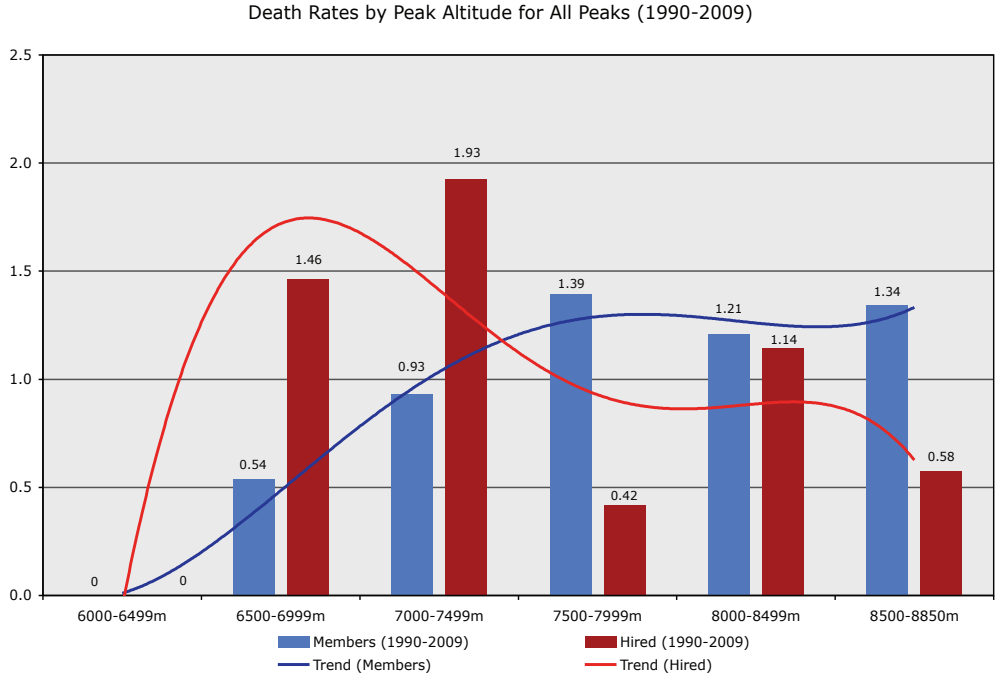


**Chart D-1b: Member and hired death rates for all peaks from 1990-2009**

The death rates in the above and subsequent charts in this chapter represent the percentage of climbers that died for each category in the chart.

Chart D-1b shows member and hired death rates from 1990 to 2009, showing the death rates when the 2005 Kang Guru accident is included. Death rates for members have decreased in all groups when compared to the 1950-1989 period. Death rates for hired generally have decreased from those of the 1950-1989 period except in the 6500-6999m range and in the 7000-7499m range. But in the 7500-7999m range, the hired death rate has dropped to 0.42% most likely due to the fewer hired personnel used above base camp for ferrying loads through the dangerous avalanche zones by more recent expeditions attempting the 7000ers in alpine style.

The early 1990s coincide with the increase in popularity of commercial climbing, which has contributed significantly to the numbers of climbers going above base camp (almost 54% of all climbers above base camp were on the commercial routes of one of these three peaks after 1990).

| | Members | | | Hired | | |
|---|---|---|---|---|---|---|
| **1990-2009** | **Above BC** | **Death Cnt** | **Death Rate** | **Above BC** | **Death Cnt** | **Death Rate** |
| 6000-6499m | 690 | 0 | 0.00 | 214 | 0 | 0.00 |
| 6500-6999m w/o KGUR & AMAD Com Rte | 1083 | 7 | 0.65 | 294 | 2 | 0.68 |
| 7000-7499m | 3654 | 34 | 0.93 | 934 | 18 | 1.93 |
| 7500-7999m | 789 | 11 | 1.39 | 241 | 1 | 0.42 |
| 8000-8499m w/o Cho Oyu Com Rte | 3834 | 81 | 2.11 | 1207 | 28 | 2.32 |
| 8500-8850m w/o Everest Com Rtes | 2075 | 33 | 1.59 | 1160 | 8 | 0.69 |
| **Totals w/o ACE Commercial Routes** | **12132** | **173** | **1.43** | **4061** | **68** | **1.67** |
| | | | | | | |
| 2005 Kang Guru Accident | 7 | 7 | 1.00 | 11 | 11 | 1.00 |
| | | | | | | |
| Ama Dablam Commercial Route | 3379 | 10 | 0.30 | 857 | 4 | 0.47 |
| Cho Oyu Commercial Route | 5020 | 26 | 0.52 | 1504 | 3 | 0.20 |
| Everest Commercial Routes | 5742 | 72 | 1.25 | 4578 | 25 | 0.55 |
| **ACE Commercial Route Totals** | **14141** | **108** | **0.82** | **6939** | **32** | **0.46** |

**Table D-2: Deaths for peak altitude ranges (6000-8850m) from 1990-2009 excluding the 2005 Kang Guru accident and for the Ama Dablam, Cho Oyu, and Everest commercial routes**

When the 2005 Kang Guru accident and the commercial routes for Ama Dablam, Cho Oyu, and Everest are excluded in the 1990-2009 period, a different picture emerges as shown in Table and Chart D-2.

Comparing Charts D-1b and D-2, one can see that the 8000m+ death rates are higher when the Cho Oyu and Everest commercial routes are removed and more closely resemble what one would expect for non-commercial Himalayan climbing.

In Chart D-2 the death rate continues to climb into the 8000m-8499m range topping out at 2.11% for members and 2.32% for hired, then declines for the very highest peaks.

The three most dangerous peaks, Annapurna I, Manaslu, and Dhaulagiri I (see Table D-3) are in the 8000m-8499m range and their death rates are strongly affected by avalanches (see the later section *Avalanche Deaths* in this chapter).

The death rates for Ama Dablam, Cho Oyu, and Everest are lower than the other peaks in their respective altitude ranges suggesting that they are relatively safer. But this appearance of safety may be due to the fact that the vast majority of the climbers are on the easiest and safest routes with extensive fixed ropes and in many cases under the direct supervision of experienced commercial guides or Sherpa and Tibetan assistants.

During the 1950-1989 period before commercial climbing become common and when other more challenging routes were being attempted in higher proportions, the death rates on Ama Dablam, Cho Oyu, and Everest were much higher.

**Worst Disaster in Nepalese Himalaya Wipes Out French Team**

From *The Seasonal Stories* of Elizabeth Hawley – Autumn 2005

The worst disaster ever to befall an expedition in the Nepalese Himalaya struck a seven-member French team on Mt. Kang Guru. The only previous death on the mountain was that of a West German named Bernd Arenz, who died in a fall on 24 October 1985. Now twenty years later almost to the day, on 20 October, all the French, led by Daniel Stolzenberg and including his wife, and 11 of their Nepalese employees who were in their base camp tents after the members' late afternoon tea, when they were swept by avalanching into a deep gorge below.

All 18 people perished. Several other porters were outside their tents and managed to survive and to trek to the nearest village, Meta, where they met a French-Israeli expedition planning to climb another mountain in the area, Ratna Chuli. This team immediately informed the French embassy in Kathmandu of the disaster.

Early rescue attempts to retrieve the climbers' bodies were mostly ineffective. One, that of Bruno Chardin, a ski resort manager, was found before they suspended their search because of continued avalanching. In the meantime French specialists in post-avalanche searches with special equipment and two sniffer dogs arrived from France. By mid-November, when they too called off their work until early next year, the bodies of another member, Jean-Francois Jube, an advisor to the French Ministry of Youth and Sports, and a low-altitude porter, Mani Lal Gurung, had been discovered.

The previous record death toll on a single expedition in Nepal had been set by a South Korean team on Manaslu. In April 1972 15 men—10 Nepalese, four Koreans and one Japanese cameraman—were killed when a big avalanche struck their tents at 3:15 a.m. But most of the Koreans were inexperienced in the Nepalese Himalaya, whereas at least two of the Frenchmen had been to Nepalese or Pakistani 8000m mountains, and all of them lived in mountainous parts of France. Stolzenberg, for example, who came from Chamonix, was a professional guide and had been a professor at the prestigious ENSA (National School of Skiing and Alpinism). And they had an experienced sirdar (leader of the Nepalese staff) named Iman Gurung, who had summited Everest twice, most recently in May this year, as well as Cho Oyu twice.

It is easy to be wise after the event, and some people questioned the wisdom of the base camp's location. It was surrounded by 35-40 degree slopes. One porter reportedly suggested that the camp be moved to what he considered a safer location downhill, but his proposal was not acted upon.

A noted French climbing instructor, Jean Coudray, who came to Kathmandu after he had discussed this subject with previous Kang Guru leaders, noted that the team had placed their base camp at the normal site. "In this area, there is no place for base camp that is completely safe; there is no safer site for it" than the one everyone has used. In any case, "the cost of mountaineering is a little risk."

Furthermore, he pointed out, there was continuous heavy snowfall for many hours. The resulting avalanching was made of powder snow, the worst kind of avalanche because it travels down a slope of 30 degrees or more very fast—200 or more kilometers per hour—and its "target" is impossible to predict: it can shift direction often. In this case, the avalanching happened to target base camp.

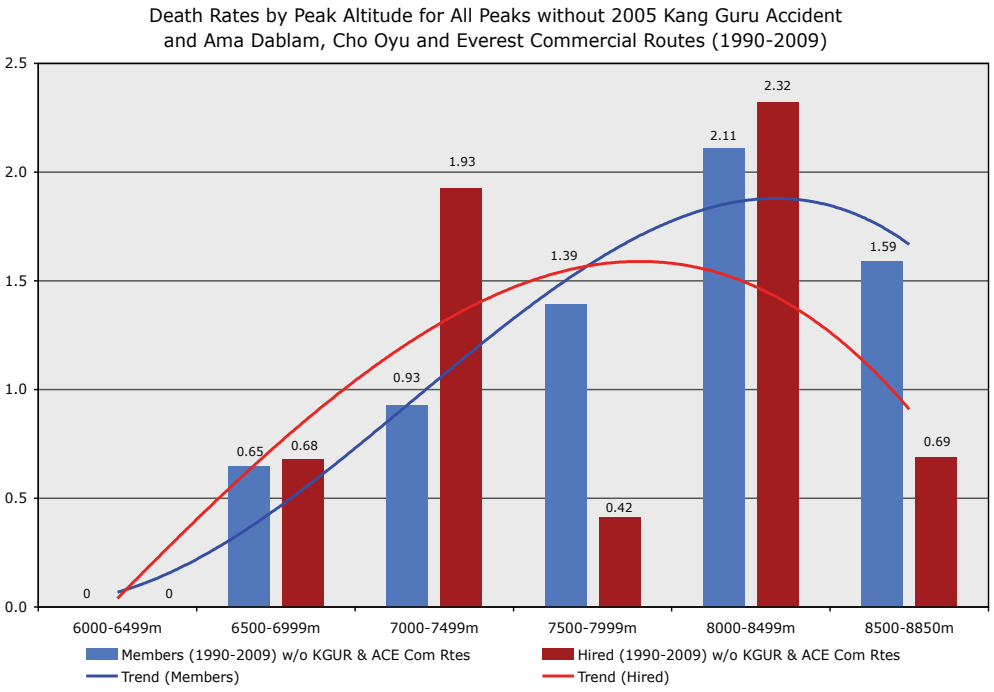


**Chart D-2: Member and hired death rates for all peaks from 1990-2009 excluding the 2005 Kang Guru accident and the Ama Dablam, Cho Oyu, and Everest commercial routes**

## Deaths on Popular Peaks

Table and Chart D-3 give the death rates for the most popular peaks in Nepal, those peaks with more than 750 members above base camp (roughly equivalent to 75 or more expeditions).

| | Exped Cnt | Members | | | Hired | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Above BC | Death Cnt | Death Rate | Above BC | Death Cnt | Death Rate | Above BC | Death Cnt | Death Rate |
| BARU (7152m) | 198 | 1137 | 4 | 0.35 | 352 | 6 | 1.70 | 1489 | 10 | 0.67 |
| AMAD (6814m) | 742 | 3963 | 17 | 0.43 | 963 | 4 | 0.42 | 4926 | 21 | 0.43 |
| All 6000ers | 1395 | 7339 | 46 | 0.63 | 2185 | 21 | 0.96 | 9524 | 67 | 0.70 |
| CHOY (8188m) | 1019 | 5638 | 36 | 0.64 | 1716 | 9 | 0.52 | 7354 | 45 | 0.61 |
| LHOT (8516m) | 192 | 1071 | 11 | 1.03 | 668 | 1 | 0.15 | 1739 | 12 | 0.69 |
| EVER (8850m) | 1274 | 9131 | 139 | 1.52 | 7303 | 71 | 0.97 | 16434 | 210 | 1.28 |
| All Peaks | 6358 | 39126 | 608 | 1.55 | 17717 | 224 | 1.26 | 56843 | 832 | 1.46 |
| MAKA (8485m) | 223 | 1411 | 23 | 1.63 | 589 | 14 | 2.38 | 2000 | 37 | 1.85 |
| All 8000ers | 3627 | 23111 | 391 | 1.69 | 12609 | 152 | 1.21 | 35720 | 543 | 1.52 |
| All 7000ers | 1336 | 8676 | 171 | 1.97 | 2923 | 51 | 1.74 | 11599 | 222 | 1.91 |
| PUMO (7165m) | 226 | 1296 | 32 | 2.47 | 278 | 9 | 3.24 | 1574 | 41 | 2.60 |
| MANA (8163m) | 275 | 1624 | 45 | 2.77 | 684 | 14 | 2.05 | 2308 | 59 | 2.56 |
| DHA1 (8167m) | 288 | 1698 | 50 | 2.94 | 574 | 15 | 2.61 | 2272 | 65 | 2.86 |
| KANG (8586m) | 108 | 833 | 25 | 3.00 | 388 | 7 | 1.80 | 1221 | 32 | 2.62 |
| ANN1 (8091m) | 169 | 1111 | 45 | 4.05 | 413 | 17 | 4.12 | 1524 | 62 | 4.07 |

**Table D-3: Deaths for peaks with more than 750 members above base camp from 1950-2009 ordered by increasing member death rate**

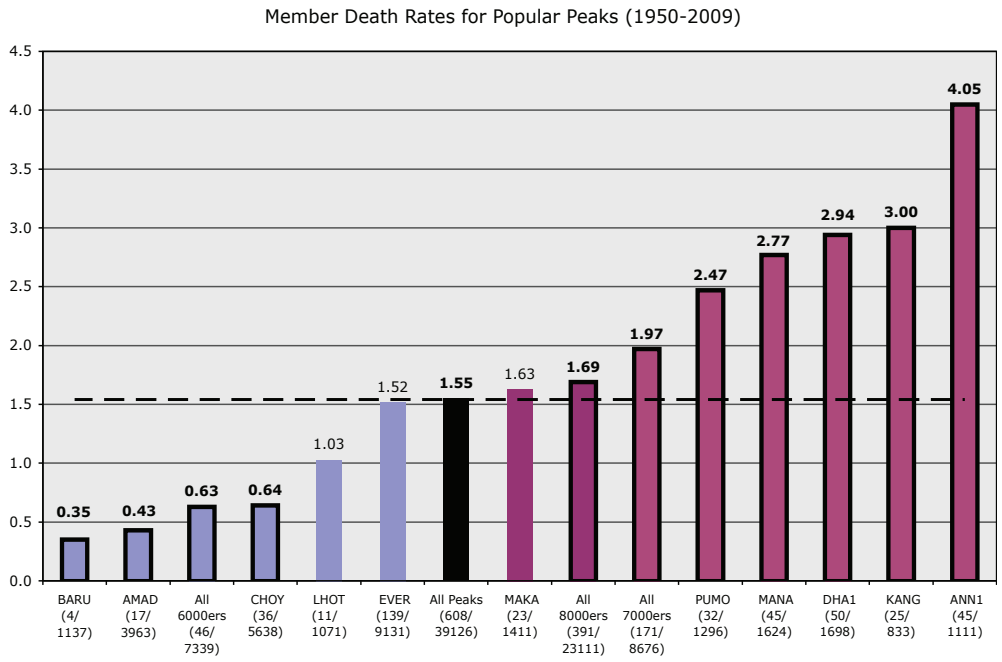


**Chart D-3: Member death rates for popular peaks from 1950-2009**
**with more than 750 members above base camp**
**(the death rate is above the column bar; the death and above BC counts are below)**
**(see Appendix A for the definitions of the peak symbols in this and subsequent charts)**

The columns outlined in black in the above chart and in the six charts that follow for the deadliest 6000ers, 7000ers, and 8000ers for members and hired represent peaks or groups of peaks that statistically have either significantly higher (in **red**) or lower (in **blue**) death rates than the mean death rate for all peaks (in black). Statistical significance means that there is less than a 5% probability that the result occurred by chance. For the non-outlined peaks, the death rates can be considered as only anecdotal evidence of higher or lower death rates than the mean rate for all peaks.

Ama Dablam and Cho Oyu are significantly safer for members than the mean (average) of 1.55% for all peaks (in black), whereas Everest is very close to the mean for all peaks (in part because it contributes so much to the overall rate). For two other peaks that often are climbed commercially, Baruntse is very safe at 0.35% whereas Pumori is much more dangerous at 2.47%.

### Deadliest Peaks for Members

The next group of charts shows member death rates for the deadliest peaks in Nepal, those peaks with member death rates above average and with some significant amount of climbing activity.

Chart D-4 shows the 6000m peaks with member death rates above average for peaks with 25 or more members above base camp. All of these peaks have death rates higher than the mean death rate of 0.63% for all 6000ers. But it should also be noted that many 6000m peaks only have one or two member deaths, which means that a single

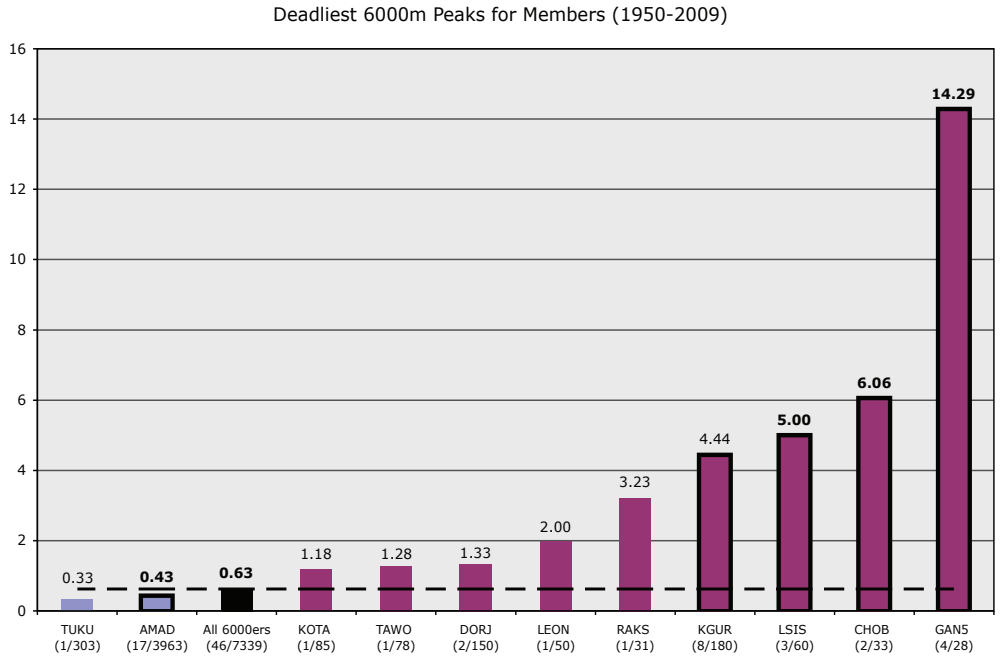


**Chart D-4: Member death rates for selected 6000m peaks with 25+ members above base camp from 1950-2009 (the death rate is above the column bar; the death and above BC counts are below)**

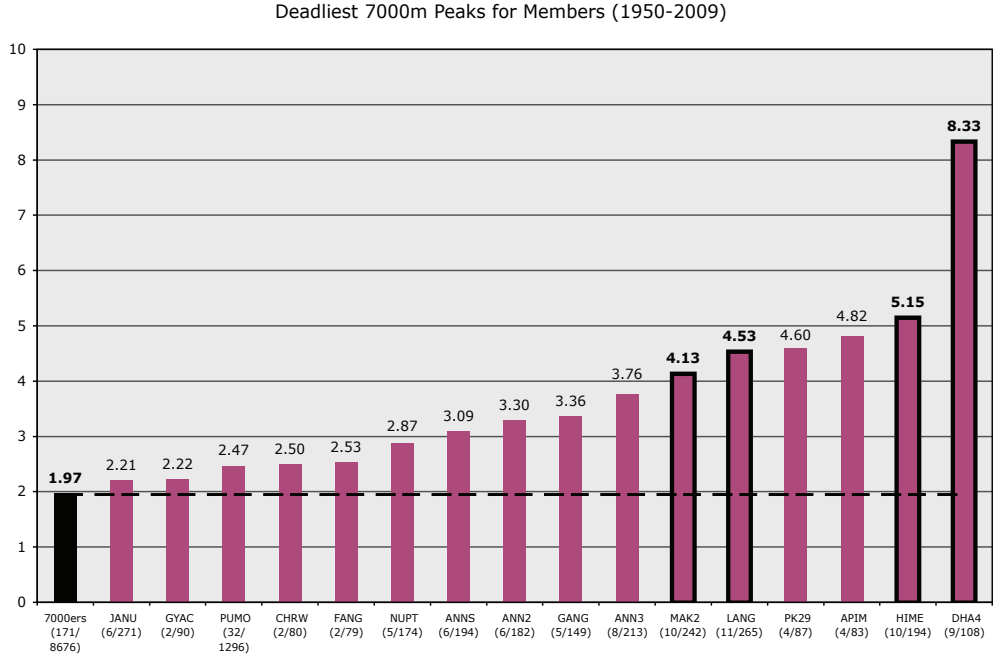


**Chart D-5: Member death rates for selected 7000m peaks with 75+ members above base camp from 1950-2009 (the death rate is above the column bar; the death and above BC counts are below)**

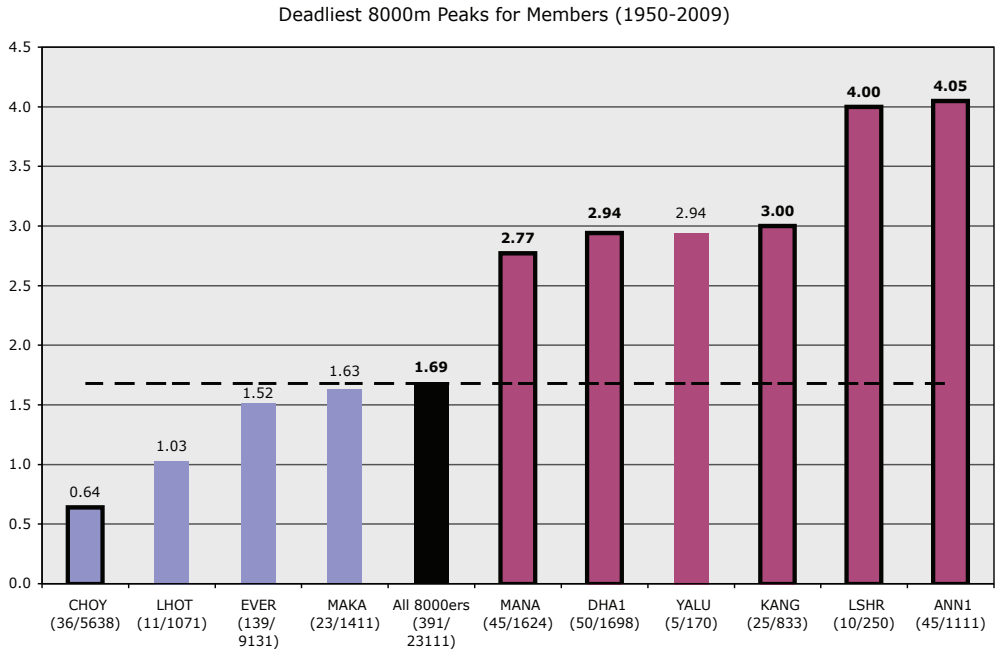


**Chart D-6a: Member death rates for 8000m peaks with 150+ members above base camp from 1950-2009 (the death rate is above the column bar; the death and above BC counts are below)**

accident can easily alter the results. Only Ama Dablam with 17 deaths, Kang Guru with 8 deaths (7 of which occurred in 2005), Ganesh V with 4 French deaths (all the result of one avalanche), and Langshisa Ri with three Japanese deaths (again the result of a single avalanche) have more fatalities; the two Austrian deaths on Chobuje also were the result of a single avalanche. Kang Guru, Langshisa Ri, Chobuje, and Ganesh V are the only peaks with statistically significantly higher death rates given the number of deaths and the numbers of climbers attempting the peak. Ama Dablam with the most deaths is still significantly safer than the mean for members on the other 6000m peaks.

Chart D-5 shows the 7000m peaks with member death rates above average for peaks with 75 or more members above base camp. All of these peaks have death rates equal to or higher than the mean death rate of 1.97% for all 7000ers.

Dhaulagiri IV (7661m) has the highest death rate for members with over four times the mean. Five of the nine member deaths on Dhaulagiri IV occurred in one accident when five Austrians and their Sherpa disappeared on a summit bid in 1969 along a heavily corniced ridge. The last walkie-talkie contact with the summit team was at 6 p.m. on 9 November, the night before their planned summit bid. But after 7 days of no further contact, the summit team was presumed lost and a helicopter search was requested. Bad weather delayed the search until 21 November. Their bodies were never found and were presumed lost in an avalanche or a fall from the ridge.

However, the deaths rates for each of the 7000ers are only statistically significant for Dhaulagiri IV, Himalchuli East, Langtang Lirung, and Makalu II. The death rates for

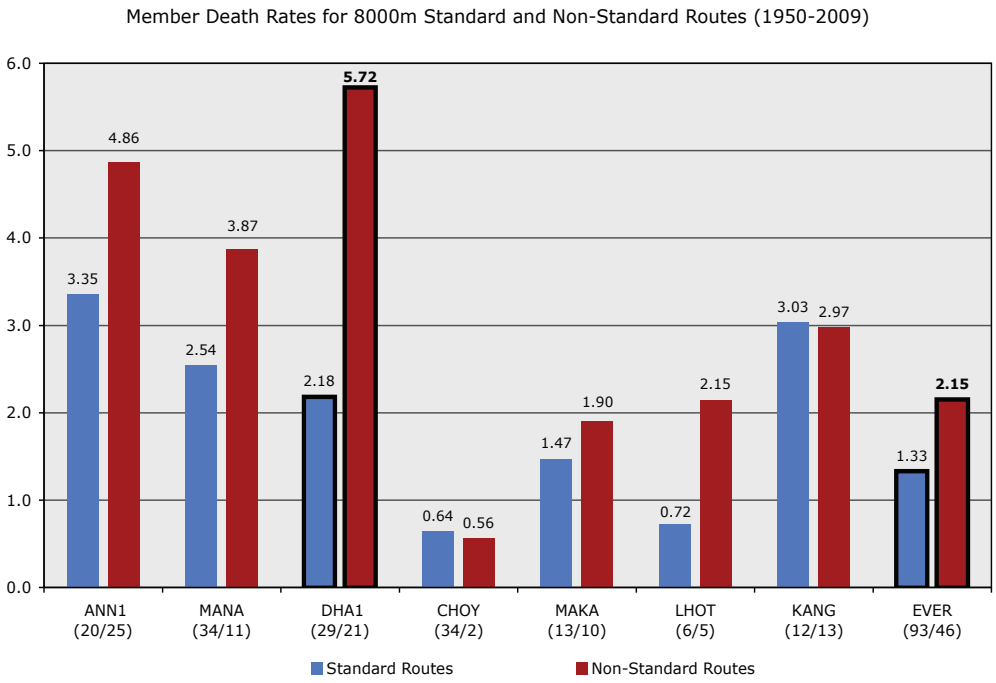


**Chart D-6b: Member death rates for 8000m standard and non-standard routes from 1950-2009 (the death rates are above the column bars; the death counts are below) (column pairs outlined in black indicate statistically significant differences in death rates between the standard and non-standard routes)**

| **8000m Standard Routes:** | | |
|---|---|---|
| ANN1 – N Face | CHOY – NW Ridge | KANG – W Face |
| MANA – NE Face | MAKA – Makalu La-NW Ridge | EVER – S Col-SE Ridge, |
| DHA1 – NE Ridge | LHOT – W Face | N Col-NE Ridge |

two other peaks, Pumori and Annapurna III, are close to the limits of being significant due to their higher above base camp counts.

Chart D-6a shows member death rates for the 8000m peaks with 150 or more members above base camp. The most deadly 8000m peaks are Annapurna I, Lhotse Shar, Manaslu, Kangchenjunga, and Dhaulagiri I, all with death rates significantly higher than the mean death rate of 1.69% for all 8000ers, and all are avalanche prone and technically demanding. Only Cho Oyu has a death rate significantly lower than the mean at 0.64%.

The death rates for Everest and Makalu, despite their high above base camp counts, are too close to the death rate for all 8000ers to be significantly lower than the mean. The above base camp count for Yalung Kang is too small to be significant.

Chart D-6b shows member death rates for the standard and non-standard routes on the eight major 8000m peaks in Nepal. The non-standard routes are significantly more dangerous only on Dhaulagiri I and Everest. For Dhaulagiri I, the north face and southeast ridge have had numerous member fatalities; for Everest the north and southwest faces have been the most dangerous.

**The Death of Dawa Wangchu on Cheo Himal**

From the Elizabeth Hawley notes of an interview with Alan Burgess - 6 Nov 1990

On the 29th of October Alan Burgess and Dawa Wangchu went on recce to see if it was feasible to climb the southeast ridge; they decided it was and then returned to C1. On the 30th the team set out for the ridge (and the summit if possible, but this was "a long shot"). Burgess, Mathew Golden, John Whiteley, Derek Nobles, and Dawa Wangchu left C1 at 4 a.m. Nobles turned back after an hour (trouble with his crampons and he was not entirely well) while the other four continued on. At 11 a.m. they were about 200 ft below the southeast ridge with Whiteley and Golden 300 ft behind Burgess and Dawa Wangchu. Dawa Wangchu was now leading and he put in an ice stake and Burgess climbed up to him and from there Dawa was to go on up and put in another ice stake that would be better anchored. Dawa anchored the rope and came down his fixed line and tied on another rope to the fixed rope but became disconnected from the fixed rope (probably the rope broke after he had untied a knot that Burgess had put there to tie off a flaw in the rope). Dawa fell 800 vertical feet (1000 ft in distance) but he was still alive after landing in deep snow at the bottom of a section of very dangerous ice cliffs. Burgess reached him in 30 minutes: he had massive head injuries (a fractured skull) and was bleeding from his skull profusely and coughing blood. Burgess stayed with him 3 hours, and finally got him standing. Dawa could see but could not speak. Burgess tried to pull him down a steep snow slope and got him down 60 ft, but then Dawa disconnected his harness and took off his gloves and turned away from Burgess and lay down signaling Burgess to go on alone. Regretfully Burgess left him. Now the ice and ice cliffs will soon take him all the way down (he probably would have died in next half hour).

## Deadliest Peaks for Hired Personnel

The next group of charts show death rates for hired personnel for the most dangerous peaks in Nepal, those peaks with death rates above average and with a significant number of hired personnel that went above base camp.

Chart D-7 shows the 6000m peaks with hired death rates above average for peaks with 10 or more hired above base camp. All of these peaks have death rates higher than the mean death rate of 0.96% for all 6000ers.

Only five peaks have hired death rates higher than the mean rate illustrating how relatively safe the 6000ers have been for hired personnel. Note from the Chart D-7, the five peaks with death rates higher than the mean had only a total of 16 deaths: one on Kantega, two on Leonpo Gang, one on Cheo Himal, one on Raksa Urai, and eleven on Kang Guru, indicating the low numbers of hired personnel used on the 6000m peaks (see Table D-1). Only on Kang Guru is the hired death rate statistically significant. Ama Dablam at 0.42% is significantly safer than the mean for hired personnel.

Chart D-8 shows the 7000m peaks with hired death rates above average for peaks with 25 or more hired above base camp. All of these peaks have death rates equal to or higher than the mean death rate of 1.74% for all 7000ers. Dhaulagiri IV and Gangapurna have been extremely dangerous for hired with deaths rates approaching five times the average. Only these two peaks have statistically significantly higher death rates than the mean death rate for all 7000ers.

## Altitudes of Death

Chart D-14 gives the death counts for altitudes of death for all climbers (members and hired personnel) for all peaks. Death counts are used instead of death rates in the charts below because it is not always known how high each climber went above base camp (*The Himalayan Database* more precisely tracks the altitudes of those who summited or reached the expedition high point).

Altitudes of death for avalanches and falls are added to Chart D-14. The **red** trend line for avalanche deaths mirrors the shape of the total death **blue** trend line illustrating the strong impact that avalanches have on overall deaths. The **red** columns top out at the intermediate altitudes (6500m-6900m) where the snow accumulations are the greatest, and then taper off more rapidly because avalanches are fewer where snow accumulations are less.

The **green** trend line for falls generally increases illustrating the danger of falling as one gets higher on the mountain and becomes more fatigued. The flattening out of the fall trend line is due in part to the fewer number of climbers reaching altitudes above 7500m (the majority of the peaks are lower than 7500m).

Chart D-15 give the altitudes of death for all climbers for the 8000ers. When considering only the 8000m peaks, the **green** trend line for falls continues to rise as altitude increases better illustrating the danger of falling at the very high altitudes.

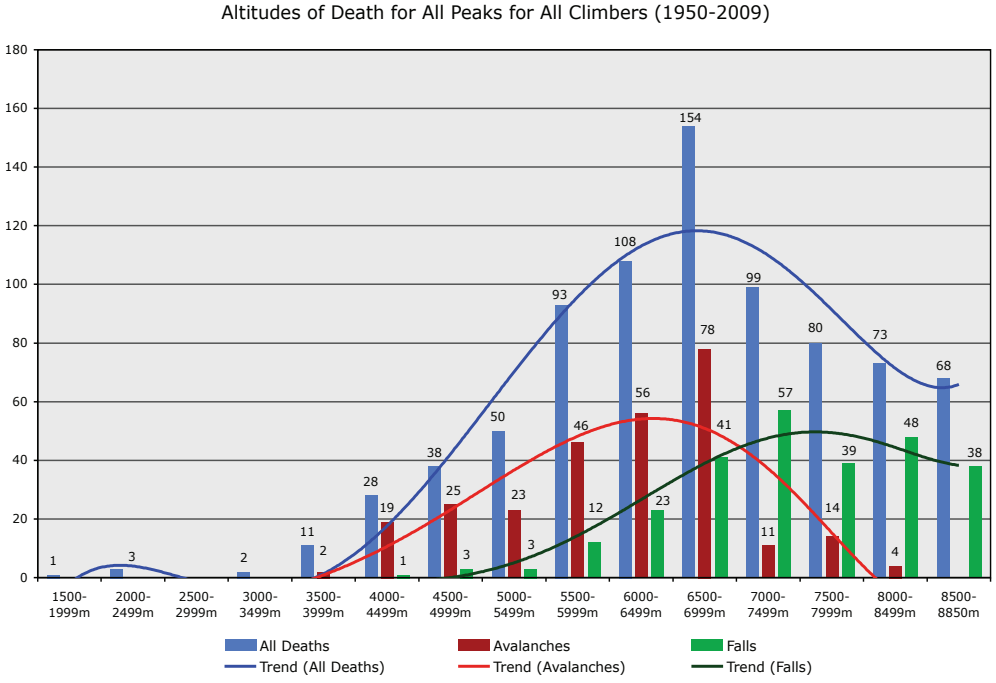


**Chart D-14: Altitudes of death for all peaks from 1950-2009**

The altitudes of death given in Charts D-14 and D-15 represent the altitude of the incident that led to the eventual death; for example, if a climber sustained fatal injuries from a fall at 7500m, but died later at base camp, the altitude of death would be recorded as 7500m.

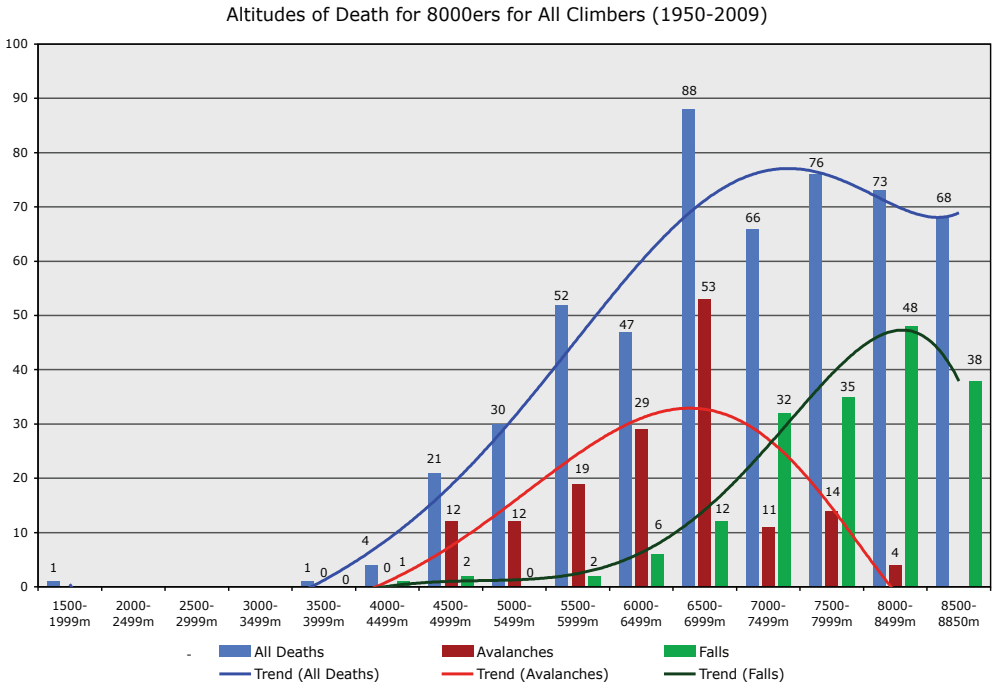


**Chart D-15: Altitudes of death for all 8000ers from 1950-2009**

## Causes of Death

Table D-16 gives the causes of death for members and hired personnel for all peaks from 6000m to 8850m. The last two rows of the table indicate the number of deaths where acute mountain sickness (AMS) or major storms were either the primary cause or a contributing factor. For example, the primary cause of death for Scott Fischer on Everest was exposure/frostbite with the contributing factors of AMS and the disastrous storm of May 1996.

For both members and hired personnel, the majority of the deaths are due to falls or avalanches. For members, falling was the leading cause of death (39.0%), whereas for hired avalanches were the leading cause (46.4%), most likely because hired spent much of their time and energy establishing and supplying camps located in avalanche-prone zones.

Somewhat surprisingly, AMS did not figure as prominently as might be expected. AMS may be a hidden factor that was not known or accurately reported; for example, AMS may well have caused a few falls during descents from summit bids of the 8000m peaks, even though it went unreported.

Table D-16 includes deaths that occurred on expedition approach or return marches or at base camp as a result of non-climbing events. These deaths often were the results of trail accidents, illnesses, heart attacks, etc. For example, two leaders of an autumn 1992 Makalu II expedition were killed in the PIA air crash while flying into Kathmandu to join their team (taking the concept of approach march to the extreme).

| Cause of Death | Members | | Hired | | Total | |
|---|---|---|---|---|---|---|
| | Cnt | Pct | Cnt | Pct | Cnt | Pct |
| AMS | 46 | 7.6 | 20 | 8.9 | 66 | 7.9 |
| Exhaustion | 18 | 3.0 | 2 | 0.9 | 20 | 2.4 |
| Exposure/Frostbite | 35 | 5.8 | 1 | 0.4 | 36 | 4.3 |
| **Fall** | **237** | **39.0** | 31 | 13.8 | 268 | 32.2 |
| Crevasse | 15 | 2.5 | 5 | 2.2 | 20 | 2.4 |
| Icefall Collapse | 2 | 0.3 | 15 | 6.7 | 17 | 2.0 |
| **Avalanche** | 175 | 28.8 | **104** | **46.4** | 279 | 33.5 |
| Falling Rock/Ice | 14 | 2.3 | 9 | 4.0 | 23 | 2.8 |
| Disappearance | 26 | 4.3 | 2 | 0.9 | 28 | 3.4 |
| Illness (non-AMS) | 26 | 4.3 | 15 | 6.7 | 41 | 4.9 |
| Other | 12 | 2.0 | 12 | 5.4 | 24 | 2.9 |
| Unknown | 2 | 0.3 | 8 | 3.6 | 10 | 1.2 |
| **Totals** | **608** | **100.0** | **224** | **100.0** | **832** | **100.0** |
| | | | | | | |
| AMS-related | 67 | 11.0 | 18 | 8.0 | 74 | 8.9 |
| Weather/Storm-related | 44 | 7.2 | 6 | 2.7 | 50 | 6.0 |

**Table D-16: Causes of death for all deaths for all peaks from 1950-2009**

| Death Classification for All Deaths | Members | | Hired | | Total | |
|---|---|---|---|---|---|---|
| | Cnt | Pct | Cnt | Pct | Cnt | Pct |
| Death enroute to/from BC | 19 | 3.1 | 35 | 15.6 | 54 | 6.5 |
| Death at BC | 21 | 3.5 | 33 | 14.7 | 54 | 6.5 |
| Route preparation | 270 | 44.4 | 122 | 54.5 | 392 | 47.1 |
| Ascending in Smt Bid | 72 | 11.8 | 6 | 2.7 | 78 | 9.4 |
| Descending from Smt Bid | 194 | 31.9 | 22 | 9.8 | 216 | 26.0 |
| Expedition evacuation | 32 | 5.3 | 6 | 2.7 | 38 | 4.6 |
| Other/Unknown | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **Totals** | **608** | **100.0** | **224** | **100.0** | **832** | **100.0** |

**Table D-17: Death classification for all deaths for all peaks from 1950-2009**

Table D-17 classifies deaths based on the phase of the expedition at which the deaths occurred. Ascending and descending deaths on summit bids are recorded regardless of whether the actual summit was attained.

Route preparation, the phase when lower camps are established and stocked and the summit teams position themselves at their highest camp in anticipation of a summit bid, was the most dangerous phase of an expedition for both members and hired. The second most dangerous phase for members was descents from summit bids. But if danger is viewed on a per-day basis, then for the larger peaks summit day would be the most dangerous day because the number of summit days is far less that the number of route preparation days for most expeditions.

For hired, the second most dangerous phase was the approach or return march often because lowland porters were unable to adapt to the higher, colder climates due to inferior clothing and equipment or undetected illnesses (five died from AMS and seven died from other illnesses). In addition, six died from avalanches below base camp, and six staff members of a spring 2002 Spanish Makalu expedition were lost in a helicopter disappearance (probable crash) while returning to Kathmandu from their expedition.

Table D-18 shows causes of death during route preparation. For members, avalanches followed by falls were the most prevalent. For hired, only avalanching posed much of a problem; icefall collapse was a distant second with the majority of those icefall

| Cause of Death Route Preparation | Members | | Hired | | Total | |
|---|---|---|---|---|---|---|
| | Cnt | Pct | Cnt | Pct | Cnt | Pct |
| AMS | 13 | 4.8 | 4 | 3.3 | 17 | 4.3 |
| Exhaustion | 3 | 1.1 | 0 | 0.0 | 3 | 0.8 |
| Exposure/Frostbite | 15 | 5.6 | 0 | 0.0 | 15 | 3.8 |
| Fall | 71 | 26.3 | 5 | 4.1 | 76 | 19.4 |
| Crevasse | 7 | 2.6 | 4 | 3.3 | 11 | 2.8 |
| Icefall Collapse | 2 | 0.7 | 15 | 12.3 | 17 | 4.3 |
| Avalanche | 137 | 50.7 | 81 | 66.4 | 218 | 55.6 |
| Falling Rock/Ice | 9 | 3.3 | 7 | 5.7 | 16 | 4.1 |
| Disappearance | 4 | 1.5 | 0 | 0.0 | 4 | 1.0 |
| Illness (non-AMS) | 8 | 3.0 | 3 | 2.5 | 11 | 2.8 |
| Other | 0 | 0.0 | 3 | 2.5 | 3 | 0.8 |
| Unknown | 1 | 0.4 | 0 | 0.0 | 1 | 0.3 |
| **Totals** | 270 | 100.0 | 122 | 100.0 | 392 | 100.0 |

**Table D-18: Causes of death during route preparation for all peaks from 1950-2009**

| Cause of Death Ascending in Smt Bid | Members | | Hired | | Total | |
|---|---|---|---|---|---|---|
| | Cnt | Pct | Cnt | Pct | Cnt | Pct |
| AMS | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Exhaustion | 2 | 2.8 | 0 | 0.0 | 2 | 2.6 |
| Exposure/Frostbite | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Fall | 39 | 54.2 | 5 | 83.3 | 44 | 56.4 |
| Crevasse | 2 | 2.8 | 0 | 0.0 | 2 | 2.6 |
| Icefall Collapse | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Avalanche | 13 | 18.1 | 0 | 0.0 | 13 | 16.7 |
| Falling Rock/Ice | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Disappearance | 14 | 19.4 | 1 | 16.7 | 15 | 19.2 |
| Illness (non-AMS) | 2 | 2.8 | 0 | 0.0 | 2 | 2.6 |
| Other | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Unknown | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **Totals** | **72** | **100.0** | **6** | **100.0** | **78** | **100.0** |

**Table D-19: Causes of death during summit bid ascents for all peaks from 1950-2009**

collapses being in the Khumbu Icefall on Everest (six Sherpas died in one accident in 1970). The 1970 serac collapse as well as other accidents in the Khumbu Icefall during the 1960-1980s gave it the reputation of being most dangerous part of Everest; but since 1986, only two fatal accidents have occurred: three Sherpas died in 2006 due to a serac collapse and one more in 2009 due to an ice avalanche off the West Shoulder.

Table D-19 shows causes of death while *ascending* during a summit bid. For members, falls followed by unexplained disappearances (probable falls) were by far the most prevalent. For hired, minimal (only 6) deaths occurred during summit bid ascents.

Table D-20 shows causes of death while *descending* from a summit bid (includes both those who summited and those who did not summit). For members, falls were the major cause of death, followed by exposure/frostbite, AMS, and exhaustion. This supports the general consensus that descending from the summit late in the day when cold and exhausted is a particularly perilous time of a climb. For hired, falls were the primary cause of death during descent from a summit bid.

Table D-21 gives the causes of death for members on summit day (while ascending or descending in a summit bid). Across all altitudes, falls are by far and away the leading of cause of death, from 63.3% for the 7000ers down to 44.0% for Everest. In general as

| Cause of Death Descending in Smt Bid | Members | | Hired | | Total | |
|---|---|---|---|---|---|---|
| | Cnt | Pct | Cnt | Pct | Cnt | Pct |
| AMS | 20 | 10.3 | 1 | 4.5 | 21 | 9.7 |
| Exhaustion | 12 | 6.2 | 0 | 0.0 | 12 | 5.6 |
| Exposure/Frostbite | 20 | 10.3 | 0 | 0.0 | 20 | 9.3 |
| Fall | 114 | 58.8 | 19 | 86.4 | 133 | 61.6 |
| Crevasse | 3 | 1.5 | 0 | 0.0 | 3 | 1.4 |
| Icefall Collapse | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Avalanche | 4 | 2.1 | 2 | 9.1 | 6 | 2.8 |
| Falling Rock/Ice | 3 | 1.5 | 0 | 0.0 | 3 | 1.4 |
| Disappearance | 8 | 4.1 | 0 | 0.0 | 8 | 3.7 |
| Illness (non-AMS) | 6 | 3.1 | 0 | 0.0 | 6 | 2.8 |
| Other | 3 | 1.5 | 0 | 0.0 | 3 | 1.4 |
| Unknown | 1 | 0.5 | 0 | 0.0 | 1 | 0.5 |
| **Totals** | **194** | **100.0** | **22** | **100.0** | **216** | **100.0** |

**Table D-20: Causes of death during summit bid descents for all peaks from 1950-2009**

| Cause of Death During Summit Bids | All Peaks | | 6000ers | | 7000ers | | 8000ers | | Everest | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cnt | Pct | Cnt | Pct | Cnt | Pct | Cnt | Pct | Cnt | Pct |
| **AMS** | 20 | 7.5 | 0 | 0.0 | 1 | 1.7 | **19** | **9.9** | **8** | **9.5** |
| **Exhaustion** | 14 | 5.3 | 0 | 0.0 | 0 | 0.0 | **14** | **7.3** | **12** | **14.3** |
| **Exposure/Frostbite** | 20 | 7.5 | 0 | 0.0 | 2 | 3.3 | **18** | **9.4** | **15** | **17.9** |
| **Fall** | **153** | **57.5** | **8** | **57.1** | **38** | **63.3** | **107** | **55.7** | **37** | **44.0** |
| Crevasse | 5 | 1.9 | 1 | 7.1 | 2 | 3.3 | 2 | 1.0 | 0 | 0.0 |
| Icefall Collapse | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **Avalanche** | 17 | 6.4 | **5** | **35.7** | **7** | **11.7** | 5 | 2.6 | 0 | 0.0 |
| Falling Rock/Ice | 3 | 1.1 | 0 | 0.0 | 2 | 3.3 | 1 | 0.5 | 0 | 0.0 |
| **Disappearance (Unexplained)** | **22** | **8.3** | **0** | **0.0** | **8** | **13.3** | **14** | **7.3** | **6** | **7.1** |
| Illness (non-AMS) | 8 | 3.0 | 0 | 0.0 | 0 | 0.0 | 8 | 4.2 | 5 | 6.0 |
| Other | 3 | 1.1 | 0 | 0.0 | 0 | 0.0 | 3 | 1.6 | 0 | 0.0 |
| Unknown | 1 | 0.4 | 0 | 0.0 | 0 | 0.0 | 1 | 0.5 | 1 | 1.2 |
| **Totals** | **266** | **100.0** | **14** | **100.0** | **60** | **100.0** | **192** | **100.0** | **84** | **100.0** |
| | | | | | | | | | | |
| Ascending in summit bid | 72 | 27.1 | 7 | 50.0 | 21 | 35.0 | 44 | 22.9 | 17 | 20.2 |
| **Descending from summit bid** | **194** | **72.9** | **7** | **50.0** | **39** | **65.0** | **148** | **77.1** | **67** | **79.8** |
| | | | | | | | | | | |
| AMS-related | 33 | | 0 | | 2 | | 31 | | 16 | |
| Weather/Storm-related | 24 | | 0 | | 5 | | 19 | | 13 | |

**Table D-21: Causes of death for members while ascending or descending in summit bids from 1950-2009**

peaks become higher, other factors come into play. For the 6000-7000ers, avalanches are more frequent and for the 8000ers, the physiological factors (AMS, exhaustion, and exposure-frostbite) become more important. Unexplained disappearances are also a factor, but many of those are likely due to falls. And across all altitudes, falls during descent are much more prevalent (two to three times the rate of falling during ascent).

Charts D-21a-b show altitudes of death on summit day for the commercial routes on Everest. For the south side, falls are the leading cause (12) followed closely by physiological causes (9) with most of the deaths occurring above the Balcony (17 of 22 deaths). For the north side, the reverse is true: physiological causes (23) outstrip falls (10) with most of the deaths occurring at or above the First Step (31 of 41 deaths). The four disappearances most likely are from falls or physiological causes leading to falls. The preponderance of physiological deaths on the north side may be due to climbers spending more time above 8000m because their highest camp is normally at 8300m, 400m higher than the high camp at 7900m on the South Col.

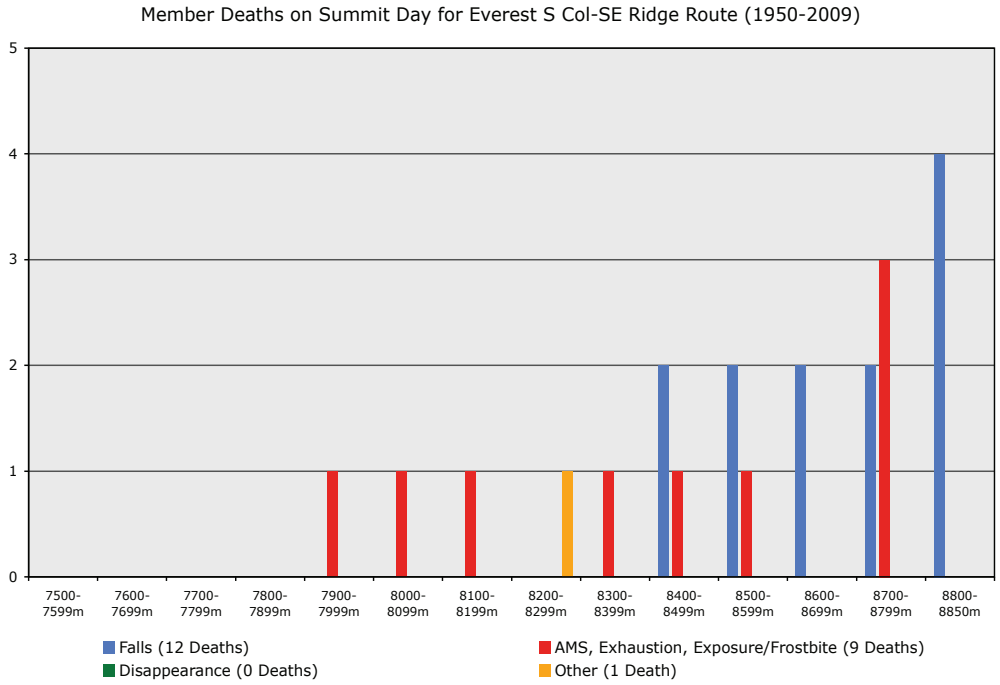


**Chart D-21a: Causes of death for members while ascending or descending in summit bids on Everest South Col-SE Ridge commercial route from 1950-2009 (S Col=7900m, Balcony=8400m, S Summit=8750m, Hillary Step=8800m)**

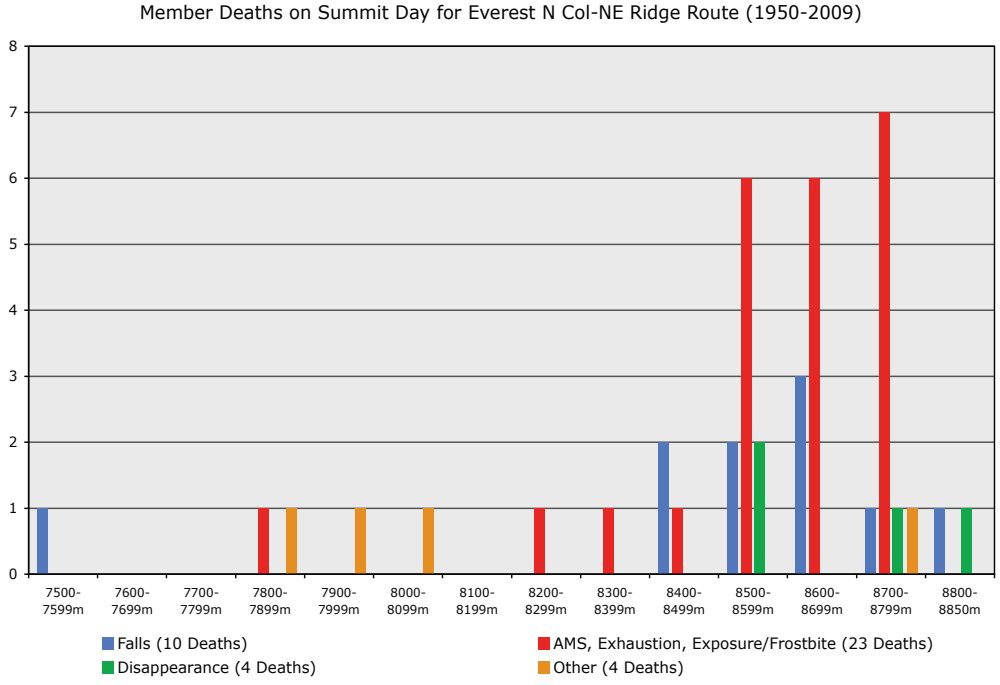


**Chart D-21b: Causes of death for members while ascending or descending in summit bids on Everest North Col-NE Ridge commercial route from 1950-2009 (Normal high-camp=8300m, 1st Step=8450m, 2nd Step=8680m, 3rd Step=8700m)**

**A Deadly Bolt From the Sky**

From *The Seasonal Stories* of Elizabeth Hawley – Spring 1991

Hans Kammerlander, Friedl Mutschlechner, and Karl Grossrubatscher planned an alpine-style ascent of the normal northeast-face route on Manaslu from a camp at 6000m near the base of their 8163m mountain.

But their program did not work out in several ways. They climbed without any Nepalese Sherpas or artificial oxygen, as planned, but unfavorable weather with frequent heavy snowfall caused them to set up three successively higher camps in the course of their ascent.

After nearly three weeks of climbing, they decided that bad weather and lack of time was forcing them to give up hope of reaching the summit, but early in the morning of 10 May three of them started up from camp 3 at 6900m. They could see that the weather would not remain good long enough for them to make a summit bid, but the morning was fine and they would climb upwards for a while.

After half an hour's climb, at about 7000m, Mutschlechner's fingers were becoming numb from the extremely cold wind, and having suffered from frostbitten fingers before, he did not want another episode of that, and he turned back to camp 3. When the two others had reached about 7200m, Grossrubatscher had to stop climbing up; he had not brought his ice ax with him that morning, and now the terrain required one. So he, too, returned to camp 3 and was seen moving around its tent by teammates watching from base camp until clouds moved across and the camp was no longer visible from below. Kammerlander continued alone to 7500m and then finally he also abandoned the climb.

When Kammerlander arrived back at camp 3, Mutschlechner asked him, "Where is Karl?" Near the tent they discovered his ice ax with a glove in its strap. A bit farther away, perhaps 100m, they found his body. His neck was broken. How this had happened is a mystery: his legs, arms and head were not badly broken; the slope where camp 3 was located was gentle with snow in good condition; if he had climbed up to a nearby serac and fallen from it, there was no trace of his fall in the snow; he was a healthy, strong professional mountaineer.

The two survivors placed their friend's body atop a closed crevasse that in warmer weather will open and receive it. They then took down the tent, descended to camp 2 at 6200m, packed up that tent and, roped together and on skis, they continued down the snow-covered slopes. But now fog or wisps of cloud were passing over them and visibility was poor; finally, about 100m above camp 1 at 5600m, they were enveloped in such thick cloud that Mutschlechner suggested they wait for the mists to clear a bit. They could hear continuous soft thunder, their hair was full of electricity and their ice axes were humming from it, but they saw no lightning in their dense fog. But suddenly Kammerlander had a sharp popping sound in his ear, which felt as though it had been bitten. He dropped to the snow and tugged on the rope between him and Mutschlechner; there was no answering tug, and when he went to Mutschlechner later, Kammerlander saw that he was dead with three burn marks on his head and his cap. Mutschlechner had been only eight meters away from his colleague and a mere two vertical meters above him at the highest point of a small snow-covered hill. It was about 4:00 p.m. and snow was falling. Mutschlechner is believed to have been the first mountaineer ever killed by lightning in Nepal.