

Summary:

Risk of disasters in transport

This report contains an estimate of the risk of disasters in transport in Norway. The risk is expressed in terms of the long-term expected annual frequency of accidents. An annual frequency of, for example, 0.01 means that, on the average, there will be one accident during a period of one hundred years. The term disaster denotes accidents in which several people are killed. In estimating the frequency of disasters, the following categories of accidents were applied:

Accidents with 1 person killed

Accidents with 2-9 persons killed

Accidents with 10-19 people killed

Accidents with 20-99 people killed, and

Accidents with 100 or more people killed.

The estimates of the frequency of accidents in these categories are based on Norwegian experience after about 1970 (rail and air), 1980 (ships), or 1990 (road), supplemented with information concerning the historical frequency of major accidents in Great Britain (rail), Northwestern Europe (ships) and the OECD-countries (road and air travel). Table S.1 presents the results of the estimation.

Table S.1: Long-term frequency of major accidents in transport in Norway

Number of people killed per accident	Road	Rail	Ships	Air
1	234.0	7.00	0.32	1.64
2-9	32.9	0.50	0.20	2.00
10-19	0.0500 7	0.006	0.11	0.10
20-99	0.0000 2	0.01	0.033	0.07
100-	0.0	0.00	0.0077	0.02
Fatal accidents per year	266.93	7.52	0.67	3.83
People killed per year – long-term	301.63	10.09	5.56	14.62
Long-term frequency of accidents with at least 20 fatalities	1 in 46,510 years	1 in 100 years	1 in 25 years	1 in 11 years
Observed number of people killed per year	300.88	12.30	11.33	14.96
Period for observed number of deaths	1990-97	1970-97	1981-95	1970-97

During the period covered by the estimates, there was about 300 fatalities per year in road transport (1990-97), about 12 per year in rail transport (1970-97), about 11 per year in maritime transport (1981-95), and about 15 per year in air travel (1970-97). The risk of being killed in an accident has been reduced for all modes of transport after 1970, except for maritime transport, for which data that show long-term trends in risk could not be obtained. For most modes of transport, it is expected that the risk of fatal accidents will be lower in the years ahead than it was during the period used to estimate the historical frequency of fatal accidents in Table S.1.

Table S.1 shows that the expected long-term frequency of disasters (accidents in which more than 20 people are killed) is highest for air travel, second highest for maritime travel, third highest for rail travel and lowest for road transport. The annual frequency of disasters is estimated to 1 in 11 for air travel, 1 in 25 for maritime travel, 1 in 100 for rail travel and 1 in about 46,500 for road transport.

The relative contributions of small and major accidents to total risk varies substantially between the various modes of transport. Table S.2 shows fatality risk, estimated on the basis of the long-term frequencies of fatal accidents taken from Table 1 and the amount of transport performed in 1997.

Table S.2: Fatality risk by mode of transport and the contribution of disasters to fatality risk

Mode of transport	Deaths per year	Mill personkms 1997 (rounded)	Deaths per billion personkms	Percentage of deaths in disasters
Road	301.63	55,000	5.5	< 0,1%
Rail	10.09	2,600	3.9	5-10%
Maritime	5.56	1,700	3.3	45-55%
Air	14.62	4,100	3.6	35-40%

The figures given in Table S.2 are intended to be representative of long-term frequencies and levels of risk. They will not necessarily be representative of events in a certain year or in a specific time period. Disasters in Table S.2 include all accidents in which at least 20 people are killed. It is seen that disasters contribute substantially more to overall fatality risk in air travel and maritime travel than for the other two modes of travel.

The estimates of the annual frequency of disasters are very uncertain. The uncertainty cannot be quantified in a meaningful sense, because it depends not just on the number of accidents on which the estimates are based, but also on the assumptions made with respect to future changes in risk levels. There has been a tendency for risk to go down, but at the same time the volume of transport has grown. The net effect of these trends may be an unchanged number of accidents. Moreover, the results of the calculations depend on what assumptions are made. In many cases, the assumptions made can be discussed and a different choice might have given a different result.