ORIGINAL ARTICLE

Accidents in Germany

Evaluation of the German Telephone Health Survey 2004

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SUMMARY

Introduction: In the year 2006 there were over 19 000 fatal accidents in Germany and estimates put the number of accidental injuries at more than 8 million. Detailed information on the pattern of accidents is indispensable for the definition of priorities in accident prevention.

Methods: The German Telephone Health Survey 2004 provides representative cross-sectional data on the health of German residents from 18 years of age ($n = 7341$). Questions on the prevalence of accidents (13 items) were selected for analysis.

Results: Every tenth interviewee reported being injured in an accident in the previous 12 months. Men, particularly young men, are at greater risk of accidents than women. Almost one third of all accidents occurred at home. Social status had no influence on the probability of having an accident, but did affect where the accident happened.

Conclusion: The survey yields information on the overall pattern of non-fatal accidents in Germany. The data point to target groups for accident prevention measures.

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In the year 2006, there were 19 479 fatal accidents in Germany; in the same year, 8.37 million people were injured in accidents, according to an estimate by the German Federal Institute for Occupational Safety and Health (1). These figures demonstrate the major importance of accidents for all parties involved – not only for the injured persons, who suffer temporary damage or even long-term impairment of their health, but also for society as a whole, which must pay the cost of illness and of lost person-years of work. The German Federal Statistical Office estimates that the cost of illness due to injury, poisoning, and other external causes (ICD-10 codes S00 – T98) in 2006 exceeded 11 billion euros (2). This amount was just over 5% of the total estimated cost of illness in Germany.

The planning of accident prevention measures is an important task of health policy that must be based on accurate knowledge of the accident situation nationwide. Statistics from multiple sources can be used for this purpose. Traffic accident statistics inform about accidents that have come to the attention of the police. Work and school accidents are also legally reportable whenever they are within the scope of statutory accident insurance. On the other hand, accidents that occur at home or during leisure activities are not registered systematically. Accidents of these two types accounted for almost two-thirds (64%) of all cases of accidental injury in 2006, as the Federal Institute for Occupational Safety and Health has estimated (1). Cause-of-death statistics are a further source of information about accidents. An accurate picture of the accident situation is difficult to obtain, not only because only some types of accidents must be reported according to the law, but also because there is overlap among the different types of statistics that are collected on the subject.

In order to assess the possibilities for prevention and to determine where the emphasis of prevention efforts should lie, data on the sociodemographic features of the affected persons must be collected and analyzed:

- In what age group(s) are accidents particularly common?
- Are there sex-specific differences with regard to accident sites?
- Are persons of lower socioeconomic status in greater danger of accidental injury?

Such questions can hardly be answered with official statistics. Useful information has been obtained from a nationwide, representative telephone survey performed by the Robert Koch Institute. In this article, we discuss

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some of the findings of this survey regarding the prevalence and sites of accidents, particularly as these relate to the accident victims' age, sex, and social status.

Materials and methods

The Robert Koch Institute's Telephone Health Survey 2004 is a cross-sectional study providing representative data on the health of the German population. It encompasses, for example, the distribution of and risk factors for chronic illnesses as well as subjective aspects of health, health behavior, and the utilization of health care services (3). Accidents are a major emphasis of the survey. Only unintentional accidental injuries were registered; data were not collected on injury through violence or self-harm. A total of 7337 persons responded to the question whether they had required medical care for an accidental injury at any time in the previous 12 months. Those who said yes were asked to answer 12 further questions regarding the site of the accident and the nature and consequences of the injury.

The survey was conducted from September 2003 to March 2004 in the telephone studio of the Robert Koch Institute. The survey was designed to yield a representative sample of German-speaking adults living in private households in Germany, insofar as they are reachable by a fixed (non-mobile) telephone. Sampling was performed with the Gabler-Häder method employing randomly generated telephone numbers (4), which was obtained from the Centre for Survey Research and Methodology (Zentrum für Umfragen, Methoden und Analysen, ZUMA) in Mannheim, Germany (5). When this method is used, households with unlisted numbers can be reached as well. In order to make the survey's conclusions as representative as possible, the data were weighted in a two-step procedure according to the current distribution of the German population with respect to age, sex, and region of residence. (These distributions were derived from population statistics that were collected by the Federal Statistical Office as of 31 December 2001, which can be found under Statistisches Bundesamt: Fortschreibung des Bevölkerungsstandes at the Internet address www.gbe-bund.de).

In this article, the information provided by the survey participants about accidental injuries are discussed descriptively and in the context of the participants' sociodemographic characteristics. Chi-square tests were performed to establish sociodemographic correlations with the aid of SPSS software (Statistical Package for the Social Sciences 14.0). This was primarily a hypothesis-generating rather than a hypothesis-testing study; thus, all reported p-values are to be interpreted as exploratory. Accordingly, alpha adjustment was not performed.

Results

Age and sex

Roughly one in ten of the men and women surveyed over the telephone reported having sustained an accidental injury requiring medical attention in the previous 12 months (n = 739). In nearly all age groups, more men than women said they had been injured in accidents

The frequency of accidents resulting in medical treatment (at least one accident in the past six months) by age and sex, n = 7337 (source: German Telephone Health Survey of the Robert Koch Institute, 2004).

(figure). The p-value for this difference in the overall group consisting of all men and all women surveyed was 0.000 ($\chi^2 = 12.885$, df = 1). In men, the reported incidence of accidents was found to decline with age until age 79 is reached. The accident rate rises again at still older ages, though this finding is less reliable because of the small number of male survey participants aged 80 or older. No consistent age-related trend was observed in women. The frequency of accidents is especially high in younger men.

87% of the participants who had sustained accidental injury reported having been injured in a single accident, while the remainder had been injured multiple times. Multiple injuries were particularly common among 18- to 29-year-olds, 21% of whom were injured more than once.

Accident sites

Participants who reported having had at least one accidental injury requiring medical attention in the previous 12 months were asked for details about the site of the accident – whether it occurred at the workplace (not counting travel to and from work), in traffic, at home, or during leisure activities outside the home. The largest group of injured persons sustained injuries at home. More than half of all reported accidents occurred at home or during leisure activities (table 1).

Measures to reduce the incidence of accidents at the home should be primarily directed toward women and the elderly. More than one-third of the women who had been injured in accidents had sustained their injuries at home. "Home" is named with increasing frequency as the site of the injury-producing accident

TABLE 1

Accident sites depending on the sex of the accident victim (each victim may have been injured at one or more accident sites)

Accident site	Overall		Men		Women	
	Weighted cases	Percent of all accident victims	Weighted cases	Percent of all accident victims	Weighted cases	Percent of all accident victims
Workplace* ¹	165	22.3	122	30.3	43	12.8
Traffic* ²	208	28.1	86	21.3	122	36.3
Home* ³	220	29.8	99	24.6	121	36.0
Leisure* ⁴	165	22.3	108	26.8	57	17.0
Total number of * ⁵ accident victims	739		403		336	

In the chi-square tests for men vs. women, there was 1 degree of freedom (df = 1) for all accident sites.

*¹) Chi-square test for men vs. women: $\chi^2 = 17.689$, $p = 0.000$

*²) Chi-square test for men vs. women: $\chi^2 = 4.117$, $p = 0.049$

*³) Chi-square test for men vs. women: $\chi^2 = 0.975$, $p = 0.338$

*⁴) Chi-square test for men vs. women: $\chi^2 = 19.948$, $p = 0.000$

*⁵) 739 persons overall sustained accidents in the time period indicated.

Because some victims sustained multiple accidents, the number of victims differs from the number of accidents that occurred at each accident site.

Source: Telephone Health Survey of the Robert Koch Institute, 2004.

with increasing age of the respondent. Only 20% of the injured persons aged 18 to 29, but 45% of those aged 60 to 69, reported having been injured at home. A special problem group presumably consists of aged persons who fall at home because of multimorbidity, among other reasons. In the survey, the rate of accidents at home was high (8%) among women aged 80 or above, though this finding is less reliable because the number of female participants in this age group was low.

Leisure-time accidents outside the home occur to men about twice as often as women. Statistical testing confirms that there is a sex difference (table 1). Just above one-third of persons injured during leisure-time activities are under 30 years old. About one of every fifteen men in this age group had had a leisure-time accident requiring medical attention within the previous year. The frequency of leisure-time accidents decreases with increasing age.

The frequency of accidents that occur during leisure activities is presumably related, among other things, to sports. Persons who stated in the survey that they had had an accident in their leisure time were significantly more active in sports than respondents who had sustained no accidental injuries: 93% of men injured in their leisure time stated that they took part in sports (but only 59% of all men surveyed). The frequency of accidental injury rises with the time spent in sporting activities: 2% of men who took part in sports for up to two hours a week had had a leisure-time accident, as compared to 6% of men who took part in sports for more than two hours a week.

The workplace plays a prominent part in accidental injuries in men. Nearly one-third of men who reported having been injured, but only one woman in eight, was injured at work. The result of the chi-square test supports the major sex difference (table 1). The percentage of persons who injure themselves at work remains

relatively constant among all age groups in the working-age population. A mild decline in the rate of work accidents can be observed with increasing age. The probability of an accident at work is also a function of the amount of time spent at work: 5% of men employed full time reported having had an accident during working hours, while the corresponding figure among men working less than 35 hours per week was only 1%. Even when the fact that women are more likely than men to work part-time is corrected for, women remain less likely than men to be injured at work.

The survey also addressed the question whether certain occupational groups are at greater risk of accidental injury at work. It was found that men, in particular, who stated their occupation as "blue-collar worker" more commonly sustained accidental injury at work. 6% of male laborers had an accident at work in the space of one year, while the comparable figure among white-collar workers was only 2%.

Traffic accidents were the most common cause of accidental injury cited by female respondents. More than one-third of female accident victims had had a traffic accident, as compared to only about one in five male accident victims. The rate of injury in traffic accidents among men is, correspondingly, much lower than the rate among women (table 1). Though the data do not show any pervasive age-related trend, it is clear that one group in particular – young men – is more prone to traffic accidents than any other. 5% of all male respondents aged 18 to 29 said they had been involved in a traffic accident in the previous 12 months (as compared with 2% of all male respondents).

The information provided by respondents regarding their modes of transport was particularly interesting. The largest group of accident victims consisted of pedestrians (41%). Every fifth person in the group of persons injured in traffic was riding a bicycle when the accident occurred. These two groups require special

TABLE 2

Accident sites depending on the social status*¹ of the accident victim (each victim may have been injured at one or more accident sites)

Accident site	Low social status		Intermediate social status		High social status	
	Weighted cases	Percent of all persons questioned with low social status	Weighted cases	Percent of all persons questioned with intermediate social status	Weighted cases	Percent of all persons questioned with high social status
Workplace* ²	22	4.8* ⁴	94	4.1* ⁶	36	2.4* ^{4,6}
Traffic	42	3.9	95	2.4	61	2.8
Home	44	4.1	100	2.5	68	3.1
Leisure	24	2.2	78	2.0* ⁵	61	2.8* ⁵
Total number of accident victims* ³	127	1070	374	3929	218	2169

In the chi-square tests for low vs. high and intermediate vs. high social status, there was always 1 degree of freedom (df=1).

*¹ Winkler index.

*² The number of persons who were employed at the time of questioning was used as the denominator in the calculation of the percentage of persons who had suffered accidents in the workplace. Ten cases were excluded from analysis because the accident victims were already unemployed or retired at the time of questioning.

*³ 719 persons overall for whom information on social status was available sustained accidents in the time period indicated.

Because some victims sustained multiple accidents, the number of victims differs from the number of accidents that occurred at each accident site.

*⁴ Chi-square test for low vs. high social status: $\chi^2 = 7.201$, $p = 0.011$

*⁵ Chi-square test for intermediate vs. high social status: $\chi^2 = 4.274$, $p = 0.048$

*⁶ Chi-square test for intermediate vs. high social status: $\chi^2 = 8.455$, $p = 0.003$

Source: Telephone Health Survey of the Robert Koch Institute, 2004.

attention. Half of the accidentally injured pedestrians were 60 years of age or older (49%), and the percentage of women among them is high (66%). Among injured bicycle-riders, one-third were 70 years of age or older (33%), while 60% were women.

Social status

In the Telephone Health Survey, data were collected on a number of parameters of socioeconomic status – education, qualifications, professional standing, and net household income (net income of all household members after deduction of tax and social security contributions). These data can be used to construct a summary three-level index of social status (the Winkler index) (6). Men and women of low social status were found to have been injured in accidents slightly more commonly than men and women of the highest social status (men, 14% vs. 10%; women, 11% vs. 10%).

Bivariate analysis revealed a marked correlation – between an individual's socioeconomic parameters and the site of the accident. To summarize, it can be said that persons of low social status tend to sustain accidental injuries at work, while persons of the highest social status tend to sustain injuries during their leisure time (table 2). A comparison of the status groups revealed a high rate of work accidents among employed persons of low socioeconomic status as compared to employed persons of the highest socioeconomic status. Leisure-time accidents also occur more frequently among persons of high socioeconomic status than among persons in the middle group. This result probably reflects a higher rate of participation in sports among persons of higher socioeconomic status. The correlation between physical activity and social status has been multiply demonstrated (7).

Discussion

The Telephone Health Survey of 2004 yields a detailed overview of the accident situation in Germany. The data obtained in this survey permit the conclusion that every tenth man and woman in Germany in 2003/2004 sustained at least one accidental injury requiring medical treatment at some time in the previous 12 months. This conclusion is consistent with annual estimates of the number of accidentally injured persons published by the German Federal Institute for Occupational Safety and Health (8). The ability to link information on the site of the accident with sociodemographic traits, and the availability of data on the outcome of the accident (injuries and their care), are particular advantages of this survey. The percent contribution of each possible accident site to the total number of accidents can be estimated. Data from the survey are particularly useful in areas where no official statistics exist, e.g., accidents occurring at home or in the workplace and traffic accidents that are not reported to the police.

On the one hand, representative population-based surveys offer a great deal of potential for analysis of the accident situation in Germany. On the other hand, this type of survey has certain intrinsic limitations, e.g., relating to the way the population sample is selected. Certain groups of people are not reached effectively to participate in survey, e.g., very old persons and immigrants. Moreover, the content of a survey is necessarily limited – e.g., in comparison to the labor statistics of the statutory accident insurance carriers – because telephone surveys consist of many wide-ranging questions that are meant to cover numerous aspects of the individual's physical and mental health. The results of a telephone survey are comparable to the findings of official statistics only to a limited extent.

Likewise, any comparison of accident data, classified according to internationally used diagnosis numbers, across different countries is problematic. Although the collection of data on accidents is considered an important priority in many countries, the actual data collection that is currently being performed – e.g., in the member states of the European Union – varies both in the methods used and in the degree of comprehensiveness of data collection (9). Like the Telephone Health Survey in Germany, international studies have revealed a marked influence of age and sex on the prevalence of accidental injury, as well as a correlation with the individual's socioeconomic status (10). In view of the wide-ranging consequences (including economic) of accidental injuries, the European Union is currently seeking to harmonize the manner of data collection on this subject across its member countries. Some 235 000 persons die in Europe every year as the result of accidents or violent attack. Injuries are the fourth most common cause of death in the EU (10).

From an epidemiological and public health perspective, the data from the Telephone Health Survey that are discussed in this article constitute an important supplement to the available official statistics on accidents, and they point to possible future modes of accident prevention in Germany. Among other things, accidents involving pedestrians seem to be a particular problem in need of a solution: their frequency in the Survey is many times higher than that in traffic accident statistics, presumably because the police are often not called to the scene of an accident. The fact that injuries requiring medical treatment can ensue implies that this segment of the accident situation in Germany should be dealt with more intensively. An appropriate goal for the future is to improve our knowledge of the main characteristics of accidents and of the persons sustaining accidental injury, so that better approaches to accident prevention can be developed.

Conflict of interest statement

The author declares that she has no conflict of interest as defined by the guidelines of the International Committee of Medical Journal Editors.

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