The medium and long-term health impact of disasters

Gezondheidsraad **President**
Health Council of the Netherlands

To the Minister and State Secretary of Health, Welfare and Sport

Subject : Presentation of advisory report
The medium and long-term health impact of disasters
Your reference : GVM/2331336
Our reference : U1363/hvdk/664-E
Enclosure(s) : 1
Date : 20 December 2006

Dear Minister, State Secretary,

In reply to your request (your letter reference GVM/233 1336), I hereby present our advisory report on the medium and long-term health impact of disasters. The report has been produced by a Health Council committee appointed by myself for this purpose. The Committee has based some of its findings on opinions offered by the various standing committees on Medicine and Environmental Health. I fully endorse the conclusions and recommendations of the Committee.

Further to a study of the international and Dutch literature on the subject, the Committee has been able to identify the health complaints which a disaster can cause in the longer term, the extent to which they occur, and the current knowledge with regard to their diagnosis, progress and prognosis. Disasters can indeed give rise to well-documented physical and psychological conditions. The majority of sufferers recover within a reasonable period. However, some experience prolonged health complaints, with a minority continuing to do so for several years. The advisory report includes an inventory of the many factors which can play a role in the emergence and perpetuation of symptoms. It also devotes attention to the efficacy of the interventions currently available following a disaster.

The Committee recommends that the current Dutch policy line with regard to aftercare services be continued, since it is very much in keeping with the scientific findings to date. With regard to specific provisions made on case-by-case basis, such as the establishment of an Information and Advice Centre, the Committee recommends that 'evaluation moments' should be agreed in advance, being those times at which the relevant decision should be made.

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Experience suggests that, over time, the majority of people are no longer dependent on specific provisions, having found their way to the regular assistance channels.

I am submitting a copy of this letter to the Minister of the Interior and Kingdom Relations and to the State Secretary for Housing, Spatial Planning and the Environment.

I remain, yours sincerely,

(signed)

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to:

the Minister of Health, Welfare and Sport

No. 2006/18E, The Hague, 20 December 2006

The Health Council of the Netherlands, established in 1902, is an independent scientific advisory body. Its remit is "to advise the government and Parliament on the current level of knowledge with respect to public health issues..." (Section 22, Health Act).

The Health Council receives most requests for advice from the Ministers of Health, Welfare & Sport, Housing, Spatial Planning & the Environment, Social Affairs & Employment, and Agriculture, Nature & Food Quality. The Council can publish advisory reports on its own initiative. It usually does this in order to ask attention for developments or trends that are thought to be relevant to government policy.

Most Health Council reports are prepared by multidisciplinary committees of Dutch or, sometimes, foreign experts, appointed in a personal capacity. The reports are available to the public.

The Health Council of the Netherlands is a member of INAHTA, the international network of health technology assessment (HTA) agencies that promotes and facilitates information exchange and collaboration among HTA agencies.

This report can be downloaded from www.healthcouncil.nl.

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Contents

Executive summary

This advisory report addresses two questions placed before the Health Council of the Netherlands by the Secretary of State for Health and Welfare:

1 What is known about the prevention, diagnosis, progress and mid-to-long term prognosis of health problems further to a disaster?
2 What is known about the effectiveness (in terms of both response and long-term efficacy) of professional healthcare and counselling services following a disaster?

In producing this report, the Commission has chosen to observe the legal definition of a disaster, viz. "an event which leads to the disruption of normal societal interaction on such a scale that coordinated government interventions become necessary". This report is exploratory in nature; it is not to be regarded as a 'manual' setting out how the government *should* act following a disaster. The motive behind the State Secretary's questions is that the government wishes to be sufficiently well informed to be able to implement a policy which will help to reduce the health problems experienced by victims.

While the problems experienced by disaster victims used to be regarded as an inevitable 'fact of life', they are now interpreted in their medical and psychological context. Recent years have seen a significant shift in thinking with regard to disasters and the victims of those disasters. In the past, the problems experienced by victims were largely seen as an inevitable 'fact of life', which should be

accepted as such. Today, those problems are recognized as being medical and/or psychological in nature. Moreover, public sympathy for the victims of disasters has increased, as has attention for the necessity of coming to terms with the consequences of a serious incident, a process which may indeed require some assistance. These societal and sociological aspects must be taken into account when determining disaster response policy.

Disasters can cause well-documented physical and psychological complaints, as well as medically unexplained physical symptoms. The victim of a disaster can suffer direct physical injury, infection, radiation poisoning or other toxicological effects. There may also be psychological complaints caused by the shock of the disaster or its aftermath. In addition, a disaster is followed by an increase in the number of medically unexplained physical symptoms, being those with a physical manifestation but no clear physiological cause. The symptoms displayed may include persistent headaches, fatigue, stomach complaints and muscular pain. These form an important category of post-disaster ailments, and one on which the scientific world has yet to reach any consensus. Moreover, the domain of medically unexplained physical symptoms has yet to be clearly defined.

The physical damage caused by a disaster can take many forms. The nature of the immediate adverse impact on a disaster victim's physical health is closely related to the nature of the disaster itself. There may be burns, damage to the airways due to the inhalation of smoke or other hazardous substances ('inhalation trauma'), fractures, and symptoms caused by infection, radiation or intoxication. Generally, the treatment of this immediate physical damage is the first aspect to receive attention following a disaster. Some people may suffer serious physical disfigurement, which can also have far-reaching psychosocial implications.

The most common long-term reactions to a disaster are anxiety disorders, depression, 'persistent recollection', substance abuse and medically unexplained physical symptoms. Estimates of the prevalence of these reactions vary widely. In western countries, some 20% to 50% of disaster victims are thought to suffer one or more such effects. However, this is not to say that any increase in the psychological disorders which fall into the recognized classifications (depression, anxiety, post-traumatic stress syndrome, addiction) has been observed, although such an increase has been noted in certain groups. They include the mothers of young children, evacuees, migrants, people with a prior history of psychological or psychiatric problems, and adolescents.

There is no clear link between the nature of psychological or medically unexplained physical symptoms and the nature or cause of the disaster. In western countries, disasters which are caused by human commission or omission seem to give rise to greater negative health impact than natural disasters. There are no indications that certain types of disaster are more often responsible for some syndromes of physical complaints than for others.

Most victims succeed in regaining their emotional balance without professional assistance. Direct involvement in a disaster makes substantial claims on a person's adaptability and resilience. People vary greatly in terms of the way in which they will respond to a disaster. Many will suffer stress – sometimes extreme – during both the disaster itself and its immediate aftermath. This may be regarded as a normal reaction to an abnormal situation. In many cases, any resultant health problems will be temporary in nature. Most people are indeed very resilient and will 'bounce back' within a reasonably short period.

Most people regain their emotional balance within eighteen months, but some experience health complaints of a more long-term nature. In general, health problems are most acute in the period immediately following the disaster. Other than actual physical incapacity, these problems usually subside within eighteen months. However, in 20% to 25% of victims, the complaints will persist for many years, and in some cases longer than ten years. These victims suffer serious long-term problems. The more serious the complaint in the short term, the greater the likelihood that it will persist beyond the usual recovery time.

The etiology of psychological and medically unexplained physical symptoms is determined by multiple factors. The factors which influence the emergence and persistence of psychological and medically unexplained physical symptoms can be classified into three groups. There are the 'predisposing' factors (i.e. the differences in personal susceptibility to psychological imbalance), the precipitating factors (external circumstances which prompt the emergence of health complaints in susceptible persons) and the 'perpetuating' factors (those which cause the complaint to persist and stand in the way of recovery).

Significant predisposing factors include a history of psychological imbalance (depression, anxiety disorder, post-traumatic stress syndrome), lower socio-economic status, and the lack of an adequate social network.

The most significant precipitating factor is likely to be the sudden and inescapable nature of the disaster, and its immediate effects in terms of injury, per-

ceived danger to life, uncertainty regarding the fate of loved ones, and the loss of one's home and property.

Perpetuating factors are linked to the nature of the disaster, the nature of the person concerned and the social and societal setting. One disaster-related maintenance factor is long-term evacuation, while personal factors which stand in the way of prompt recovery include low self-esteem and ineffective coping strategies, such as a tendency to ignore problems or to blame others. Other maintenance factors include involvement in long and complicated compensation claims, belief in conspiracy theories, and feelings of anger or suspicion directed towards the government. Societal factors which promote recovery include attention, acknowledgement and respect, adequate financial support and prompt reconstruction and repair of the physical damage caused by the disaster.

There is no evidence to support a causal link between media coverage of a disaster and health complaints, and such evidence is unlikely to be forthcoming given the difficulty of researching such a relationship. The media can play a significant positive role in providing information about the effects of a disaster. Nevertheless, it is not unreasonable to assume that media coverage which speculates on the causes of post-disaster health complaints is likely to extend the period in which those complaints are experienced. The Commission dismisses the contention that a disaster will always and inevitably give rise to long-term psychological or psychiatric complaints as ungrounded.

Good organization and quality of disaster management procedures is also important from the perspective of preventive healthcare. The manner in which rescue efforts and victim support services are organized in the acute phase of the disaster will do much to determine the extent of health effects in the middle to long term. There is also a direct proportional relationship between the number of fatalities caused by the disaster and the extent of psychopathological symptoms exhibited by the survivors. The sooner the survivors know exactly where they stand, and the sooner their safety is assured, the less significant the likelihood of long-term negative health impact will be.

The preventive effect of early psychological interventions has not been subject to adequate research, but it is clear that a single debriefing session has no preventive value. Interventions during the acute phase of a disaster are intended to reduce stress-related complaints and to minimize the likelihood of the victim developing post-traumatic stress syndrome. It is clear that a single 'debriefing' session, at which victims are encouraged to talk at length about the disaster and

its emotional consequences, is not effective and may even be detrimental. This prompts the Commission to advise against the use of single debriefings, and to advise caution in the use of other interventions of a debriefing-like nature. There is little or no thorough research into the preventive effect of interventions other than debriefing during the acute phase.

The emphasis of psychosocial services immediately after a disaster should be on the promotion of natural recovery and self-sufficiency. The lack of evidence to support the effectiveness of interventions in the acute phase does not mean that no psychosocial care should be offered. The profession endorses the view that prompt and proper assistance can promote natural recovery and self-sufficiency, and hence safeguard the longer-term health of the victim. This can best be achieved by directly addressing the immediate needs of the person concerned, in the practical, social and emotional areas. In practice, this will entail offering a 'listening ear', helping to reunite victims with their loved ones, helping to resolve practical problems, and informing victims of the potential effects of the incident on their general health and well-being. First-line relief workers should also be able to identify those victims who require further therapeutic treatment, and must ensure that such treatment is available.

Prompt and adequate information can help victims to regain control of their lives. It is essential that the government, as the party responsible for information provision and risk communication following a disaster, is fully aware that creating any (further) uncertainty could seriously exacerbate the problems faced by the victims. Uncertainty with regard to one's exposure to hazardous substances, for example, will lead to fear and anxiety, and provides a fertile breeding ground for rumour and speculation. Uncertainty, anxiety and speculation may cause and maintain psychological and medically unexplained physical symptoms. The government can avoid this by conducting its communication with the public openly and honestly from the very outset, even where some aspects are still not fully clear.

Effective treatments exist for depression, anxiety and post-traumatic stress syndrome. Although little research has been conducted into the treatment of these disorders in the context of a disaster, substantial research has indeed been conducted in other contexts. The Commission is of the opinion that the existing treatments are likely to be just as effective in the disaster context as in any other. Guidelines and protocols now exist for the treatment of depression, anxiety dis-

orders and PTSD. As yet, there are no guidelines covering the treatment of medically unexplained physical symptoms.

The Commission recommends that the current policy with regard to aftercare services following a disaster should be continued. At present, the main features of this policy are integrated psychosocial assistance, an Information and Advice Centre (IAC) function, health research and monitoring, and the national centres of expertise: 'Impact' and the Centre for Health Impact Assessment of Disasters (CGOR). While there is insufficient hard evidence that this aftercare policy has helped to prevent health complaints in the medium to long term, the Commission nevertheless recommends that it should be continued since its value is supported by the scientific results achieved thus far.

Disaster victims often experience a multitude of (interrelated) problems, including those of housing, work, financial concerns, problems in the private sphere, and health complaints. It is therefore preferable to offer assistance in an integrated form. An Information and Advice Centre is well placed to mediate between the people with problems and questions on the one hand, and the social welfare and relief organizations on the other.

The IAC function is temporary in nature. Because it is difficult to predict how the requirement for information and advice will develop, it is necessary to establish suitable evaluation moments at the outset. It is also important to ensure that downsizing is possible when appropriate.

In order to conduct effective health research among disaster victims, there must be a system whereby the victims (direct and indirect) can be monitored on an ongoing basis. However, this type of research has certain drawbacks. Both clinical experience and research results to date suggest that it can increase the individual's concerns about his or her health. This is a reason for exercising additional care when using this approach.

In the case of a disaster of such impact that the regular channels cannot cope, even with additional support, it is recommended that specific disaster-related assistance services other than the IAC should be implemented. The nature of the likely problems and health complaints caused by involvement in a disaster do not themselves call for specific disaster-related assistance, but the scope and extent of the assistance requirement may render it necessary to set up temporary teams or institutions. The exact period during which these bodies are active will depend on the nature and extent of the assistance requirement. The comments made regarding the flexibility of the IAC and the period in which it operates therefore apply here too.

Chapter 1

Introduction

In November 2002, the State Secretary for Health, Welfare and Sport requested the Health Council to produce an advisory report on the current scientific knowledge with regard to the medium and long-term health impact of disasters, and how this knowledge can be used to improve the assistance services provided to those affected, directly or indirectly, by a disaster (see Annex A). On 16 June 2003, the President of the Health Council appointed a committee charged with answering the State Secretary's questions (see Annex B).

1.1 Background to the State Secretary's request

Certain serious events can leave deep scars on a person's life, often persisting for many years after the event itself. The disasters which have affected the Netherlands in recent decades, including the Bijlmermeer air disaster, the devastating explosion of a fireworks warehouse in Enschede, and the fire in a crowded café in Volendam on New Year's Day 2001 – have all had a great impact. The people affected by such disasters still suffer poor physical and/or mental health even years later.

The State Secretary for Health, Welfare and Sport has therefore asked whether the government has done – and continues to do – enough to minimise the health impact of disasters. Is the assistance provided to people affected by disasters good enough? Can it be improved, given the experience that has reluctantly been gained both in the Netherlands and elsewhere in the world in recent

years? If so, how? In particular, an overview of the current scientific knowledge is required in order to support decision-making in a number of areas:

- In what circumstances is it necessary to institute specific assistance and counselling provisions?
- How long should the assistance organisations and activities set up in response to a specific disaster be maintained?

1.2 The nature of this report and the approach adopted

This report deals with a topic on which there is little scientific certainty. The process of collecting, collating and analysing knowledge is still in its infancy. Nevertheless, there are probabilities, possibilities, ideas and hypotheses which can serve to direct (research) policy. The State Secretary therefore indicated that this report can be exploratory in nature.

The report is concerned with the consequences of disasters in terms of human health in general. Because immediate interventions (those in the 'acute' phase) can have a significant influence on the consequences in the medium and long terms, such interventions will be considered where relevant. Following consultation with the State Secretary, it was decided that this report should not devote specific attention to the support and counselling provided to members of the emergency services. This should certainly not be taken to imply that the people involved in disaster response on a professional basis do not warrant or require any extra attention. Should it prove necessary, the Health Council will produce a separate report on the health impact suffered by this group.

In producing this report, the Committee has drawn on the international literature. However, it has made particular use of research into the health impact of four disasters which have occurred in the Netherlands: Bijlmermeer air crash (1992), the outbreak of Legionella in Bovenkarspel (1999), the Enschede firework disaster (2000), and the Volendam fire (2001). In examining the international literature, the Committee has relied on synoptic reviews. Accordingly, events such as the terrorist attack on the World Trade Center in New York (11 September 2001) are not given explicit coverage in the report, but are mentioned only insofar as the consequences are included in those reviews. In presenting its summary of the current scientific knowledge regarding the long-term health impact of disasters, the Committee has drawn upon the 2005 bibliography compiled by IJzermans, Dirkzwager and Breuning[106].

In order to gain a better understanding of the issues involved, the president and the secretary of the Committee conducted a number of interviews with the victims (or surviving family members of victims) of five disasters.

1.3 The structure of this report

In Chapter 2, the authors discuss the term ‘disaster’ and define a number of the related concepts. A number of terminological issues arise, due in part to society’s perception of a ‘disaster’, informed as it is by the times and culture, and in part to the fact that the current document is an English translation of the original report written in Dutch.

Chapter 3 describes the nature and extent of the health effects most commonly seen following a disaster, while Chapter 4 presents the results of health surveys conducted following recent disasters in the Netherlands.

Chapter 5 considers the risk factors for psychological complaints and the phenomenon of ‘medically unexplained physical symptoms’ (MUPS). Chapters 6 and 7 are devoted to the interventions which can be made by the government, the medical profession and other response organisations in order to alleviate the immediate hardship caused by the disaster and reduce the likelihood of long-term health problems. The report distinguishes between interventions which address the local community as a whole (Chapter 6) and those which are concerned with the individual (Chapter 7). The authors devote particular attention to the efficacy and effectiveness of these various interventions. In conclusion, Chapter 8 considers future action.

This report observes the stylistic convention of using masculine pronouns throughout. ‘He’, ‘him’ and ‘his’ should always be understood to include ‘she’, ‘her’and ‘hers’.

Chapter 2

Disasters, victims and psychotrauma

The word ‘disaster’ can be used in various senses. For the purposes of this report it is defined as “an event which leads to the disruption of normal societal interaction on such a scale that coordinated government interventions become necessary”. First, we must therefore determine what kind of event will lead to such disruption. To do so, we consider the repercussions for the people affected. For the purposes of simplicity, we shall refer to ‘victims’. This section discusses what constitutes a ‘disaster’ under this definition and outlines the changes that have occurred in society’s thinking with regard to disasters and victims. It also considers the emergence and meaning of the term ‘psychotrauma’.

2.1 Disasters

2.1.1 The meaning of ‘disaster’

The Oxford English Dictionary defines a ‘disaster’ as “anything that befalls of ruinous or distressing nature; a sudden or great misfortune, mishap, or misadventure; a calamity.”, while Roget’s Thesaurus offers (near) synonyms including *adversity, catastrophe, breakdown,* and *fatality.* These are particularly broad definitions. In practice, whether an unfortunate event can actually be termed a disaster depends on the context and the perceptions of those who experience it. This report adopts the definition offered by the Dutch *Wet rampen en zware ongevallen* (Disasters and Major Accidents Act, see inset below.)

The Act states that a disaster is "an event which leads to the disruption of normal societal interaction on such a scale that coordinated government interventions become necessary." However, this clearly calls for the terms 'disruption of normal societal interaction' and 'necessary' (government interventions) to be defined as well.

The definition of 'disaster' according to Article 1b of the Disasters and Major Accidents Act (here in translation).[1]

A disaster or major accident shall be regarded as any event:
1°. which leads to a serious disruption of public order and safety whereby the lives and/or health of many persons, the quality of the environment or any major material interests are damaged or placed in clear and present danger, *and/or*
2°. which demands the coordinated deployment of services and organisations in order to mitigate damage and/or reduce the level of hazard.

It remains difficult to determine exactly when an 'incident' becomes 'disaster'. However, it is possible to identify certain characteristics of an incident which support its being considered a disaster. They include:

- a situation which threatens human health
- a situation in which there is significant material damage
- a situation in which there is acute and immediate danger
- a situation in which the social structures of (part of) the community are disrupted
- a situation which engenders a collective sense of helplessness, insecurity or lack of safety
- a situation of such scale and extent that regular manpower, resources and organisations are inadequate.

The likelihood of an 'incident' warranting the epithet 'disaster' rises in proportion to the presence (or potential presence) of these characteristics. Accordingly, the definition applied in this report is a good operational definition which provides some insight into the type of events that can fall into this category, but it is not conclusive.

2.1.2 *Types of disaster*

The incidents which the Disasters and Major Accidents Act seeks to address are extremely diverse. Natural disasters, major traffic accidents (road, rail or air), explosions, fires, large-scale exposure to hazardous substances, a flu pandemic or an outbreak of some other serious human or veterinary disease: all are covered by the Act. The Ministry of the Interior applies a system whereby various types of disaster are classified for the purposes of preparation[10].

For many years, it was usual to classify disasters into only two groups, based on differences in significance, extent and impact:

- natural disasters: earthquakes, floods, tsunamis, volcanic eruptions, tornados, etc.
- man-made disasters (caused by accidental human action, oversight or negligence): air crashes, shipwrecks, incidents involving chemical or nuclear explosions, etc.

However, many disasters bear some of the characteristics of both categories. They include floods caused by poor maintenance of the water defences, or the effects of earthquakes when combined with poor design and structural engineering of buildings. Moreover, it is possible to add a third category:

- disasters further to deliberate human acts, and in particular terrorist attacks.

Disaster management is not concerned with war situations, and hence neither is this report. Nevertheless, the impact which a war situation can have on human health is to some extent comparable with that caused by a disaster. Indeed, wars are the ultimate disaster. The findings of research in the field of armed combat have therefore contributed to current scientific knowledge about the health effects of disasters.

2.2 Victims and 'persons affected by a disaster'

Various terms are applied to the people who have been affected by a disaster, directly or indirectly. The most common term in everyday usage is 'victim'. Once again, the Oxford English Dictionary has much to say on the matter, offering several definitions and almost 1,500 words of explanatory notes and sources. For our purposes, the closest OED definition is "a person who is reduced or destined to suffer under some oppressive or destructive agency". The literature has recently adopted such terms as 'persons affected by the disaster'* on the basis

that they are less emotionally charged and to avoid the suggestion that absolutely everyone who experiences a disaster will, by definition, suffer long-term effects. Use of the term 'victim' would, it is claimed, detract from people's ability to resume a normal life. Some authors and organisations have even begun to use the term 'involved' rather than 'affected'. It is not for the Netherlands Health Council to enter into such philological debates. For the purposes of simplicity, the term 'victim' will be used throughout this report, but it should be remembered that a person can become a 'victim' either directly or indirectly.

2.3 The phasing and nature of health effects

People who experience a disaster will often experience some adverse health effects, whether physical, psychological or a combination of the two. Serious physical injury (perhaps involving disfigurement) will almost always carry a psychological component, while psychological injury can also manifest itself in physical symptoms. The two types of complaint are therefore closely interrelated. We shall return to consider specific health complaints and their treatment later in this report. Although the recovery processes following a disaster are gradual, it is customary to describe them in a number of phases. There are various systems of such phases in current usage. The Committee has opted to apply a system of three phases: the acute phase (approximately the first four weeks following the disaster), the medium-term phase (four weeks to five years) and the long-term phase (five years and beyond).* The manner in which the health effects of disasters are addressed cannot be viewed in isolation from the social and cultural context, as described in the following sections.

2.4 Social context

Each country and each era has its own response to adversity and disasters. Traditionally, religious and national feelings, with their rituals and symbols, play a key role. The latter half of the twentieth century saw many significant shifts in the way in which people address disasters and their consequences. Many such shifts can be attributed to medical and social developments, as well as the interaction between them.

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* An internet search using Google results in some 152,000 hits for "persons affected by war", compared to 489,000 for "war victims".

* For the sake of simplicity, this report refers to the 'longer' term to cover both the medium and long terms.

2.4.1 *The emergence of the term 'psychotrauma'*

Fifty years ago, the term 'trauma' referred almost exclusively to physical injury; only neurologists applied a different meaning. Today, the word is commonly used in the sense of 'psychotrauma', with terms such as 'stress' and 'coping' entering the everyday vocabulary. In recent years, the public's awareness of the psychological effects of disasters has increased greatly. Most people now know and accept that involvement in a disaster can cause psychological problems, and that such problems can persist for a long time. This increased awareness is further to a process which began in the mid-twentieth century, whereby the public, or at least that of the western world, became more interested in and familiar with matters of health, medicine and psychology. The causes of this process include increased social respect for scientific thinking in the fields of medicine and psychology, the creation of specialist disciplines within healthcare, the ongoing secularisation of society, and the establishment of the welfare state.

2.4.2 *Medical developments*

The deep scars that a disaster can cause have featured in the literature since the time of Homer[192]. However, it is only in the last 150 years that researchers have turned their attention to the lack of psychological well-being from the medical perspective. Medical papers were written about anxiety and dissociative symptoms among front-line troops in the American Civil War (1861–1865) and in both World Wars. These papers laid the foundation for today's scientific knowledge about the physical and psychological responses to extremely stressful situations.[58,80,104,192] Each successive war saw new terms being applied to the health conditions experienced by soldiers: 'irritable heart', 'effort syndrome', 'shell shock', 'war neurosis', and latterly 'combat stress disorder'. The symptoms which drew the doctors' attention to the possibility of stress-induced conditions included palpitations, extreme fatigue, headache and dizziness: exactly the symptoms which are now among the category of 'medically unexplained physical symptoms'.

It was only in the late twentieth century that the responses to extreme stress began to be regarded as symptoms of a disorder which was not directly linked to the patient's individual character or predisposition to mental problems. This was largely due to the findings of studies among Vietnam veterans, victims of sexual violence, the survivors of Nazi concentration camps and those of the atomic bombing of Hiroshima and Nagasaki.[16,71,130] Such research led to the coining of

the term 'Post-traumatic Stress Disorder' (PTSD), which was included in the classification system for psychiatric disorders in 1980.[13,15] It was therefore recognised that certain drastic experiences can indeed give rise to a psychological disorder with specific characteristics and symptoms. The introduction of standardised diagnostic interview techniques[102,166,167] enabled more systematic research to be conducted into the symptoms which can emerge following a disaster. In the case of disorders such as depression and PTSD, certain clear and generally accepted criteria have been established. In the case of 'medically unexplained physical symptoms' (MUPS; see Section 3.5), the quest for such criteria continues. Persistent recall, avoidance behaviour, depression, substance abuse and certain physical symptoms seem to occur in a substantial proportion of disaster victims. While our knowledge about the causes, risk factors, progress and treatment of these symptoms has increased, there is still some uncertainty regarding the most appropriate medical response to MUPS.

The concept of PTSD has also drawn criticism and demur. It is frequently regarded as a social construct just as much as a medical one, whereby even those who have previously functioned well and have shown no signs of mental instability can be seriously affected by a traumatic event. Indeed, this is reflected by the very name *Post-traumatic* Stress Disorder, which suggests that the cause of the condition is external. Critics claim that, by regarding the 'stressor' as the prime causative factor, insufficient attention may be devoted to aspects of assistance, social support, personality, culture and the perceptions of victims.[184,216,218] This sort of criticism has prompted much debate and the arguments have yet to be resolved. There continues to be a distinct difference of opinion regarding the degree to which the various factors, including the objective seriousness of the event, the psychological make-up of the victim himself, and the affective context in which he has experienced the event, are responsible for the emergence and persistence of the disorder.

The findings of research conducted in America are significant in this context. It was found that ethnic and cultural groups show distinct differences both in their susceptibility to psychiatric or psychological disorders following a disaster, and in the degree to which they will seek treatment for such disorders.[152] Research in the Netherlands has also contributed to the awareness that, while there are similarities between certain demographic groups, there are also distinct differences, not only in terms of the way in which they express their lack of well-being but in the course of their recovery (Bijlmermeer[57], Enschede[67]). One limitation of the current research literature on the psychological effects of disasters is that over eighty per cent of the publications in English are concerned with studies conducted in the western, industrialised countries.[152]

2.4.3 *Medicalisation, psychologisation and legalisation*

The medical and psychological approach to disaster response has now largely subsumed the traditional national and religious approaches. Insomnia and listlessness are now more commonly viewed as real symptoms of a real condition and hence a matter for the doctor or psychologist. Today, disaster victims will receive information from the assistance services and through the media on the disorders they may experience, possible symptoms and how to interpret those symptoms. Accordingly, psychological reactions have become the domain of public health care services, with a role for the government in terms of prevention and treatment. The recent worldwide wave of terrorist attacks has served to give this development new topicality. Terrorism, as the very word implies, is intended to prompt a psychological reaction on the part of the general public. If the effects of terrorism are to be mitigated, it is essential for governments to stress that fear is a perfectly normal response to danger, and to promote self-reliance and resilience.

The increased 'medicalisation' of psychological problems, and the growing expectation that society should provide solutions for the benefit of the individual, is not specific to disaster situations. In the treatment of almost all psychological complaints in the general population, and especially that of anxiety and depression, there is a general trend whereby people seek and expect professional attention.[124] People now regard the *treatment* of their psychological problems as more important than support from their social network or religious community.

Further to this, there is also a trend whereby victims are likely to seek legal redress in the form of compensation. More than ever before, people are aware of their rights and are prepared to exercise them. The lawyer has therefore come to play an even more important role. The willingness – or desire – to seek compensation for alleged suffering caused by all sorts of events also extends to the psychological damage caused by disasters. Indeed, the Dutch government set up compensation funds following the Bijlmermeer air disaster, the Enschede firework explosion and the Volendam fire, and the victims of that fire were also declared eligible for functional invalidity benefits.

2.5 Conclusion

To establish the most appropriate disaster management and response policy demands a realisation that not only scientific knowledge is of relevance, but also the socio-cultural context of the day. With regard to the terms of reference within which the Committee was asked to produce this report, a further relevant factor is

that the problems experienced by victims following a disaster are now recognised as actual medical and psychological conditions. In the past, they may have been regarded as problems inherent to life in general, which must be addressed by the individual. Society's attitude to disasters and their victims has changed, as has that of the medical profession. There is now greater compassion for victims, and greater attention (including media attention) for the way in which the effects of a disaster should be addressed.

Another aspect which policy must recognise is the tendency to apply the words 'disaster' and 'victim' – words which are traditionally associated with extreme situations – to more trivial events.

It is reasonable to assume that there is a link between the 'medicalisation' of the psychological complaints caused by disasters and other significant socio-cultural developments. These include the individualisation and secularisation of society which have led to the loss of traditional symbols and support systems, as well as the emergence of the 'compensation culture'. The authors regard such developments as 'givens' which do much to determine the context of this report. It is not for the Health Council to pass any judgement concerning their desirability.

One point on which the members of the Committee were unable to agree is whether the Netherlands now has a 'victim culture', whereby the term 'trauma' is inflated and a greater number of people are regarded (or are encouraged to regard themselves) as 'victims'.[218] If so, this would result in a decline in self-reliance and increasing demand for assistance services, at the cost of those who actually require such services. Some members believe that they have observed such a development in the Netherlands, while others see little or no evidence to support the claim.

Chapter 3

The health impact of disasters

Involvement in a disaster situation can affect both physical and mental health. Physical health may suffer due to direct injury, contamination, radiation or poisoning. Mental health can suffer due to the shock of the event itself and its aftermath. Given that all disasters are unique, and that there are significant differences in the form and methodology of the available studies, it is difficult to draw any general conclusions about health impact. However, 'difficult' does not mean 'impossible', as the following will demonstrate.

3.1 The link between health complaints and the nature of the disaster

Researchers originally assumed that technological disasters would inflict greater damage to health than natural disasters, because they believed that this type of disaster underlines human callousness and negligence and hence undermine the life perspective. However, a 1991 meta-analysis[170] reveals that it is actually natural disasters which cause greater stress and psychopathological disorders than those attributable to human failure. These findings were included in a semi-quantitative review of the empirical literature published in 2002[152], whereby they were placed in perspective by further findings that the nature and location of the disaster are also significant. In developing countries, the consequences of natural disasters are usually more serious than those of any type of disaster in the western world. This is attributed to the better quality of housing, the regulations covering land usage, alarm systems and so on which are common in the west. In the

industrialised countries, however, technological disasters appear to cause greater stress and other negative impact than natural disasters, although it must be conceded that evidence to support this statement is limited.[78,152] Apart from the fact that research findings can be subject to methodological error, they can also be distorted by the inclusion of too many 'indirect' disaster victims. The effects recorded will then be only slight, since there is a direct relationship between the degree to which someone is affected by the disaster (the immediacy) and the extent of the effects he will experience.

There are indications that mass violence, such as a terrorist attack, will account for greater impairment to psychological well-being than any other type of disaster.[152] Sudden terrorist actions create acute feelings of fear and helplessness, undermining the public's confidence more than other disasters. Many people feel vulnerable and exposed, having been robbed of their belief that the world around them is a safe and just place.

3.2 Body and mind

It is customary to classify health complaints as either physical or psychological, each with their own distinct set of causes. Were we to apply this approach to the disorders which can be caused by disasters, we would not be telling the entire story. Besides physical injury resulting directly from the disaster and the psychological effects, there is a third category known as 'medically unexplained physical symptoms' (MUPS). As the term makes clear, these are physical symptoms without any clear underlying physical cause and no direct (demonstrable) connection with the disaster itself. Such systems can include persistent headache, fatigue, stomach upsets, joint pain and muscular pain.

The authors believe that any discussion as to whether MUPS should be regarded as a physical or a psychological condition will be fruitless. Body and mind form one intrinsic whole. Accordingly, for the purposes of this report, the Committee has opted to recognise three separate categories of health impact: physical injury as a direct result of the disaster, psychological disorders and MUPS. It does so for practical reasons rather than any desire to apply any strict separation between the three.

3.3 Physical injury

A disaster can cause many different types of physical injury, depending on the nature of the disaster and the extent of the victim's exposure. It is notable that so

Table 1 Reported health complaints/disorders following various types of disaster.

	skin	eyes	respiratory	cancer	reproductive planting	gastro-intestinal
earthquake	+[21]					+[134]
forest fire		+[217]	+[49]			+[50]
flood						+[213]
storm	+[125]		+[125]			+[125]
volcanic eruption		+[117]	+[133]			+[133]
chemical spillage	+[24]	+[61]	+[61]	+[25]	+[144]	
explosion	+[22]	+[122]	[155]			
nuclear disaster				+[188]		
terrorist attack		+[139]	+[141]			

little systematic research has been devoted to this category of health effect. Similarly, research into the longer-term consequences is very scarce.[106] The quality of that which does exist is questionable, chiefly because most studies lack adequate control groups. Table 1 presents an impression of the links between certain physical complaints and certain types of disaster. Some of the complaints in the rightmost column (gastro-intestinal) could fall equally well into the category MUPS (see Section 3.5).

3.3.1 *Radiation*

Exposure to ionising radiation can occur due to accidents at nuclear power stations, through deliberate use of nuclear weapons, or further to terrorist action. The nature and size of the victim group will vary according to the type of incident. There can be immediate, short exposure, or long-term indirect exposure to various radionuclides via contaminated food and water. The direct effects will be seen within a few months in the form of mortality due to radiation sickness. In subsequent years, there may be deaths due to cancer. Further information about the risks of exposure to ionising radiation is to be found in the Health Council's report on this topic, published in 2006.[88]

The greatest nuclear disaster in history took place at the Chernobyl Nuclear Power Plant (Ukraine) on 26 April 1986. The World Health Organisation (WHO) and the Chernobyl Forum (an international group of experts assembled by the International Atomic Energy Agency) have since made an inventory of the health effects for which clear scientific evidence exists.[9, 188] During the first four months after the disaster, 28 people (plant employees and emergency service workers) died due to radiation poisoning and/or burns. Between 1987 and 2004 there were a further 19 deaths due to radiation exposure.[188] An increase in the

incidence of childhood thyroid cancer was also noted, with no fewer than 4,800 cases diagnosed.[9]

The increase in cases involved mostly children who were aged under two at the time of the incident, including unborn babies still in the womb. Nine have since died. Among emergency response workers and the residents of the affected area, only a very slight increase in the mortality rate has been observed (compared to control groups). Nevertheless, it is certain that the disaster has had a major impact on the psychological health of the victims. That is due to several factors, including the large-scale evacuation of the area, the loss of economic stability and the ongoing uncertainty with regard to the potential long-term health effects of exposure to radiation. The increase in health complaints reported by the local population can probably be better explained in terms of the *fear* of radiation than in the actual radioactive emissions themselves.[97]

It is estimated that some four thousand people (emergency workers, evacuees and the residents of the most heavily contaminated areas) will die from cancer caused by the ionising radiation.[188] However, this estimate allows for a wide margin of error. Other estimates place the figure at anywhere between thirty and sixty thousand deaths.[74] This illustrates the dilemma that a government can face when providing public information about the consequences of a disaster. Nevertheless, it is important that it is fully open about the uncertainties that exist.

Exposure to ionising radiation caused by an accident involving a nuclear weapon, deliberate use of a nuclear weapon or a terrorist attack could contaminate large areas and large numbers of people. The major issues would then be the scale and speed of the evacuation and the supply of uncontaminated food. The extent of exposure and the degree to which delayed effects would emerge are particularly difficult to assess, giving rise to great uncertainty concerning health.

3.3.2 *Infectious diseases*

Exposure to microbial agents can also have widely varying health effects, depending on the specific pathogen concerned. Besides outbreaks of infectious diseases which are known or suspected to be capable of human-to-human transmission – e.g.influenza, Severe Acute Respiratory Syndrome (SARS) and fowlpest – there can be (insidious) incidents affecting relatively large numbers of people. An example is the 1999 Legionella outbreak in Bovenkarspel (see Section 4.4). It is also possible that microbial agents such as anthrax spores could be deliberately used in terrorist activity. As a general rule, the organisations involved in the control of infectious diseases will quickly be aware of the nature

of the threat, its source, the seriousness of the potential effects and the manner in which the disease is likely to spread. In the case of terrorist use, on the other hand, it will not always be possible to provide a clear indication of the risks of exposure nor when the contaminated area can once again be regarded as safe. However, unlike the effects of ionising radiation, which have a long latency period, those of microbial agents will quickly become evident.

3.3.3 *Toxic substances*

There are many misconceptions regarding the effects of (usually short-term) exposure to toxic substances during a disaster. These substances can be emitted in solid form, usually as particulate matter (as in the case of asbestos or a dust cloud following an explosion), in liquid form, as an aerosol (extremely small droplets of liquid in the air) or as a gas. The smoke from a fire consists of a mixture of particulates and gases. Exposure is mostly through inhalation. Occasionally, exposure occurs due to direct skin contact, but usually only among those people who are extremely close to the epicentre of the disaster. Even where a dermatological reaction does occur, the level of gaseous substances absorbed through the skin is usually so low as to be negligible.

The nature of the physical reactions will depend on the substance or substances concerned.[205] The effects on human health of most of the chemicals used in industrial processes are unknown, whereupon it is not possible to predict the longer-term health impact. Much the same applies to exposure to smoke. In disasters in which chemical substances are emitted, exposure will generally be limited and of short duration provided people manage to leave the affected area quickly and escape the (visible) smoke. The main impact will then be the acute effects of the smoke and dust and, depending on the nature of the disaster, the effects of any specific chemical substances. Those effects are limited and temporary, comparable with the powder smoke created by fireworks lit at a bonfire party. Only if there is exposure (even of short duration) to high concentrations of caustic substances such as chlorine and methylisocyanate (Bhopal, see below), or longer-term continuous exposure (say, fifteen minutes or longer) close to the source (and with deep inhalation) will a person ingest enough of the toxic substance to cause irreversible damage to internal organs. (See also the Health Council's report on intervention norms for disaster management, to be published in 2007.) In practice, it may be impossible to flee the disaster area and escape exposure entirely. This would be the case if the incident were to occur in a tunnel, underground station or other enclosed space which can not be readily evacuated for whatever reason. Finally, inhalation of substances having a very long

elimination half-life (weeks or months as in the case of dioxins or polychlorbiphenyls) can result in visible toxicity (e.g. chloracne) only much later. To date, no such incidents have been reported in the Netherlands.

In fact, there have been no toxicological disasters in the Netherlands which have caused the deaths of members of the general public. The best-known chemical disasters elsewhere include the dioxin disaster in Seveso, Italy (1976)[23-25] and the disaster involving the emission of methylisocyanate (MIC) at the Union Carbide plant in Bhopal, India (1984).[61,144] In Seveso, the most immediate and most evident health effect was the (temporary) incidence of chloracne. Longer-term effects included a higher mortality rate from cardiovascular disorders, which may have been due to the stress of the incident and its aftermath. The immediate death toll in Bhopal was over two thousand, but it is estimated that a further ten thousand people died during subsequent years as a result of their exposure to the gas, while two hundred thousand have experienced long-term health effects including various forms of physical incapacity.

3.4 Psychological effects: prevalence, progress and prognosis

There are great differences in the way that individual people respond to a disaster. There can be no doubt that to be directly involved in a disaster places a great burden upon one and makes substantial demands on one's ability to adapt. It is therefore only normal for people to display stress reactions during the disaster itself and the period immediately thereafter. Such reactions may be at the emotional level, (anxiety, anger, dismay, grief, 'emotional numbing'), at the cognitive level (reduced concentration, memory lapses, reduced decision-making ability, confusion, nightmares, feelings of guilt, 'fretting'), at the physical level (fatigue, exhaustion, insomnia, irritability, reduced resistance, headache, gastro-intestinal complaints), and at the interpersonal or social level (argumentative behaviour, poor performance at work or school, mistrust, feelings of rejection, or a tendency to become over-protective of loved ones). Although these reactions can be intense and unpleasant, they must be regarded as a 'normal response to an abnormal event'[83] and in most cases the related physical symptoms will disappear spontaneously. In short, a person is severely affected by the disaster, but will not meet the clinical criteria for any documented 'syndrome'. In most cases, people manage to recover their equilibrium within a reasonable period.

The most common psychological disorders seen in the longer term are depression, anxiety and (symptoms of) Post-Traumatic Stress Disorder, including persistent recall of the event and the avoidance of situations or locations which are reminiscent of the disaster. This applies equally to natural disasters and those due

to human commission or omission, and symptoms may be seen in both adults and children.[37] Excessive consumption of alcohol among adolescents[162,163] and substance abuse among adults[33] have also been reported. The literature sometimes refers to psychological complaints and MUPS jointly under the heading 'disaster syndrome'.[73] We can speak of Post-Traumatic Stress Disorder (PTSD) where certain forms of serious stress symptoms (persistent recall, avoidance, increased irritability) endure for longer than one month after the event, or develop more than one month after the event.* (The clinical criteria for PTSD are presented as Annex C to this report).

Estimates of the prevalence of psychopathological reactions to disasters vary widely. This is due to the specific character of each disaster and the major differences in research methodology and populations. Estimates of prevalence one year after the event range from 20 to 50 per cent,[37,98] which would correspond with the findings of research conducted in the Netherlands (see Chapter 4). The estimates are primarily based on disasters which have occurred in the western industrialised countries. In developing countries, the proportion of victims displaying psychopathological disorders after a devastating disaster can be higher.[173]

The fact that between 20% and 50% of disaster victims still have psychological complaints one year after the event does not necessarily entail any increase in the prevalence of psychiatric disorders with recognised classification criteria. Much past research has relied on questionnaires completed by the victims themselves, rather than on clinical interviews or clinical criteria further to the DSM-IV or ICD-10. An increase in reported psychological complaints for which classification criteria exist (anxiety disorder, depression, dependence, PTSD) is less clearly documented in the literature. A limited number of studies involving the general population, with monitoring at intervals before and after the disaster, shows no significant increase in the prevalence of disorders.[38,44,73,168,180] However, these studies were small in scale and in some cases had methodological shortcomings. Among certain groups, including mothers with young children,[39,100] evacuees,[100] ethnic minority immigrants,[34,67] people with previous psychiatric problems[35,39] and adolescents,[30,34,221] the disorders considered here were recorded in much larger numbers. Moreover, experience following the Enschede firework disaster, whereby a total of some eight hundred patients presented with a diagnosable psychological disorder over a four-year period and

* It is necessary to draw a distinction between PTSD and 'Acute Stress Disorder' (ASD), the latter referring to cases in which the symptoms appear within four weeks of the event and persist for at least two days. In order to meet the clinical criteria for ASD, the patient must display dissociative symptoms, either during or immediately following the disaster itself. (See also Annex C).

were treated by a specialist aftercare team,[149] suggests that the complaints experienced by adults are sometimes serious enough to meet the criteria for a clinically relevant disorder.

Only a small number of reviews considering the course of the complaints over time are available,[152,212] as well as a number of separate articles and reports (see also Chapter 4). It would seem that symptoms and effects are usually most marked in the period immediately following the disaster, whereupon they gradually decrease in intensity.[170] Occasionally there may be brief periods in which their regression slows or is actually reversed. In a very few cases, the complaints emerge only after some time has passed.[221] Most symptoms and effects are largely resolved entirely within one year to eighteen months. However, some persist for much longer or can actually become worse over time.[18,136,215] Among a statistically significant minority of the study populations (estimated to be between 20% and 25% of victims), the symptoms persist for months or years, and occasionally for longer than ten years.[143,221] Moreover, a clear link has been established between the seriousness of the symptoms in the short term and that of symptoms in the medium and long terms.[152]

3.5 Medically Unexplained Physical Symptoms (MUPS)

To be involved in a disaster is a traumatic and stressful experience which can certainly bring about certain adverse health effects.[205] Often, it is difficult to determine whether the problems and symptoms which emerge after a disaster are due to exposure to toxic substances, to the stress situation, to a combination of the two, or to sheer coincidence. It is certainly possible that some health problems which have been caused by entirely different causes are attributed to the disaster. In such cases, there are often physical symptoms such as persistent headache, fatigue, stomach pain, chest pain, pain in the joints and muscles: all symptoms for which no direct medical cause can be found and which are common in the general population at any time. These symptoms may be ascribed to exposure to hazardous substances or radiation alleged to have been emitted during the disaster, even where there is no clear relationship. This phenomenon is also known as somatic (or causal) attribution and can be extremely persistent.[36,96] One way in which it can be countered is to conduct research into the extent of possible exposure as soon as possible after a disaster in which there is any suspicion that toxic substances or radiation have been released (see also Sections 4.2.1 and 6.4). Somatic attribution was particularly noticeable in the aftermath of the Bijlmermeer air disaster (see Section 4.1). Following the Enschede firework disaster, attempts were made to preclude it by performing an exposure study almost imme-

diately. Although an increased prevalence of MUPS was indeed recorded in Enschede[92,110] (see also Sections 4.2.1 and 4.2.2), there were no indications that people were routinely attributing their physical symptoms to exposure to hazardous substances. It may be that the favourable results of blood and urine tests played a role here.

Researchers have attempted to identify syndromes of physical symptoms which are typical of certain types of disaster, but this quest has thus far been in vain. The frequency of self-reported physical symptoms is indeed higher among the disaster victim groups than in the general population, but the profile is virtually identical. There are indications that disasters which involve exposure (or presumed exposure) to hazardous substances or radiation account for a relatively high number of MUPS cases,[95,97] but there is no little hard evidence to support any direct link. Estimates of the prevalence of MUPS among the general population, i.e. disregarding any disasters, vary from 6% to 36%.[17,135,193] Following a disaster, the percentage is usually higher (against that of a control group) but the degree of variance differs according to the precise symptoms. Moreover, the prevalence of the various health complaints varies greatly from one disaster to another, even when measured at the same intervals.[191]

The prevalence of MUPS usually decreases over time,[191] but there are exceptions. Some instances in which the prevalence has remained stable for months or even years have been recorded ,[55,62,118,215] as has an actual increase in prevalence over time.[136]

3.6 The effects of disasters on other aspects of life

Even where physical or psychological complaints fail to meet the clinical criteria required for a specific syndrome or disorder, they can indeed affect various aspects of daily life. They account for decreased quality of life and increased demand for healthcare provisions. Sometimes, performance at school[34] or work can suffer, and there may be cases of employment incapacity. However, these effects were not observed in some studies.[36,131,179] While it is not always clear exactly what is cause and what is effect, it is certain that disaster victims do sometimes experience a multitude of interrelated problems, including loss of their home, work problems, financial problems, relationship problems and health complaints. This is illustrated by the autobiographical account of someone involved in the 1992 Faro air disaster.[186]

It also seems likely that involvement in a serious incident will alter a person's outlook on life, and this is also of great significance. It has been established that the local birth rate falls (and the number of terminations on request increases)

following a disaster in which toxic substances or ionising radiation are released.[99] This phenomenon is attributed to a negative attitude towards bringing children into the world. However, involvement in a disaster can, in the fullness of time, also have positive effects. It would seem that disasters eventually make some people and communities better rather than worse. It is suspected that people who have been directly confronted with the fragility of the human existence will take an entirely different view of life. They will re-order their priorities, become better able to assess the true value of everyday events and objects, and to enjoy them accordingly. In the literature, this phenomenon is termed *'post-traumatic growth'*.[126,171,182,185]

Chapter 4

Health studies following recent disasters in the Netherlands

Over the past fifteen years, health surveys have been conducted following the Bijlmermeer air disaster, the Faro airport disaster (1992),[186] the fire on the Achille Lauro cruise liner (1994),[195,196] the Hercules air crash (1996), the Legionella outbreak in Bovenkarspel (1999), the Enschede firework disaster (2000), the ATF fire in Drachten (2000)[69] and the Volendam café fire (2001). Similar studies were carried out following the outbreak of foot-and-mouth disease in 2001[202] and that of fowlpest in 2003.[31] The form of these studies varied from written questionnaires to individual medical inspections (partly further to establishing treatment plans), and epidemiological research at group level. Both existing records and information gathered specifically from the victim groups were used. In the case of the 1996 Hercules air crash, a group of emergency rescue workers was investigated after a period of several years, with particular reference to the impact which the incident had upon them and the manner in which they were able to cope with any subsequent effects.[198]

These studies have provided much important information about the short-term effects experienced by disaster victims, their families and friends, and in some cases about the long-term effects and the effects experienced by emergency service workers. In terms of medium and long-term effects, the surveys conducted following four disasters are of particular relevance: the Bijlmermeer air crash, the Enschede firework disaster, the Volendam fire and the Legionella outbreak in Bovenkarspel. Each has produced quantitative information about the incidence, seriousness and course of the health complaints attributable to the

respective disasters. The results of these studies seem to confirm the trends described by the international literature and discussed in Chapter 3 of this report.

4.1 The Bijlmermeer air crash (1992)

On 4 October 1992, an El Al Boeing 747 cargo plane crashed into two apartment buildings in the Amsterdam district of Bijlmermeer. The four-man crew and 39 people on the ground were killed. Initial estimates of the number of people who had witnessed the incident at first hand ranged from eight hundred to one thousand, including up to three hundred children. Over 260 people were made homeless.[81] Based on studies conducted by local GPs, it was later estimated that approximately 6% of the local population – some 5,500 people – had in some way been affected by the disaster.[111]

Soon after the incident, research was conducted to determine whether it had led to any increase in the sensitivity to aircraft noise in the district. For the first three to ten weeks after the incident, there did indeed seem to be a temporary increase in perceived noise nuisance.[160,161]

Six months after the disaster, 26% of those affected (including the eye-witnesses) were found to be suffering from post-traumatic stress disorder, while 44% displayed post-traumatic stress reactions without actually qualifying for the diagnosis PTSD.[46] At this time, 73% of the survey respondents had availed themselves of the victim support services, and the majority were satisfied with the assistance they had received.

Eighteen months after the disaster, there had been hardly any reduction in the number of victims with a psychological disorder such as PTSD.[45] It then became clear that a number of people were suffering from post-traumatic personality changes, or complex PTSD, manifesting itself as physical and mental exhaustion. It was also discovered that it had taken some victims a very long time to gain access to the support and counselling services.

In 1998 and 1999, i.e. six and seven years after the disaster, the Academic Medical Centre (AMC) in Amsterdam and the Netherlands Institute for Health Services Research (NIVEL) conducted a further study into health complaints (reported by telephone) which the people concerned attributed to the disaster. No fewer than 846 callers reported a total of 3,463 complaints (an average of four per caller). Ten per cent of these complaints had emerged within a year of the disaster but had been resolved by the time of the phone calls. The other ninety per cent were ongoing complaints. A doctor (usually the patient's own GP) had been consulted for 87% of the complaints, and a prescription had been written in respect of 60%. Three in four respondents (77%) reported physical symptoms

(such as non-specific malaise and gastro-intestinal problems), 42% reported psychological problems, 33% complained of respiratory problems, and 22% reported localised mobility problems, including joint and muscular pain. Of the 143 eyewitnesses to the disaster, 99 (69%) reported symptoms of PTSD. Because there was no control group, this study was supplemented by two validated health questionnaires for which general reference information was available. A comparison revealed that respondents' answers deviated (in a negative sense) from the reference norms in all areas of physical and psychological functioning.[111]

The study also scrutinised GPs' patient records for 553 callers (subject to informed consent). Researchers investigated whether the complaints reported by telephone had also been reported to the GP, and whether there was any probable connection between these complaints and the disaster. Of the ten most frequently reported complaints, memory lapses (forgetfulness) was the least likely to have been reported to the GP. Those for which medical advice had been sought most often were fatigue, dermatological problems, anxiety, shortness of breath and back problems (all with a reporting rate of approximately 80%). According to the researchers, only 2211 complaints could be classified as '(very) probably connected to the disaster'.[111] In fact, 11% of the various problems had been drawn to the GP's attention *before* the disaster occurred, while 15% were reported only within a few months prior to the survey reference date (i.e. in mid-1998).

Uncertainty regarded the cause of the crash and the nature of its cargo did much to prolong the aftermath of the disaster. Inadequate risk communication fed media speculation. At this time, the psychological symptoms (anxiety, nervousness, recall) and acute stress caused by the disaster itself gave way to stress caused by concerns about the alleged hazardous cargo of the aircraft itself. This stress manifested itself as medically unexplained physical symptoms (MUPS). The degree to which the disaster had impinged upon its victims' lives was found to be a good predictor of the extent of psychological impact, regardless of gender or country of origin.[111]

The high level of social unease which had now arisen among both the local population and emergency service workers eventually led to a large-scale study being mounted. In fact, the *Medisch Onderzoek Vliegramp Bijlmermeer* (Medical Investigation following the Bijlmermeer Air Disaster; MOVB) was first suggested when the Health & Safety department of KLM wished to undertake a further study of hangar staff who had handled the wreckage of the aircraft and who had reported certain health problems. Later, the study was expanded to include the police who had attended the scene and the local residents. It involved a combination of individual medical examinations and an epidemiological survey. This study was set up under great social and societal pressure, and commenced a full

eight years after the disaster itself. The epidemiological survey component proved unviable since the pre-determined response criterion of 70% could not be achieved.

The individual medical examinations involved over 4,800 local residents and emergency service workers, and were conducted between January 2000 and March 2002. The appointments included extensive personal attention for any physical or psychological complaints reported by the subjects. Following the 'check-up' itself, the doctor would make an appointment to discuss and explain the findings. During this follow-up appointment, the doctor would also give his assessment of the subject's overall state of health. Some 24% of subjects were advised to ask their GP for a referral to the specialist aftercare services.[119]

An epidemiological survey of emergency service workers was conducted among three groups: the police officers who had attended the scene of the disaster, the fire service crews at the location, and hangar staff who had subsequently been in contact with the wreckage of the aircraft. Their details were compared with those of three similar control groups who had not been involved in dealing with the disaster. The survey involved information relating to a total of 2,500 individual subjects. It sought not only to measure the effects of the disaster itself, but also those of the aftermath. A proportion of the groups who had been directly involved in the disaster continued to show more physical and psychological complaints than the control groups even seven years after the event itself. Such complaints included rashes and skin eruptions, stiffness and pain in joints, fatigue, chronic coughing, concentration problems and depression. Accordingly, a connection was established between these complaints and the disaster. In addition to the questionnaires, the study involved taking blood, urine and saliva samples. The comprehensive laboratory tests carried out further to a full physical examination revealed no differences between the survey subjects and the control groups. Urine samples were tested for any indications of exposure to hazardous substances.* Here too, there was no difference between the subjects who had been involved in the disaster and those who had not.[103,120] The main conclusion of a doctoral thesis produced further to this epidemiological survey is that the professional involvement of the emergency workers required to attend the scene of the Bijlmermeer air disaster did result in medically unexplained symptoms in the long term.[178]

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* The Committee wishes to note that urine and blood tests conducted many years after the event would not be expected to reveal signs of exposure to hazardous substances, since all such substances would have been naturally expelled, excreted or depleted to below detectable levels during the intervening period. However, such tests can be useful in the treatment of patients.

The effects survey conducted as part of the MOVB investigated whether participation in the study itself had helped to alleviate feelings of unease on the part of the emergency service personnel and local residents. Approximately 3,500 emergency workers and local residents took part. The results reveal that concerns and complaints actually increased slightly as a result of the study. Participation in the MOVB did not serve to reassure the subjects, and in some cases it exacerbated concerns about personal health. This was particularly true of those subjects who had reported having serious concerns even before the study.[121,211]

The suggestion that disaster victims could have been exposed to uranium radiation led to twenty people being tested for chromosome damage. All tests proved negative.[29]

The Bijlmermeer air disaster is an example of an incident in which people attribute their health problems to exposure to substances or radiation thought to have been released during the event, despite their initial satisfaction with the aftercare services. This phenomenon was seen among both the local residents and the emergency response staff. There was even one GP active in the local community who attributed his patients' symptoms to such exposure. The situation drew extensive media coverage and speculation, resulting in a vicious circle of rumours about alleged exposure as an explanation for certain physical complaints.

4.2 The Enschede firework disaster (2000)

On 13 May 2000, a series of explosions in the warehouse of S.E. Fireworks in Enschede caused over one thousand casualties and (eventually) claimed 23 lives. Serious damage to houses over a wide area resulted in over ten thousand local residents having to leave their homes for one or more days, while some 1,200 lost their homes and their personal possessions altogether.[183] Of the many casualties, 527 received treatment in various nearby hospitals: 13% were admitted while 87% were treated as out-patients. Sixty per cent of the admissions required surgery for perforating thorax, stomach or skull injuries, non-perforating stomach injuries and/or compound fractures. The majority of out-patients required treatment for secondary blast injuries to the head and extremities (superficial injuries, cuts, contusions and fractures) caused by flying shrapnel.[207] No specific follow-up information is available for this group.

Immediately after the disaster, the Minister of Health and Welfare appointed a Coordinator of Victim Support Services whose immediate responsibilities included the setting-up of an Information and Advice Centre to provide integrated psycho-social assistance to anyone affected by the incident. The Coordi-

nator was also expected to prepare for the eventual establishment of Centres of Expertise to undertake health surveys and provide psychosocial aftercare following any future disaster. The Coordinator recommended that a health survey should be conducted among the people affected by the Enschede disaster, and this survey eventually grew to include a number of studies conducted under the general banner of *Gezondheidsmonitoring Getroffenen Vuurwerkramp Enschede* (Health Monitoring of Victims of the Enschede Firework Disaster; GGVE), with results published in subsequent years in the form of interim reports. The final report has now also been published.[183] Several further studies were conducted by other organisations, including Medisch Spectrum Twente (a cooperative alliance of hospitals in the region), the University of Twente, the City of Enschede, the association representing the victims of the disaster and the regional federation of general practitioners. These studies examined aspects such as the victim support plan, social and physical reconstruction, and the workload of general practitioners. The current report includes only a summary of the main conclusions of the GGVE studies.

4.2.1 *Specific research among victims*

The first health study, which involved a population of over four thousand people, was concerned with exposure to hazardous substances, the subjects' overall state of health (with particular reference to the psychological effects experienced by direct victims, passers-by and emergency workers), and environmental monitoring.[138] A study conducted by the National Institute for Public Health and the Environment (RIVM) soon after the disaster revealed no elevated levels of certain specific elements in the blood and urine samples provided by the study group which would indicate exposure to the chemicals used in fireworks.[165] The initial results were published eight weeks after the disaster itself. It was therefore quickly established that victims had not been exposed to any hazardous substances.

The study of the health effects experienced by local residents, passers-by and emergency staff was carried out by the RIVM and the Institute for Psychotrauma.[92,183] It relied on questionnaires presented to randomly selected respondents at three set reference points: three weeks, eighteen months and almost four years after the disaster. For the purposes of comparison, the latter two questionnaires were also presented to a control group of respondents in Tilburg who had not been involved in the disaster.

During the first two to three weeks following the explosions, the percentage of non-ethnic residents reporting health complaints showed a marked rise. The

most common health problems were depression and anxiety, persistent recall, avoidance, insomnia, physical symptoms and loss of physical functionality (see Table 2). Eighteen months after the disaster, the prevalence of these symptoms had indeed declined slightly, but even after four years, some people in this group were still experiencing physical and psychological health impairment. Those victims who had experienced serious damage to their homes and property showed a prevalence of health complaints two-and-a-half times higher than that of the Tilburg comparison group. Of those people in the non-ethnic group who were previously in employment, twenty per cent were claiming incapacity benefit two to three weeks after the disaster, this figure falling to ten per cent after eighteen months and to nine per cent after four years.

Among the group of victims of ethnic origin, the percentage with health complaints was between one-and-a-half and three times greater than in the non-ethnic group, regardless of whether there had been serious damage to home and property (see Table 2). Although here too there was a clear decline in the prevalence of health complaints over time, some 60% to 65% were still suffering some degree of depression, persistent recall and avoidance, physical complaints and/or sleep disorders four years after the event. At the eighteen month reference point, 41% of the ethnic victims had PTSD and this figure remained unaltered at the four-year reference point. Among this group of victims, use of antidepressant drugs was significantly higher than among the non-ethnic group at both eighteen months and four years after the disaster. However, excessive alcohol consumption was markedly less common in the ethnic group than in the non-ethnic group.

Table 2 Source: Grievink, L. *et.al* Gezondheid getroffenen vier jaar na de vuurwerkramp Enschede [Victims' health four years after the Enschede firework disaster. Zaltbommel/Bilthoven, IvP, RIVM, 2004.

complaint/symptom	prevalence in non-ethnic victim group			prevalence in ethnic victim group		
	2-3 weeks after disaster	18 months after disaster	4 years after disaster	2-3 weeks after disaster	18 months after disaster	4 years after disaster
depression	47.3	30.6	26.4	75.8	62.1	65.1
anxiety	42.7	26.4	20.0	71.1	58.3	59.4
recall/avoidance	69.9	36.6	23.1	87.6	62.1	60.6
hostility	44.2	26.1	23.0	72.0	61.4	62.7
physical complaints	34.9	27.3	20.2	61.9	65.4	61.9
sleep disorders	42.9	35.8	31.8	69.0	62.5	63.8
restricted physical functionality	55.0	25.2	27.0	70.7	46.3	47.6
use of sleeping pills/ tranquilisers	13.8	12.5	12.1	18.5	29.0	28.7
PTSD		13.6	10.2		40.8	41.0
use of antidepressants		7.0	7.6		20.5	26.5
excessive alcohol consumption		9.0	8.0		1.6	3.4

The victims, regardless of ethnicity, who had suffered serious damage to home and property and who reported persistent health problems four years after the disaster had declared these problems during the earlier surveys. Some 80% to 90% of these cases were therefore chronic in nature. Approximately 70% of the local residents with psychological complaints at the four-year reference point had been in contact with (mental) health service providers during the foregoing period. Of those meeting the clinical criteria for PTSD, 83% had sought professional help.

A separate comparative study was conducted into post-traumatic stress reactions in children aged four to eighteen who had been immediately affected by the disaster. According to the assessment of the parents, the prevalence of such reactions in children aged four to eleven decreased from 40% to 28% during the period from two-and-a-half years to four years after the disaster.

4.2.2 *General practitioner monitoring*

In a second type of health survey ('general practitioner monitoring'), the existing patient records of the victims, and primarily those held by their GPs or in some cases the company doctor, were used to monitor victims' health.[107-110,183] Patient information drawn from GPs' files and those of the IAC was compared against a reference group of patients who were registered with the participating GPs but did not live in the disaster area and were not recorded as being affected by the disaster. This study, which looked at patient information dating from one year before to five years after the events of 13 May 2000, was the first controlled, longitudinal study ever conducted after a disaster.

The victims' call on health care services, measured in terms of the average number of consultations with the GP, increased during the first two-and-a-half years following the disaster, both in comparison with that before the disaster and that of the reference group. Thereafter, the number of consultations decreased, but did not decrease to the level seen before the disaster. This increase in demand for healthcare services showed no relation with the age or gender of victims, but did reflect the type of health insurance held. Those with mandatory public health insurance made a greater call on health services than those with private insurance, regardless of all other circumstances. Immediately following the disaster, many patients presented with stress reactions, feelings of anxiety, and neck and shoulder problems. After approximate two years, GPs were seeing symptoms of chronic stress, depression, back pains and gastrointestinal problems. The prevalence of psychological problems such as stress, depression and sleeping disorders increased markedly among the victim group immediately following the disaster,

and continued to be far higher than usual five years after the event. The prevalence of anxiety-related disorders, which had been particularly high immediately after the disaster, reverted to its pre-disaster level within five years. The number of patients presenting with depression and/or general fatigue increased immediately following the disaster, reached a peak after two-and-a-half years, and then declined.

The prevalence of lower back pain, occasionally accompanied by referred pain elsewhere, had increased two-and-a-half years after the disaster, reaching a peak at four-and-a-half years. Neck pain was more prevalent among the victim group both immediately after the disaster and four years later. By contrast, there was no marked increase in the presentation of complaints involving shoulder and/or muscular pain. The prevalence of hypertension and diabetes mellitus among the victim group increased significantly during the five year period following the disaster, although this may be explained by the fact that GPs carried out supplementary investigations more readily. During the first two years, the victim group did present more frequently with MUPS (stomach pains, headache).

The main risk factors underlying the development of health problems after the disaster were found to be pre-existing psychological symptoms and the loss of home and property.

Other monitoring studies focused on ambulance and fire crews, police officers, staff of the local authority and the increased take-up of mental health services provided by the regional authority and Mediant (see below).

4.2.3 *Cross-linking studies*

A number of cross-linking studies were also conducted, whereby the results of the three measurements carried out as part of the health survey were combined with those of the general practitioners' monitoring.[183] The results of this exercise therefore relate to those disaster victims who had taken part in (at least one of) the health survey measurements *and* for whom a digital medical file was available from a GP in Enschede. (The GP files were restricted to those patients who had registered as a disaster victim with the IAC.)

The existence of psychological problems prior to the disaster proved to have a high predictive value in terms of both psychological and physical problems after the disaster. Those with a pre-existing psychological problem were found to be almost twice as likely to develop PTSD, both at the eighteen-month and the four-year reference point. Victims with a pre-existing chronic illness experienced greater problems in terms of social functioning, general health, physical pain and physical role limitations after the disaster. However, they did not report depres-

sion, feelings of anxiety or the symptoms of PTSD any more often than other members of the group.

Young people, members of the ethnic minorities, those with pre-existing psychological problems and general psychological problems afterwards, and those people who had lost their home or personal possessions contacted the mental health services more frequently than the elderly, couples, and those victims who did not suffer psychological problems either before or after the disaster.

A reasonably strong correlation was found between the number of general psychological and physical problems reported by the victims themselves and the number recorded by general practitioners, both two to three weeks and eighteen months after the disaster.

The majority of the self-reported complaints (i.e. reported to the IAC) were not presented to the general practitioner. Only problems which were reported at both the first and the second measurement were more likely to be reported to the GP. Those victims who did indeed present their symptoms to the GP were not in worse general health than those who did not, nor did they have a greater number of problems. The majority of the symptoms which were presented proved to be 'medically unexplained'.

The people who had least contact with their GPs were those in the younger age groups, the privately insured, and those less affected by the disaster in terms of loss of property. However, although this subgroup did have less contact with GPs, when they did present they were found to be suffering problems similar to those of the remainder of the victim cohort.

Those people who met the clinical criteria for PTSD eighteen months after the disaster had a risk of coronary and circulatory disease twice that which would otherwise be expected, and more problems with the airways, the digestive tract, the skin and general mobility. They were also more likely to suffer headaches.

The children in the victim group displayed more behavioural problems after the disaster, but did not present a greater number of symptoms to the GP. The control group of children was carefully selected to match the circumstances of the victim group prior to the disaster.

4.2.4 Results of the Mediant Nazorg Vuurwerkramp (MNV) project

The final report of the study of adults treated by *Mediant Nazorg Vuurwerkramp* (Mediant Aftercare Services; MNV) describes the experiences after the disaster from the perspective of victim support staff.[149] This was the first time that a complete, integrated range of psychological services and social assistance had been made available to all persons affected by a disaster in the Netherlands.

The purpose of this study was to enable a full evaluation of the range of services offered to the victim group. It provides information about the nature and extent of the psychological problems suffered by the people who reported to the care service soon after the disaster, and about the outcomes of the counselling and other assistance offered. The study is the first systematic investigation of the results of assistance services provided to an entire community affected by a disaster.

The study relied on two methods: scrutiny of the files of all clients reporting to the MNV, and a questionnaire-based survey of clients who entered into a course of treatment. The combination of these methods results in both general information about all clients approaching the aftercare team, and more detailed information about those clients who remained under treatment for some time.

The study revealed that the total number of victims seeking assistance from Mediant was roughly in line with the previous estimate (based on experience elsewhere) of 1,500. The organisation also saw an annual increase in the number of client approaches of between 5% and 8% during the four-year period following the incident. It is interesting to note that, following a short surge of several hundred clients during the first few months, the main influx of disaster-related problems only really began in the second year, gradually decreasing after four years.

The total number of clients that proceeded to undergo counselling or some form of clinical treatment was lower than the figure cited above, being approximately nine hundred adults and two hundred children. Following procedures to establish a compensation fund and a public advertising campaign, there were further upturns in the number of clients reporting. A notable finding is that a large proportion (81%) of those who originally came to the centre merely to accompany a friend or family member eventually became clients themselves. This proportion is far greater than seen among visitors to regular mental health service centres. Of the group of clients reporting disaster-related problems, approximately ten per cent continued to undergo treatment or counselling for a full two years. This figure is considerably lower than the original estimate of approximately 33%, or five hundred clients.

The dossier study revealed that PTSD was the main clinical diagnosis in approximately fifty per cent of the adult cases, while twenty per cent were diagnosed with depression or an adjustment disorder. A Comprehensive International Diagnostic Interview (CIDI) held with the respondents to the questionnaire-based survey revealed depression in almost 60% of cases, PTSD in 40%, some other form of anxiety disorder in 37%, somatoform disorders (MUPS) in 35%, and addictive disorders in 27%. These CIDI diagnoses (but not the clinical diag-

noses) demonstrate a pattern over time which is familiar from the literature, viz. more PTSD at first, and more depression and somatoform disorders later on. The differences between the clinical diagnoses and the CIDI results can be explained – at least in part – by the emphasis on PTSD in the training given to the MNV team. It seems reasonable to assume that counsellors under-diagnosed depression, anxiety disorders (other than PTSD), somatoform disorders and dependence. A similar emphasis on PTSD was also reflected by the treatment options selected.

Based on the MNV team members' own notes in the patient files, it seems that over half of the clients under treatment eventually made a full clinical recovery. Similarly, in the opinion of the treating physician or counsellor, fifty per cent of the respondents in the questionnaire-based survey had recovered. However, the questionnaires exploring symptoms, social functioning, and quality of life suggested that slightly less than half of respondents had achieved full recovery. A comparison between the findings of the questionnaires and the clinical recovery rate shows that between 25% and 40% of those deemed to have recovered were nevertheless found to be 'unhealthy' in terms of responses measuring psychological complaints, while between 40% and 60% achieved an 'unhealthy' rating for those aspects measuring social functioning and quality of life. Based on this disparity, we may conclude that 'recovery', as noted in the clients' files, had more to do with the absence of psychological disorders rather than the social restrictions and quality of life issues experienced by the clients themselves.

The results of the dossier study also demonstrate that those of ethnic minority background, clients who had experienced direct loss or damage to property, and those who failed to attend a treatment session on more than four occasions were less likely to achieve clinical recovery. Conversely, those who had been given a firm diagnosis other than PTSD, had undergone methodical psychotherapy or counselling, and those who were involved in the influx in the second year after the disaster had a greater chance of recovery. The 'drop-out' rate of those failing to attend treatment at all after the initial intake was higher among women, single people and the ethnic minorities. Premature discontinuation of treatment was more common among members of the ethnic minorities, people with PTSD and those who had sought initial contact during the first two years following the disaster. An analysis of the information gathered by means of the questionnaires shows that older clients, those in employment and those who were eye-witnesses to the deaths of strangers* had a higher chance of recovery, while recovery rates were lower among those with a previous history of psychological problems, those with a member of the immediate family circle injured, those who had more

* This is not in keeping with the figures presented in the literature.[151,152]

than one diagnosis further to the CIDI, those who failed to attend treatment sessions on more than four occasions, and those who waited some time after the disaster before seeking assistance were less likely to achieve recovery.

Based on these findings, the authors recommend that in any future disaster it should be remembered that the largest influx of people seeking assistance is likely to be seen approximately one year after the event. It therefore becomes possible to form a team which is better able to offer continuity than in the current arrangements, whereby external experts are brought in on a temporary basis in the start-up phase. It is also recommended that the training provided to victim support staff should not focus so strongly on PTSD, but should also include attention for depression, anxiety disorders, dependence, MUPS and problems in social functioning. Furthermore, after training staff should receive proper supervision and support in the implementation of new working methods. Such supervision could be provided by the national centres of expertise. Closer cooperation between the various healthcare service providers is required, and greater attention should be devoted to the more vulnerable groups.

4.3 The Volendam café fire (2001)

On the night of 31st December 2000/1st January 2001, some 350 young people had gathered in a café in Volendam, 'De Hemel', to see in the New Year. A fire broke out in the crowded establishment, claiming the lives of fourteen people. Four died during the fire itself, nine within one month and one slightly later. Ambulances took 241 victims to hospital; 88 were in critical condition due to burns and inhalation trauma. Of the 95 victims with burns, 27 had injuries covering more than 40% of the body surface area, 19 with 25% to 40% affected, and 21 between 15% and 24%. The remaining 28 had burns covering less than 15% of the total body surface. Of the 112 patients admitted to intensive care, 96 were suffering inhalation trauma, while 36 had injuries other than burns or inhalation trauma, such as contusions, fractures, cuts and grazes.[5]

The exact injuries of the four people who died at the scene remain unknown. Nine of the ten patients who died in intensive care had burns covering more than 40% of the total body surface area together with inhalation trauma. One patient died as the result of a neuro-thorax trauma.[5]

Immediately after the fire, a marked (five-fold) increase in the number of GP consultations was seen. Most patients were young people with burns but there was also a twofold increase in consultations by young people without burns and their parents. Of the health complaints (n = 10,137) which GPs in Volendam noted during the four weeks following the disaster, burns were the most common

(n = 466), followed by coughing (n = 158), crisis/stress reactions (n = 71) and sleeping problems (n = 53).[63] The number of consultations for hypertension showed a gradual increase (from 19 to 38) during this four-week period. Moreover, a number of people had suffered injury during the panic which followed the fire, leading to mobility problems including neck and back aches, fractured bones and sprains.

During the year following the fire, the young people who had been present at the scene visited their GP approximately three times more frequently than before the incident. During the following three-and-a-half years, there was a reduction in the frequency of consultations, but the number was still higher than before the disaster.[64] The majority of consultations concerned Medically Unexplained Physical Symptoms (24.2%) followed by other chronic conditions (19.7%), problems of the airways (11.1), mobility problems (9.4%) and the skin (7.9%). Over fourteen per cent of this patient group had (acute) stress complaints. Many victims suffered permanent disfigurement due to burns. The psychosocial effects are far-reaching and can lead to serious impairment of the quality of life.[203]

Comparison with the health information of brothers, sisters and persons of the same age in Volendam reveals that the incidence of these health problems was higher among the people who were actually at the scene of the disaster. Among the parents of the young people concerned, 15 out of 33 assessed health problems and conditions are significantly more prevalent than among the control groups. This is particularly true of hypertension, sleeping problems, coughs, lower back pain, shoulder aches and other mobility disorders, stress reactions, urinary tract infections and eczema.[64]

Five months after the disaster, there was a rise in self-reported complaints affecting both those who had been directly affected by the disaster and their classmates at school. These complaints included impaired concentration, anxiety, depression, aggression and, in particular, excess consumption of alcohol.[163] However, there was no observed increase in the use of recreational drugs such as marihuana or ecstasy. Twelve months after the disaster, the number of self-reported psychological complaints had fallen, but was still higher than among the control group. Excess consumption of alcohol remained evident.[162]

The use of prescription drugs – notably psychopharmaceuticals and in particular benzodiazepines – increased during the first six months following the fire. This was more the case among those victims with burns than among the others.[64] It is interesting to note that, although the use of psychopharmaceuticals in general and of benzodiazepines in particular gradually fell, the average number of prescriptions issued to members of this group for antidepressants continued to rise during the first eighteen months, and only then showed any decrease.

There was no marked increase in the use of antidepressants by the brothers and sisters of those present at the scene. However, their parents did take more prescription drugs than other adults in Volendam during the same period. Their use of general psychopharmaceuticals showed a 42% increase, that of benzodiazepines a 30% increase and that of antidepressants rose by 87% (compared to increases of 8%, 11% and 9% respectively among the control group).[64]

Ten months after the Volendam fire, a general precautionary survey was conducted among more than 1500 local secondary school pupils (aged 11 to 19). This revealed that over ten per cent may well have been having difficulty coming to terms with the event.[158] Girls aged 13 and over had more problems in this respect than boys in the same age group. Only some 25% of those who had been invited to attend counselling with a psychologist or social worker of the victim support services had actually availed themselves of that opportunity. The others cancelled their appointments or simply did not attend. Clearly, the approach adopted had not been appropriate. The authors of this report therefore call for a more indirect approach in order to bring young people in contact with support services. It seems likely that schools could play an important role in this respect.

4.4 Legionella outbreak in Bovenkarspel (1999)

Another disaster which took place in the Netherlands and for which the long-term effects on victims have been recorded (although without comparison to a control group) is the outbreak of Legionella (Legionnaire's Disease) in Bovenkarspel in 1999. The source of the infection was traced to a flower show which had been attended by 77,061 visitors. Of these, an estimated 188 were taken ill (133 confirmed and 55 suspected cases). Over 75% of victims were aged over 55 and the majority were male. Approximately 75% of the victims required hospitalisation, some long-term and some in intensive care. Further investigations revealed that two whirlpools and a sprinkler installation at the flower show venue harboured the *Legionella pneumophila* bacterium. One of the three genotypes of Legionella found in the whirlpool water was identical to that in samples taken from 28 of the 29 culture-positive patients. A total of 23 people died as a direct result of the outbreak. Of the patients admitted to an intensive care unit, 36% did not survive.[129]

Between six and eight months after the original infection, almost all victims had one or more consultations with their respective GPs, a medical specialist or a member of staff of the local Municipal or Regional Public Health Services. At this time, over 90% of victims assessed their own state of health to be poorer than

it had been a year previously, and over half displayed psychological symptoms such as persistent recall and avoidance reactions.[197] The victims who had been hospitalised for longer than two weeks continued to suffer more physical restrictions than those who had not, even after eight months. It was also found that women had greater difficulty sustaining social contacts with family, friends and others than men.

A health survey was conducted among 122 survivors of the outbreak seventeen months after the diagnosis of Legionnaire's Disease had been confirmed and a course of antibiotics had been given. This revealed that symptoms of shortness of breath persisted in 57% of patients. Further investigation revealed that almost half of these cases were attributable to demonstrable lung damage and a reduction in pulmonary gas transport.[115] The most common symptoms were chronic fatigue (in 75% of patients), neurological disorders (66%) and neuromuscular abnormalities (63%). When measured using a self-reporting questionnaire, 15% of patients met the clinical criteria for PTSD. The quality of life had worsened in all cases.[127,128]

However, it is impossible to state whether the diminished well-being of patients was directly attributable to infection with *Legionella pneumophila*, to the seriousness of the ensuing pneumonia or to the crisis situation itself.[127,128]

Chapter 5

Risk factors for psychological complaints and 'medically unexplained physical symptoms'

As noted above, there are no psychological disorders which are specifically disaster-related, unless one wishes to classify PTSD as such. The 'medically unexplained physical symptoms' (MUPS) which are presented following a disaster are also to be found in the general population at any time, although the prevalence is indeed higher following a disaster. The same is true of depression, anxiety and even PTSD. With a view to prevention and therapy, it is important to consider which people have an elevated risk of developing psychological complaints and MUPS following a disaster.

5.1 Etiology

Three categories of factors can play a part in the emergence and further course of the conditions under consideration:[87,135,174,191]

- Predisposing factors: factors which determine the differences in individual susceptibility, whereby one person is more likely to develop the complaints in question than another
- Precipitating factors: circumstances which prompt the emergence of complaints in susceptible people, in this case the disaster
- Perpetuating factors: the factors which cause the complaints to persist and which stand in the way of recovery.

The literature on risk factors for health complaints and other problems following a disaster distinguishes between the factors present prior to the disaster and those during and after the disaster.[37,98] This is entirely in keeping with the threefold classification discussed here.

The authors wish to emphasise that this classification is offered as an aid to understanding the problems rather than as hard scientific facts. The hypothesis is that complaints will only become chronic in nature if the three types of factor – predisposing, precipitating and perpetuating – are all present in one and the same person. There is some debate as to the relative importance of each type of factor. In the case of PTSD in particular, it remains far from clear exactly how or to what extent the predisposing and precipitating factors contribute to the development of this disorder (see also Section 2.4.2), whereupon some authorities place the emphasis on one category, while others place it on the other. Research conducted after disasters is unlikely to resolve this question. Moreover, there is no single, all-embracing, conclusive theory about the role of the various factors. However, it has indeed been established that the risk to victims rises in proportion to the number of factors at play.

Very little research has been conducted into the risk factors for MUPS following a disaster.[191] Somewhat more research has been concerned with the risk factors for psychological complaints, but its quality is not high. In many cases, the study population is too small, the control groups are inadequate (or there are no control groups at all), while various other methodological shortcomings seriously undermine the conclusions. Accordingly, the information presented here is not always backed by conclusive evidence. Nevertheless, the Committee believes that an exploratory report of this nature should include an overview (which is itself not exhaustive) of the possible factors in each category. As will become evident, these factors are closely interrelated. Their classification into three categories is, to a certain extent, an artificial one. It is clear that some factors can indeed fall into more than one category.

The overview is largely based on reviews which examine risk factors after a disaster.[37,78,90,94,98,99,151,152,176,191,212] Rather less is known about the predisposing factors than about the precipitating and perpetuating factors, since little or no data has been gathered prior to disasters. Occasionally, the Committee has chosen to cite factors which are not mentioned in the research literature, but which the members believe to be important based on their own experience.

5.2 Predisposing factors

5.2.1 Demographic factors

Age. Children of school age sometimes experience more problems than adults after a disaster.[152] In the case of very young children, the manner in which the parents react to the disaster has a significant effect.[136,152,212] The stronger the reaction, the more seriously family life is likely to be disrupted whereupon the effects on the child will be more marked.[35,175,212] Children raised in an open, supportive and communicative family setting will recover from the disaster more quickly.[94,212]

A number of studies conducted among adults create the impression that the impact of a disaster is less great as the age of the victims increases.[152] The hypothesis is that the older person's resilience is a product of life experience and possible earlier experience with similar disasters. However, American research suggests that the middle-aged (40-60) are at greater risk than both the younger and older adult age groups. The explanation for this could be that these people were already under some strain or pressure before the disaster, or that the pressures after the disaster are greater because they are required to give more support than they receive. Based on cross-cultural research, we may conclude that the effect of age cannot be regarded as a constant.[152]

Gender. Women and girls are more likely to experience (health) problems after a disaster than their male counterparts.[37,98,152,176,191,212] The mothers of young children are at particular risk, particularly if there is, or has been, some unknown and unquantifiable danger.[39,99,100] The differences observed between men and women can perhaps be partly explained in terms of other expressions of mental trauma: men are far more likely to resort to substance abuse and 'acting out' behaviour. Until recently, little attention has been paid to this particular aspect.[98]

Socio-economic status. There are strong indications that the health effects of disasters will be greater in the case of people of lower socio-economic status.[99,152] This may be due to the fact that those of higher socio-economic status have greater access to sources of assistance. International research also shows that people of lower socio-economic status are more likely to be affected by a disaster in their own area.

Culture and ethnicity. Adult members of ethnic minorities have a greater number of health complaints and other problems after a disaster than those belonging to the dominant local culture.[152] In the Netherlands, it was found that Turkish victims of the Enschede firework disaster had a greater number of health complaints than their Dutch counterparts.[67] Several explanations have been offered for this phenomenon, including cultural differences in the perception of the disaster and differences in access to healthcare and support services.

5.2.2 *Personality and functioning prior to the disaster*

Neuroticism. There are indications that neuroticism, a tendency to fret and to become anxious or fearful will increase the likelihood of problems and health complaints emerging after a disaster.[152] Conversely, having a strong, robust and stable personality will reduce that likelihood.

A feeling of being 'in control'. There are indications that people who consider themselves to have little or no control over their own lives are more likely to experience health complaints after a disaster.[89,157]

Social network and support. People who have few social contacts will be more vulnerable following a disaster.[152]

Previous psychological damage due to shocking events. People who have experienced some previous shocking event (such as an accident, rape or the loss of a loved one) and who have experienced some adverse psychological impact as a result, are more vulnerable following a disaster.[37,98] This is also the case for people who have been under prolonged stress. This is in line with current knowledge about the major lifelong impact of unpleasant experiences during one's formative years.

Health complaints prior to the disaster. People with a prior history of MUPS or of psychopathological disorders (anxiety, depression, PTSD or other psychiatric conditions) are at greater risk of developing similar disorders following a disaster.[39,98,110,152,176,191]

5.3 Precipitating factors

By far the most significant risk factor in terms of the development of health complaints and problems following a disaster is the degree to which the events

impinge upon and disrupt the subject's normal day-to-day life.[37,94,98,152,170,176,191,212] Situations which illustrate the concepts of 'impingement and disruption' include:

- being in mortal danger (or perceived mortal danger)
- being injured, suffering pain
- having a close family member injured
- the loss of a loved one
- prolonged uncertainty with regard to the fate of a loved one
- losing touch with family members (particularly in the case of young children)
- panic during the disaster
- being witness to gruesome events
- suffering large-scale material losses, e.g. of home and property
- exposure (or suspected exposure) to toxic substances or radiation.

The two factors which are most likely to result in long-term psychological effects, and in particular PTSD, are being injured and being in mortal danger, fearful for one's own life.

It is also known that those who are exposed to additional situations of this kind have a greater likelihood of suffering a psychological impact (the 'dose-response' correlation). This applies equally to adults and children.[37] Many disasters have a sequential character: there is a concatenation of drastic events, and hence a cumulation of negative effects.

A large-scale meta-analysis conducted in 1991 further demonstrates that the number and extent of the psychological problems experienced by the survivors of a disaster increase in direct proportion to the number of fatalities claimed by that disaster.[70]

For patients with burns, the regular re-dressing of their wounds represents an additional exacerbating factor, since it is a very painful undertaking.[203] It is however, necessary and the pain is inevitable.

5.4 Perpetuating factors

5.4.1 Disaster-related factors

Evacuation and quarantine. It seems probable that prolonged evacuation is a significant risk factor.[100,110] It is further reasonable to assume that factors such as the distance between the disaster area and the evacuation site, the loss of home or employment, problems of adapting to the new setting, the loss of social support, and stigmatisation, will all serve to exacerbate the risk.[98] Long-term quarantine

can have similar effects. If it is necessary to re-house victims elsewhere, these negative effects must be taken into account.

Somatic attribution. Ongoing uncertainty about exposure to toxic substances or radiation (and the impairment to health they may have caused) will increase the likelihood that people will attribute all health problems and ailments to such exposure, even where no relationship exists.[4,23] This will reinforce their belief that they themselves are unable to influence the course of the complaint in any way, which stands in the way of recovery.

Health surveys. It is usually assumed that health surveys and medical examinations after a disaster have a positive effect (in terms of reassurance) and can therefore have a preventive effect. However, we cannot be sure of this. The health effects survey commenced eight years after the Bijlmermeer air disaster showed that such large-scale studies can actually make some participants more concerned about their health, even though this particular survey did not find any evidence of negative health impact (see Section 4.1). When people are confronted with questions about their health, they can become more sensitive to physical sensations. They then imagine that they are suffering from some illness or disease, even though their test results are perfectly in order.[211] For such people, a health survey can be described as a perpetuating factor. As far as we know, no evaluation study has been performed into the effect of health surveys conducted shortly after a disaster, whereupon it is not possible to state whether the same effect is seen here. Similarly, no research has thus far found evidence to support the supposed possible effects such as reassurance, but this does not necessarily mean that such effects do not exist.

5.4.2 *Personal factors*

The personal factors which can perpetuate a health complaint include the lack of appropriate coping skills and perception. The way in which a person perceives his or her ability to control the situation will have a great influence on the course of the condition.[152] Actively tackling the problems 'head on' will help to prevent the onset of psychological disorders. Merely avoiding or ignoring the problems, a tendency to blame others and a lack of self-esteem can only be detrimental to psychological well-being. People who assume (joint) responsibility for their own recovery are likely to achieve that recovery sooner than those who believe that everything is someone else's 'fault'. Even in the case of terrorist attacks, which are clearly due to the deliberate malevolent actions of others, the Committee

believes that people must assume responsibility for their own recovery. In the case of child victims, the conduct and attitudes of the parents will do much to influence the child's ability to cope with the situation.

These factors are, at least in part, determined by the individual's personality and can therefore also be classified as predisposing factors.

5.4.3 *Social and societal factors*

Social support. Social support can act as the buffer between stress factors and the actual development of a disorder.[37,98] The extent to which someone is able to call upon emotional and practical assistance following a disaster is a further significant factor. Those who did not have a good social network before the disaster will find life afterwards particularly difficult. However, it is possible that even those who enjoyed good support in the past will find it less readily available after the disaster.[152]

Today it is common for support groups to be set up for disaster victims. Little or no formal research has been conducted into the effectiveness of such groups, but the people who join them generally find contact with others in the same position to be useful.[79] However, we do know that only a very few of the organisations set up for concentration camp survivors after World War II have actually provided support to all who required it.[219] The advantage of these self-help groups may be seen in the form of acknowledgement, recognition, the exchange of information and mutual support. The disadvantages can include a fixation on problems and compensation, lack of representiveness and political in-fighting.

The response of the community. The response to a disaster of the community to which a victim belongs will be a significant factor. Support, attention, recognition and respect all have a preventive effect in terms of health complaints. Commemoration ceremonies and monuments can also assist recovery and help people come to terms with their experiences.[156] However, if the entire community has been traumatised and disrupted by the disaster, whereupon its members are not in a position to provide mutual support, life within that community can itself be regarded as a risk factor.[152] The 'victim culture' may also impair the recovery of individual members of a community.

Blaming culture. Involvement in compensation procedures, belief in conspiracy theories, feelings of resentment and suspicion towards the government, or a feeling of being 'misunderstood' can, in the opinion of the Committee, help to perpetuate health problems following a disaster.

Conversely, *trust and confidence in the information provided and in the experts and authorities* is likely to have a positive effect in terms of recovery.[99] It is therefore important that the authorities prioritise efforts to win that trust and confidence. Poor risk communication can serve to perpetuate health complaints, as would seem to be the case following the Bijlmermeer air disaster (see Section 4.1).

Financial assistance, rapid reconstruction and rehousing help to speed the recovery of victims, in the opinion of the Committee. Where victims do not receive financial support and reconstruction does not proceed at a reasonable pace, this is likely to impede recovery.

However, the Committee also believes that generous compensation measures can have a deleterious effect. For victims suffering some health complaint, it can be tempting to attribute those problems to the disaster in order to gain victim status, aside from any financial advantage. Lengthy procedures and the 'claim mentality' can perpetuate or even exacerbate health complaints. This risk cannot be avoided altogether, but when the compensation arrangements are being devised it will be appropriate to take this factor into account. Simplicity, uniformity and rapidity should be the watchwords*.

Media coverage. The media can play a significant beneficial role in terms of providing information about the (possible) effects of a disaster (see Section 6.8). However, the Committee finds it appropriate to mention a possible side-effect of media coverage. Where the media devotes full attention to the dramatic aspects of a disaster, this can increase compassion and sympathy for the victims on the part of society at large. This may lead to some people clinging relentlessly to their role as 'victim'. The Committee also believes that persistent media speculation about the possible causes of health complaints may well be a perpetuating factor for such complaints. However, there is no hard evidence to support a causal link between media coverage and health complaints, and indeed such evidence is unlikely to be forthcoming in the near future since effective research into such a connection would be particularly difficult to perform.

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* The advisory report of the Borghouts Committee (on compensation arrangements following disasters[51]), and the cabinet's response to this report (Proceedings of the Lower House, 2005-2006 session, 29668 Policy Plan on Crisis Management 2004-2007, no. 11) must both be regarded in this context. The Dutch government considers it undesirable to implement ad hoc compensation arrangements, i.e. any arrangements other than those provided by extant legislation (*Wet tegemoetkoming schade bij rampen en zware ongevallen* WTS), although such arrangements were indeed put in place following the Enschede and Volendam disasters. Although the WTS must be revised on certain points, it forms a 'safety net' in instances in which civil law provides inadequate redress.

Chapter 6

Care for the affected community

The extent to which health interventions at the level of the entire community are effective is difficult to ascertain. The creation of experimental and control groups in the context of post-disaster support and assistance is clearly subject to major restrictions. However, this does not necessarily render it impossible to gain important knowledge about what works and what does not. Great advances can be made by drawing lessons from a detailed description and analysis of the actions and interventions undertaken, and their effects on the community. However, it is essential that such analyses are conducted with complete openness.

6.1 Initial assistance

By definition, a disaster is marked by major chaos and disruption. The restoration of order and safety, and the preclusion of any further uncertainty, will do much to restrict adverse psychological effects in the medium and long term. As stated in the previous chapter, the main risk factor in this regard is the degree to which the events impact and intrude upon people's day-to-day lives (see Section 5.3). The greater the number of fatalities, the greater the number of survivors who will develop psychopathological symptoms.[170] Rapid availability of appropriate assistance and adequate information must therefore be regarded as an important preventive measure against post-disaster health complaints. Accordingly, it is essential that action to bring survivors to safety, to treat the wounded, and to provide psychosocial 'first aid' such as housing, food and clothing, must

be undertaken as quickly as possible. The manner in which these activities are organised must therefore be as near perfect as it is humanly possible to achieve. In the Netherlands, responsibilities for such tasks falls to the 'Disaster Management Organisation', which brings together the main emergency services – police, fire and ambulance – and the emergency medical response teams (GHOR). The foregoing comments on optimisation through analysis and drawing any lessons that may emerge are equally pertinent here.

A particular point of concern at this time is the psychosocial assistance offered in the weeks immediately following the disaster. There has been criticism that the training given to victim support staff is too concerned with assistance to individuals and does not devote enough attention to that provided to groups, as is considered essential by the Netherlands Health Care Inspectorate (IGZ).[105] The IGZ recommends that the existing regional 'core teams' and support teams should be replaced by a number of national teams, so that a routine can be established and the support offered to large groups of people can be structured more efficiently. The IGZ also calls for guidelines and protocols to be produced with regard to the implementation of psychosocial support services. The organisation Impact (see Section 6.11) is currently working with the Trimbos Institute to prepare an evidence-based guideline for early interventions after disasters, which will be completed in 2007.

The support and assistance offered to staff (including emergency response workers) by employers and occupational health services can have a major influence on health and well-being in the longer term. This is also true of the way in which teachers interact with pupils affected by a disaster. Following the Volendam fire, for example, secondary schools played an important part in supporting the young people of the community. It is certainly good to resume normal work and school activities as soon as possible (and insofar as it is indeed possible) since this also provides structure and support.

6.2 Evacuation and quarantine

Sometimes it is necessary to consider evacuating and/or quarantining victims. When making such decisions, it is essential to remember that such measures, if of prolonged duration, can increase the risk of longer-term health impact. (For an account of the points to be considered with regard to such measures, see the Health Council's advisory report on intervention norms for disaster management, to be published in 2007.) Where evacuation or quarantine cannot be avoided, it is important to adopt a thorough approach in order to mitigate any negative effects. (See also Section 5.4.1).

6.3 Victim registration

The importance of identifying and registering all persons affected by a disaster as quickly as possible is widely acknowledged. Registration enables questions about the fate of loved ones to be answered promptly, it enables the requirement for assistance to be quantified and services arranged accordingly, and it enables victims to be traced at a later date for the purposes of health checks or compensation payments.

Following the disasters in Enschede and Volendam, the Ministry of the Interior and the Ministry of Health and Welfare ordered a uniform national system for victim registration to be developed. The intention is that, should a disaster occur, a contact number will immediately be made available for worried friends and family, and that hospitals, trauma centres, victim support centres and the police will begin recording the details of all victims. The Red Cross and the Ministry of Health and Welfare will also start to register details of people who are being sought by others, victims and their next of kin. This system will also be available to local authorities. However, its practical worth will only become apparent in an actual disaster situation.

The value of such a system in the medium and long term will depend on the opportunities to expand it to become a system which enables victims and those otherwise involved in the disaster (such as response and support staff) to be followed over time. This in turn will depend on the information that is (or can be) included in the system, the frequency with which it is updated, and on how long it is kept. The creation of such a system has implications in terms of the privacy of the individual. Under current data protection legislation, personal information cannot be recorded without the consent if the individual concerned. Should such consent be withheld, it may not be possible to address the needs of victims adequately.

At present, the registration systems do not, as a matter of course, include personal accounts of people's experiences or about their possible exposure to toxic substances, ionising radiation or microbial pathogens. If such information is required, it must be collected separately.

6.4 Environmental studies

Dutch policy is to conduct an immediate investigation if a disaster has (or is thought to have) resulted in the emission of toxic substances, radiation or micro-

bial agents. The first exploratory measurements are made by the fire service with a view to establishing whether such substances pose an immediate health threat.

In incidents involving industrial plants, model calculations can be used to determine whether evacuation is necessary, and if so within what radius. More specialised measurements are the purview of the Environmental Incident Service (MOD) of the National Institute for Public Health and the Environment, which will take samples and measurements on site to determine which substances (if any) have been emitted, in what quantities, and what the risk to health is likely to be. The MOD will also determine the likely distribution area of any contamination. However, there is no registration of individual exposure, although the initial measurements of both the fire service and the MOD can provide a first impression of the likelihood of victims and emergency response staff having been exposed. In most cases, identifying those people who have indeed suffered exposure and determining the duration of that exposure is far from easy. If it is necessary to do so, targeted efforts are required as soon as possible following the incident.

6.5 The Information and Advice Centre

The purpose of an Information and Advice Centre is to offer the public a single point of contact which they can approach with all problems and questions concerning a recent disaster. Victims, families and friends will feel a strong need for information about the events, what they can now expect and what they themselves must do. There will be all manner of arrangements to make, often requiring contact with numerous different organisations. Many people will simply not know where to begin, and run the risk of being ‘shunted from pillar to post’. The chaotic situation seen after the Bijlmermeer air disaster prompted the realisation that information and advice services for victims had to be dramatically improved.[72,82] The idea of the IAC was then born. The centre would be set up immediately following a disaster with a view to preventing additional psychological impact caused by poorly organised support services.[82,84] The proposal was adopted by the Minister of Health in 1999, and the practical use of the IAC concept was in 2000, following the Enschede firework disaster.

An IAC can be described as the organisation which assumes immediate responsibility for victim support without assuming any of the existing tasks and responsibilities of other agencies.[84] In other words, the IAC must know the current status of the victims, whereupon it can activate appropriate support services, and inform and advise the relevant agencies. It must also maintain contact with all persons affected by the incident. In addition to this general information and

advice function, the IAC has a role to play on behalf of individual victims and relations, in that it mediates between people with questions, problems and health complaints on the one hand, and the various support, counselling and medical services on the other. The essential feature is that people must be able to contact the IAC with any and all problems, rather than having to decide for themselves which organisation would be able to provide assistance. The IAC is not a replacement for other organisations or agencies. It is a 'referral service' which knows (or can find out) which particular organisation can address a problem. Immediately after a disaster, it will chiefly be concerned with providing information and advice on pressing practical matters such as shelter, food, clothing, etc. Once the immediate danger has subsided, attention will turn to the resumption of normal day-to-day life and to matters of medical and psychosocial care, compensation claims, transitional arrangements and rehousing.

The Minister of Health ordered IACs to be set up following the Enschede firework disaster in 2000 and the Volendam fire in 2001. The IAC in Enschede was to remain operational for three to five years, while that in Volendam would remain in place for one year. To date, the IACs have not been subject to any independent assessment, although KPMG Business Advisory Services B.V. has run a 'quick scan' evaluation on behalf of the local authorities concerned. Experience in Enschede and Volendam suggests that IACs are indeed an important component of aftercare services,[52-54,112-114,190] although there have also been problems of coordination and direction.[26] The Enschede IAC was significantly downsized in late 2002, due to a decline in the number of questions and requests for assistance. However, it remains operational at the time of writing. The Enschede local authority now has a contact desk for questions relating to the firework disaster. In view of the social impact that burns can have, the IAC in Volendam was later transformed into a Centre for Reintegration and Aftercare. According to the local authority, the centre will no longer be necessary after 2006.

The Ministry of the Interior also acknowledges the importance of an IAC. Since May 2004, local authorities have been obliged to include arrangements for the establishment of an IAC in their disaster management plans.[6] If they wish, the authorities can follow the guidelines set out in the manual based on experience in Enschede and Volendam. This manual will be updated by the Netherlands Association of Municipalities at regular intervals.[7]

There are some types of disaster, such as train derailments and air crashes, in which the victims are not all resident in the same area. Indeed, soon afterwards they may have dispersed throughout the country or throughout the world. In such cases, an IAC in the form described above – a physical point of contact – will be of little use. However, the IAC concept must also be seen in terms of its *function.*

After the Asian tsunami of 26 December 2004, it was decided to establish an 'Information and Referrals Centre' (IVC) in the Netherlands, not in the form of a physical office or building, but as a website with a few people acting as webmasters and back office staff. This was to remain in place for one year. The task of the IVC was to coordinate information flows and to refer clients to the organisations able to provide further assistance. The responsible authorities may care to consider some IVC variant when deciding on the form of an Information and Advice Centre to be set up following a disaster.

6.6 Other disaster-specific measures to prevent adverse health impact

Once a disaster situation has run its course, there should be an immediate assessment of the likelihood of adverse health effects. That likelihood will depend on the nature and the extent of the incident. Examples of general measures to prevent adverse health effects include vaccination and the distribution of antiviral agents where there is a risk of an outbreak of an infectious disease, or a ban on the consumption of locally-produced food or tap water. It is beyond the scope of this report to consider such measures in detail, interesting though that may prove. It is, however, important to realise that action must be taken according to the circumstances of the moment. Accordingly, it is essential that responsibilities are clearly established and communicated.

6.7 Health surveys and their effects

There are several forms of health inspections and checks that victims may undergo:[8]

- individual (medical) examination, primarily intended to address the individual concerns and requirements of the patient
- surveys of one or more victim groups
- health monitoring using (existing) registers and medical records, or by means of regular health surveys among fixed groups.

In general, health research has one of three possible aims:

- to optimise collective support and assistance programmes: by making an inventory of the extant health complaints and other problems, it becomes possible to match the demand for assistance to supply. A regular check on the health of the people affected by a disaster can provide useful information further to the planning of facilities for the short and longer term, and will help to improve support services following any future disaster.

- to optimise individual support and assistance: medical check-ups will identify victims' personal requirements whereupon they can be referred to the appropriate organisations. This type of health research centres upon the individual and their needs. Unlike the other two types described here, it is therefore not epidemiological in nature. An example is the series of individual health checks conducted as part of the MOVB study following the Bijlmermeer Air Disaster.119 Such studies are not bound by the restrictions of the Medical Research Involving Human Subjects Act (WMO), although they may be subject to the Population Screening Act if intended to identify certain conditions or risk indicators. Despite the group nature of such studies, subjects are offered individual information and advice, and will be referred to the appropriate health care agencies as necessary.
- research conducted for scientific purposes: to increase knowledge about the health effects of disasters through a study of the affected population. The emphasis here is on epidemiological research. One example is research conducted to identify factors related to the development of (chronic) health complaints, the results of which can be used to identify potential risk groups in the earliest possible stage following any future disaster, and to develop strategies to reduce the overall number of health complaints in the longer term. The epidemiological survey of emergency response crews and hangar staff following the Bijlmermeer air disaster[103] can be categorised as research conducted for scientific purposes. The research method will usually involve a questionnaire or structured interview, perhaps in combination with a physical examination. In principle, this type of research (in which the subjects are actively approached) falls within the scope of the WMO. Moreover, if the subjects are informed of their personal results, the Population Screening Act (WBO) will apply*. Where the study requires and is issued a permit, only the WBO will apply (further to Art. 1 par. 3).

For the victims of a disaster, health research can contribute to the acknowledgement and recognition of their health complaints and other problems, while also enabling them to compare their own state of health with that of others in the same position if the results are published promptly.

* Even where the WBO applies, a study does not necessarily require a permit. The appropriate committee of the Health Council was called upon to assess the health survey conducted among victims of the Enschede firework disaster and concluded that it did not require a permit.[86]

For healthcare institutions, such research provides information which can help them to improve their treatment policy. Based on the results, local and national policy-makers can implement appropriate measures for the organisation and structuring of support services. Sometimes, a health survey conducted immediately after a disaster can establish that there has been no exposure to hazardous substances or radiation, thus avoiding unnecessary concerns about health risks, false attribution of health complaints to exposure (with the social unrest this brings, as seen following the Bijlmermeer air disaster), and ungrounded claims for compensation.

Some studies may combine the various objectives stated above. The Health Monitoring of Victims of the Enschede Firework Disaster (GGVE)[59] made use of the records maintained by GPs, the local mental health service and occupational health doctors,[107,109,110,150] while the survey conducted following the Volendam fire relied on information contributed by GPs and pharmacists.[63-65] Here too, there were several objectives.

Very little research, either national or international, has been conducted into the influence of (health) surveys on the subject's own perceptions of their state of health.[77] However, findings from related areas of research suggest that epidemiological research, even where the results are favourable, tend to raise participants' concerns about their health.[211] However, other studies into the effects of scientific research involving the victims of traumatic events provide no evidence of any adverse impact on the subjects' well-being. The MOVB study conducted over eight years after the Bijlmermeer air disaster devoted specific attention to this issue. Rather than achieving the intended purpose of reassuring the people concerned, it was found that participation in the survey by local residents and emergency response workers actually caused a slight increase in the level of concern and uncertainty.[211] The authors of the MOVB report are correct to state that it would be premature to conclude that similar studies should not be conducted in future, based on the results of this single study. Nevertheless, these results (which are in keeping with clinical experience) are enough to prompt the Committee to advise an extremely careful consideration of the necessity, need, advantages and disadvantages of such studies. The CGOR (see Section 6.11) has now appointed a committee of experts to advise the Minister of Health on the desirability of health research in specific cases.[8]

6.8 The media

There has been much speculation about the effects of the media's coverage of disasters on the health of victims and others. However, there is little hard evidence to support the suspicions. The media can play a remarkably useful function after a disaster, e.g. in informing the public about how to protect themselves against exposure to any toxic substances that may have been released. Conversely, an American study into the effects of events such as the Oklahoma City Bombing and the terrorist attacks of 11 September 2001 seems to confirm a relationship between the incidence of PTSD and depression on the one hand, and the time spent watching television coverage of these disasters on the other. Whether this is actually a *causal* relationship is uncertain.[11,38,210] A study of the psychological impact of a dreadful accident during an air display in Ukraine suggests that there is only a minor, statistically insignificant link between seeing the event frequently on television and impaired mental health.[38] Research conducted in the Netherlands also fails to provide any hard conclusions about the influence of media coverage. However, an analysis of the telephone calls reporting health complaints connected with the Bijlmermeer air disaster revealed a marked increase in the number of reports in the periods following intensive coverage of 'new findings' concerning the disaster. This led to the hypothesis that media coverage encouraged people to attribute their health complaints to the disaster, even where no direct link existed.[208,210] Similarly, research involving the emergency response crews who attended the Hercules disaster revealed that a small number were suffering particular difficulty in coming to terms with both their experiences of the event and the criticism that had been levelled in the media.[198] There had been recurrent claims that the interventions during and immediately after the disaster had been inadequate. Following the Enschede firework disaster there was a clear surge in the number of people seeking support just after an (unofficial) advertising campaign had been run.[149]

While the analysis of health complaints reported following the Bijlmermeer air disaster does not provide evidence of a causal link, it does not seem unreasonable to state that media coverage can exacerbate existing complaints. Moreover, although the media cannot transform an incident with little material damage and few victims into a full-blown disaster, sensationalist coverage can present a disaster as far worse than it already is. The number of potential victims is then just as important as the number of actual victims: frequently, news reports are not concerned with what did happen, but with what *could have happened.*[42,116,164,208,209]

The Committee considers media reports stating that a disaster will *always* give rise to prolonged psychological problems to be totally unfounded. Although there is no evidence that such media coverage causes people to attribute their health complaints to the disaster, the Committee believes it reasonable to assume that persistent speculation about the possible causes of such complaints is itself a perpetuating factor, particularly with regard to MUPS. It seems unlikely that hard evidence to support a causal link between media coverage and health complaints will be found in the foreseeable future, since the required research is particularly difficult to perform.

6.9 Risk communication

The government has a clear responsibility with regard to information provision during and after a disaster, especially in terms of informing the public about exactly what has happened and what the government is doing to mitigate the consequences. In practice, the government must usually account for its actions through the media, a process which places high demands on all the professionals involved: government officials, government spokespersons and journalists alike. The overall purpose of all risk communication is to use timely and reliable information to ensure that public confidence is not eroded and that the seeds of mistrust and suspicion cannot be sown. Each party has its own responsibilities in this regard.

The Health Council has produced guidelines for risk communication in situations in which there may be public unease about environmental factors.[85] These guidelines may also be useful in the context of a disaster.

6.10 The role of social and societal organisations

Although never subject to research (to the best of our knowledge) it would seem that the rituals, ceremonies[156] and similar activities organised by church and social organisations after a disaster are seen by victims as a source of comfort and encouragement. It is important that the government provides the opportunity and facilities for such activities to take place. The presence of public figures (such as members of the royal family or senior government representatives) will generally foster a feeling of acknowledgement and will therefore help the process of psychological recovery.

6.11 The national Centres of Expertise: Impact and the CGOR

In addition to integrated victim support services, the IAC function and health surveys, there are two national Centres of Expertise which form pillars of the current post-disaster strategy. Impact and the CGOR were both founded in 2002 and work closely together.

Among the objectives of Impact, the national expertise and advice centre on psychosocial care after disasters, is to promote high-quality and well-organised psychosocial assistance. It collects and collates experience and scientific knowledge in this area, which is then made available (in appropriate form) to various target groups. It also encourages and facilitates cooperation between the parties involved.

The Centre for Health Impact Assessment of Disasters (CGOR) forms part of the Centre for Environmental Health Research, which in turn forms part of the Environmental Risks and External Safety sector of the RIVM. The objective of the CGOR is threefold:

- to create the preconditions for rapid and effective health impact assessment following disasters, and to perform the necessary research
- to contribute to expert, independent and transparent decision-making with regard to the necessity, usefulness and the form of any health impact assessment following a disaster
- to support local and regional health services in health impact assessments following disasters, crises and incidents.

Chapter 7

Care for the individual victim

It is easier to investigate the effectiveness of interventions at the individual level than that of those at the community level. Apart from the final report on the Enschede firework disaster, there is little extant research into the effects of interventions at individual level following an actual disaster, but considerable research into their effectiveness in other situations. The Committee has therefore based this chapter largely on literature which is non-disaster-related. We assume that the context will have little or no influence on the efficacy of the interventions themselves.

In the following sections, the interventions are arranged according to the complaints and disorders they address: physical injury (Section 7.1), psychological impact (7.2) and medically unexplained physical symptoms (MUPS; 7.3).

7.1 Physical injury

Clearly, prompt and effective treatment of physical injuries caused by a disaster is a high priority. In general, the treatment of burns, fractures, inhalation trauma and internal injuries in the acute phase is crucial to the victim's prognosis. The exact nature of the treatment will very much depend on the type, seriousness and extensiveness of the injuries. A complete list of possible interventions falls outside the scope of this report, but a number of examples are given below by way of illustration.

Scars caused by burns can not only cause cosmetic and psychological problems, but may result in major functional impairment. The risks can be mitigated by prompt and proper treatment of the wounds, perhaps later followed by a skin transplant. Experience following the Volendam fire shows that inhalation trauma can lead to chronic lung disorders. Similarly, the Bovenkarspel Legionella outbreak resulted in lung dysfunction as well as neurological disorders. This underlines the necessity of prompt diagnosis and treatment during the acute phase.

If chemical substances are inhaled, come into contact with skin or are ingested in food and water, acute reactions can occur. There have also been disasters in which exposure to chemical or radio-active substances led to the emergence of symptoms months or even years later. The literature draws attention to the risk of malignancies such as lung tumours and leukaemia, miscarriage and congenital physical deformities.[20] It is therefore important for the condition to be diagnosed as early as possible so that radiotherapy and chemotherapy can be applied.

Types of intoxication which lead to symptoms emerging in the longer term include mercury poisoning from the consumption of contaminated fish or cereals, and 'toxic oil syndrome'.[20] The resulting neurological disorders include cerebral palsy, peripheral neuropathy and scleroderma, all of which develop in the longer term. Here too, timely diagnosis is essential, perhaps followed by treatment with N-acetyl pencillamine.

7.2 Psychological impact

Depression and anxiety disorders, including acute stress disorder (ASD) and posttraumatic stress disorder (PTSD; see Section 3.4 and Annex C) are the most common psychological effects of involvement in a disaster. Although it is a misconception that PTSD is the most frequently seen problem (while in fact depression is more prevalent), this section is mainly concerned with ASD and PTSD because a disaster or other traumatic condition is a necessary precondition for the development of these disorders.

Two British reviews have been recently published on the treatment of PTSD, one by *Clinical Evidence,*[27*] and the other by the National Institute for Clinical Excellence (NICE).[145] The American Psychiatric Association (APA) published guidelines for the treatment of ASD and PTSD in 2004.[189]

* Clinical Evidence an important source of information for the medical profession. It is published as a supplement to the British Medical Journal and includes up-to-date accounts of the efficacy of certain methods of treating diseases and disorders.

7.2.1 *The treatment of post-traumatic stress disorder (PTSD)*

Two treatments for PTSD have been shown to be effective: cognitive behavioural therapy (CBT) and Eye Movement Desensitisation and Reprocessing (EMDR). *Clinical Evidence* has described both as 'beneficial', finding no difference between them in terms of effectiveness.[27] The NICE protocol recommends that all patients diagnosed as having PTSD should undergo one of these two forms of treatment.[145] It should be noted that some authorities regard EMDR as merely a variant of CBT. The APA guidelines[189] describe both therapies as effective, but considers the evidence in favour of CBT to be somewhat stronger.

Cognitive Behavioural Therapy

Cognitive behavioural therapy is a form of psychotherapy which seeks to bring about changes in the patient's cognition and behaviour. Aside from the context of disasters, it has been shown to be effective in treating a range of symptoms and conditions, including depression, panic disorders, compulsive-obsessive disorders, irritable bowel syndrome, and many others.[28,101,123,132,148,199] It is essential that the therapy addresses cognitions and behaviours which are directly linked to the patient's specific symptoms. In other words, the exact form of the therapy is unique to the disorder in question.

The NICE protocol devotes much attention to CBT. NICE considers it scientifically established that CBT is an effective treatment for people with PTSD, at least in the case of trauma-focused CBT, i.e. that which revolves around the specific incident which has precipitated the condition.[145] *Clinical Evidence* describes CBT as beneficial[27], while the APA guidelines also state that it is effective.[189]

These findings are confirmed by the results of a meta-analysis of research conducted between 1980 and 2003 into the effects of psychotherapy for PTSD. Over half of patients who completed a course of CBT or EMDR recovered fully or had fewer health complaints.[32]

EMDR

Eye Movement Desensitisation and Reprocessing (EMDR) was developed during the 1980s as a treatment for traumatised persons.[172] The patient is instructed to concentrate on an image which relates to the traumatic event, and on the resultant negative feelings and thoughts. At intervals, the therapist will swing his fingers

from left to right in front of the patient's face for approximately twenty seconds, while the patient attempts to follow the motion of the therapist's fingers with his eyes. The patient is then asked to describe the images and feelings he experienced while doing so. The procedure is repeated while the patient recalls some other aspect of the traumatic event. Once the patient is less distressed by recalling the main event, he must try to concentrate on the images associated with it while also thinking more positive thoughts. Next, he must determine whether he still feels any physical tension while continuing to concentrate on the main image and the positive thoughts.

The effectiveness of EMDR as a treatment for PTSD has been established by controlled studies.[27,145,189] Nevertheless, significant differences of opinion exist with regard to how and why it is effective.[60] Some authorities believe that the eye movements themselves are the key, while others believe that the behavioural therapy elements such as 'imaginary exposure' and the displacement of negative feelings are the essence of its success. A meta-analysis of 34 studies into the effect of EMDR concludes that it is no more effective than other exposure-based techniques, and that the eye movements have no particular worth.[56]

Medication

The literature regarding the use of prescription drugs to treat PTSD is largely speculative.[76,142,153] There have been a few small-scale trials of propanolol (a beta blocker) and hydrocortisone (a corticosteroid), but these were not concerned with disaster victims in particular.[145] The results do not offer sufficient evidence to support the effectiveness of these drugs in treating PTSD or PTSD-like complaints.

According to the APA guidelines, the 'drugs of choice' for the pharmacological treatment of PTSD are the selective serotonin reuptake inhibitors (SSRIs).[189] *Clinical Evidence* describes the antidepressants Fluoxetine, Paroxetine and Sertraline – all of which are SSRIs – as 'probably beneficial'. [27] *Clinical Evidence* does not acknowledge the efficacy of any other pharmacological interventions. The NICE protocol, which is more recent than its APA counterpart and which also relies on unpublished research, considers all pharmacological interventions as being of unknown effectiveness.[145] However, it does concede that it may be appropriate to prescribe antidepressants on a short-term basis only for patients who are particularly distressed and who also have serious sleep disorders. It advises against the use of benzodiazepines given the risk of dependency.

In the Netherlands, Paroxetine is registered for the treatment of PTSD.

7.2.2 *Prevention of PTSD and reduction of stress symptoms by means of early interventions*

There is no evidence that targeted, early psychological or psychotherapeutic interventions have any preventive effect. However, it has been shown that single interventions, and the 'debriefing' session in particular (see below), do nothing to reduce the incidence of PTSD. Research into the role of pharmacological interventions in preventing PTSD is still in the experimental phase.[154,206]

Impact, in association with the medical profession and the Trimbos Institute, is currently developing an evidence-based protocol for early mental health interventions following a disaster. This will be published in 2007.

Medication to treat acute stress

According to the NICE protocol, there are no effective drugs to treat the symptoms of stress in the acute phase. If a person is extremely distressed and is suffering problems with sleeping, a doctor may prescribe sleeping tablets for a short period only. If medication is required for longer, antidepressants are preferred since the risk of dependency is somewhat lower.[145]

CBT in the treatment of acute stress

According to *Clinical Evidence*[27] a course of CBT comprising several sessions can only be described as beneficial for those patients who meet the clinical criteria for a diagnosis of ASD. Similarly, the NICE protocol recommends that people suffering serious PTSD-like symptoms in the acute phase should consult their GP who should consider a referral for CBT. The protocol further recommends that the treatment itself should specifically address the incident (trauma-focused).[145] The APA regards CBT and other exposure-based therapies as beneficial for patients with ASD.[189] Other authorities are more cautious and advise restricting the use of CBT to those patients who belong to certain risk groups.[91] It is suggested that one alternative to trauma-focused CBT in the acute phase would be regular reassessment by a clinician[70] with a view to determining whether any spontaneous recovery is being achieved. Only those patients who show no signs of improvement after one month should be referred for CBT. This approach is said to be just as effective as CBT in the first month following the traumatic incident,[70] but it is of course more efficient.

Cognitive Behavioural Therapy to prevent the onset of PTSD

Research involving people who have suffered a traumatic event (other than a disaster) indicates that CBT during the period immediately following the event may help reduce the prevalence of PTSD.[41,75,201] A fully protocolled written intervention comprising self-confrontation, re-interpretation and the 'sharing and letting go' rituals is likely to have the same effect.[201] To date, these findings are of limited significance in terms of the prevention of PTSD in disaster victims, given the limited size of the studies and the fact that some involve only people with a diagnosis of ASD. Although this diagnosis was included in the DSM-IV in 1994 as a means to identify people who may go on to develop PTSD, its predictive value has not been as high as had been hoped.[40] Moreover, no other pattern of symptoms or complaints which predicts the development of PTSD has yet been found.[40] It will therefore remain difficult to identify those persons who will not recover from the effects of a disaster unaided while they are still in the early stages of the disorder. It would be impractical and undesirable to subject all disaster victims to CBT treatment merely to prevent a few cases of PTSD.[27,91]

The search for better methods of identifying those at greater risk of PTSD continues.[91,220] Certain biological and cognitive parameters measured in the acute stage have emerged as very promising indicators of a person's ability to be able to adapt to his or her new situation.[40,70] The biological parameters include a low cortisol level, elevated pulse rate at rest and panic attacks, all of which are a measure of the functioning of the sympathetic nervous system. The cognitive factors include an overly negative assessment of the consequences of the trauma, disruption of the autobiographic memory and avoidance behaviour.[40,70] The significance of the individual 'coping style', attributions and perceptions in terms of the perpetuation of complaints has already been mentioned in Chapter 5.

EMDR

Although *Eye Movement Desensitisation and Reprocessing* (EMDR) has been shown to be effective in the treatment of PTSD (see Section 7.2.1), there is as yet no hard evidence of its value in the treatment of ASD.[146] The APA guidelines specifically state that its effectiveness in the acute phase is unproven.[189] However, the method did produce good results when used between two and ten weeks following the terrorist attack on the World Trade Center in September 2001.[177]

Debriefing

Until recently, psychological debriefing was a common victim support intervention following any traumatic incident, including disasters. Although the term *debriefing* is generally used somewhat imprecisely, it usually refers to a single, organised discussion (led by an expert moderator) of the event itself and of the resultant emotions. The method was developed during the First World War for the survivors of the trenches and battle fields, going on to be adapted for civilian use.[140] Later, those involved in victim support claimed that the intervention helped to prevent or reduce the incidence of health complaints, and that of PTSD in particular. It was assumed that the shorter the period between the incident and the intervention, the fewer problems would emerge in the longer term.[70] Today, research (by RCTs and others) has established that a single *debriefing* after a traumatic event or disaster is unlikely to have the desired effect[70,91,137,169,200] and may even be deleterious.[70] There are also indications that the benefits of a single group debriefing relative to natural recovery are equally questionable.[200,*]

The NICE protocol therefore advises against holding a single debriefing session as a matter of routine after every traumatic event,[145] as do the APA guidelines.[189] This is therefore the stance adopted by the Committee, which also advises caution in the use of any intervention with the characteristics of a debriefing.

What should be done in the acute phase?

The majority of people affected by a disaster will be able to recover unaided. Unless and until there is evidence to support the use of targeted psychological or psychotherapeutic interventions such as debriefing and EMDR, it is undesirable to offer them to all victims. During the first few weeks following the disaster, it is crucial to allow the natural processes of recovery to take effect, to promote self-reliance and to create a favourable affective setting. There is broad support for the view that doing so will have a beneficial influence on victims' health in the longer term. However, specific assistance must be available to those people who

* An unpublished RCT of a single group debriefing of American soldiers deployed on a peace-keeping mission. The study was conducted by the Walter Reed Army Institute of Research (WRAIR) in association with he Boston Veterans Affairs' Health Care System, under WRAIR protocol #862, 'The effects of psychological debriefing on soldiers deployed on a peacekeeping mission or combat mission'. Amy B. Adler, Brett T. Litz (co-principal investigators); with Carl Castro, Kathleen Wright, Jeffrey L. Thomas, Dennis McGurk, and Lolita Burrell (investigators).

require and who seek it. Victim support staff should therefore ensure that victims with ASD are offered appropriate help.

The existing guidelines in this area stress that support staff should be fully aware of the far-reaching psychological effects that a traumatic event can have. During the initial acute phase, psychosocial 'first aid' should be the priority. Staff should listen sympathetically to victims' stories, should reassure them, should provide information about the likely course of their complaints, and should help to resolve the immediate practical problems. They must be able to refer clients to the people and organisations who can provide assistance, both in meeting basic needs and in restoring contact with friends and family. Support staff would further encourage victims to share their reactions to the event with people they trust.[91] However, it is not advisable to encourage victims to reveal all the dreadful details of the event lest this leads to sensual recall, and neither should they be encouraged to allow their emotions free rein. Ineffectiveness, or perhaps even negative effect, of debriefing sessions should be noted in this context.[91]

The professional staff of (local) mental health care services can place their expertise at the disposal of the victim support staff by providing information, advice and coaching, and by stressing the importance of referring those victims who do require treatment to the appropriate channels.

7.2.3 Other psychological disorders

Depression is regularly seen in people who have been involved in a disaster, but it is also a reasonably common condition among the general population. The choice of appropriate treatment does not depend on whether the patient has been the victim of a disaster or not. The existing treatment methods for depression will apply in all cases. The significant guidelines are those issued by the CBO,[48] the NHG[204] and the American Psychiatric Association (APA).[14]

Involvement in a disaster can also give rise to anxiety disorders other than ASD or PTSD. Here, the above comments regarding depression are of equal validity. The CBO has issued guidelines[47] which include recommendations for treatment, and there is also an NHG standard.[187]

7.3 Medically unexplained physical symptoms (MUPS)

Medically unexplained physical symptoms are particularly prevalent following a disaster but, like the psychological disorders considered above, are not actually disaster-specific (see also Section 3.5). An approach based on cognitive behavioural therapy seems to be the best course of action at this time bes-

chouwd.[12,19,43,87,132,135,148,159,174,181] There are as yet no *evidence-based* guidelines for the treatment of MUPS. Further scientific research is required to render such guidelines possible.[194]

The attitude of the doctor (GP or specialist) and the manner in which he interacts with his patient are of great importance. Patients themselves do not always link their physical symptoms with the stress of the event and its aftermath. Conversely, some do make such a link, even though it is highly improbable. It is essential that the doctor is able to communicate with the patient fully about such matters.

Chapter 8

Considerations for future government policy

This concluding chapter outlines the significance of the Committee's findings in terms of future government policy. The Committee believes that the manner in which support services were provided following the Enschede firework disaster and the Volendam café fire was largely in keeping with current scientific knowledge. The mainstays of the existing policy are integrated psychosocial support, the IAC function, health impact research and monitoring, and the two centres of expertise: Impact and the CGOR. Part of the remit of these organisations is to ensure that a careful consideration is made on a case-by-case basis to decide whether any additional facilities or health monitoring are required.

8.1 Attitudes

During the period immediately following a disaster, level-headedness and calm detachment will be conspicuous by their absence. In almost every case, there will be chaos, panic, compassion, a burning urge to help everyone, promises and initiatives which actually work against each other. However, the situation demands an as businesslike, pragmatic course as possible.

In establishing that course, it is important to take certain social 'givens' into account, such as the medical and psychological interpretation of victims' various problems, the increased attention that victims will enjoy in the community, and the growing expectations of the public with regard to the government's role. The attitude towards all victims of a disaster should be one of understanding and

respect. In their communication with victims, government representatives must demonstrate due sympathy with their situation without allowing themselves to be influenced by public emotions excess. There is a trend in today's society to apply the terms 'disaster' and 'victim' to relatively trivial situations and events. Here too, caution must be exercised.

8.2 Public information

The government bears considerable responsibility for good risk communication and for cooperation with the media in this respect. A conscientious approach will serve to mitigate uncertainty and anxiety on the part of victims and the general public, which can only have a positive effect on long-term health. Rapid and full information to all parties is essential to empower people to take control of their own lives. The public must be informed if there is any ongoing danger. In any event, the government must set out the best course of action.

Following a disaster, it is essential to provide full information about the number of casualties or fatalities, thereby ensuring that the extent of the disaster is known. In order to do so, the government must have a victim registration system, and there must be a telephone number which family and friends can use to enquire about their loved ones' involvement in the disaster. The current Dutch disaster management plans provide for such facilities, but the new victim registration system has yet to prove its worth in practice.

Where a disaster may have resulted in the emission of hazardous substances, ionising radiation or microbial agents, Dutch policy is to investigate possible exposure as quickly as possible with a view to providing clarity about the hazards to public health. In its communication regarding such hazards, the government must remain open and honest at all times. This means that it must also be honest with regard to what it does *not* know. In the case of a terrorist threat, there will be some restrictions in terms of full openness, but simply making the reasons for such restrictions clear – as in the current public information folders about terrorism – clarity can be created. By remaining honest and open about health risks, and by making clear the measures to be taken by all parties, the government can enhance trust and confidence on the part of the general public.

8.3 Victim support

The government is also responsible for providing effective support to the victims of disasters. Victim support services in the acute phase are part of the overall disaster management task. The form and efficiency of rescue efforts and immedi-

ate assistance will have a major influence on medium and long-term health effects. The fewer fatalities there are, the fewer psychopathological problems will emerge among the survivors. Similarly, the sooner the survivors know exactly where they stand and are assured of their own safety, the smaller the risk of adverse health impact. Accordingly, the conclusion must be that effective organisation of the disaster relief efforts is essential, not only from the perspective of safety but from that of preventive health care.

If it is decided to develop the new victim registration system to include all persons affected by the disaster, the information recorded must be regularly updated. This raises certain issues: maintaining personal information is essential to good registration and support services, but can impinge upon individual privacy. Under current legislation, inclusion of personal information in a database requires the consent of the individual concerned, even where the information is drawn from a pre-existing database. This requirement may hinder the development of a full and reliable system, whereupon it will not be possible to address the requirements of persons affected by a disaster adequately. Current legislation gives greater weight to individual privacy than to the public interest. If the public interest is to be served well, this will inevitably be at some cost to privacy.

Effective psychosocial support in the acute phase entails promoting natural recovery and the ability to order one's own life. At present, little is known about the preventive effect of early interventions, but it is certain that single debriefing sessions have absolutely no preventive effect and may even be harmful. Accordingly, the Committee advises against the use of debriefing sessions in the traditional form, and further advises caution in the use of interventions of a similar nature.

Because victims' physical, mental and material problems cannot be regarded as totally separate from each other, it will be preferable to organise psychosocial support services in an integrated way, with all staff maintaining contact with each other and coordinating their activities. Such integration of psychosocial support has been a pillar of Dutch policy since the Enschede and Volendam disasters.

A temporary IAC can be very useful in mediating between people with questions and problems on the one hand, and the various organisations able to provide help on the other. It is now mandatory for local authorities to make arrangements for the establishment of an IAC in their disaster management plans. Because it is difficult to assess the exact requirement for information and advices after a disaster, certain evaluation moments must be agreed in advance, and the form of the IAC must be such as to allow flexible downsizing. Experience has taught us that most victims will eventually find their own way to the regular channels, whereupon they no longer need the services of the IAC.

8.4 Addressing the consequences in the longer term

A minority of disaster victims will continue to suffer long-term physical or psychological problems. The main risk factor in this regard is the extent to which the disaster has impinged upon their lives, i.e. whether they were (or considered themselves to be) in mortal danger, were wounded, suffered pain, lost family members, lost their home and property, etc. Other significant risk factors include a history of psychopathology (depression, anxiety disorders, PTSD), lower socio-economic status and the lack of a social network able to provide emotional and practical support.

It may be appropriate to monitor those in the risk groups even after the acute phase of the disaster. There are various ways of doing so. General practitioners can offer one or more follow-up appointments, or an IAC contact desk can be kept open. This will enable the government to remain abreast of victims' requirements, without necessarily offering direct specialist assistance.

Health surveys can also be a means of 'keeping an eye' on victims over a short or more prolonged period. However, given the possibility of negative effects (see Section 6.7) the Committee advises due caution. Such negative effectives will probably not apply if the information can be drawn from existing sources, such as GPs' patient records ('monitoring'). However, this presupposes that the relevant registration systems are in order and able to provide reliable information. The CGOR has appointed an expert committee to advise the Minister of Health on the necessity of health surveys and related research.

The nature of the health complaints suffered by victims renders it advisable for support and assistance to be provided through the regular channels wherever possible. These 'regular channels' include GPs, youth welfare services, schools, occupational health departments, local mental health care services and pharmacists. In many cases, victims will find the care provided by their GP to be sufficient.

General practitioners whose patient lists include many disaster victims will require additional support. A specialist team should be available to treat symptoms of post-traumatic stress.

The practice of establishing teams or organisations to provide support following one specific disaster has both advantages and disadvantages. The possible advantages are that such facilities are likely to be very accessible, with no waiting lists and not subject to the prejudiced views that some people hold with regard to regular mental health services. A possible disadvantage is that they set their clients apart from others. While this can provide a feeling of 'exclusivity', it

can also have a stigmatising effect and can encourage clients to cling to the role of 'victim', thus slowing their recovery. In some cases, however, the establishment of specific teams or organisations may be inevitable, because the number of victims is so great that the regular channels would not be able to cope. Here too, it is important to set certain 'evaluation moments' at the outset, and to allow for flexible downsizing.

8.5 Areas in which more research is required

There is now a significant body of knowledge regarding the health impact of disasters, but there are certain gaps in that knowledge. The most recent meta-analysis of research in the field dates from 1991. In the past, the emphasis of research has been on the psychological impact of disasters, with little new knowledge gained about physical effects, particularly in the longer term. Similarly, little is known about the relationship between physical and psychological effects, nor about the likely course of health complaints in the longer term (i.e. five years or more after the disaster).

In order to quantify the impact of disasters on victims' health in the medium term, a meta-analysis of all research conducted since 1990 is now required. This will produce information which will be important in designing the form of future victim support services.

If we are to be more effective in assessing which victims require treatment and which will recover unaided, we must collect information about the course of complaints and problems within specific groups.

It is generally supposed that contact between disaster victims (perhaps in the form of 'self-help' groups) will promote recovery, but there is no actual evidence to support this hypothesis, there being no empirical data relating to participation in such contact.

One means by which the current 'blanks' in our knowledge can be filled is by means of further studies of the victims themselves. However, as noted above, caution must be exercised. The health survey conducted eight years after the Bijlmermeer air disaster provided indications that such studies can actually foster rather than mitigate health concerns among the study subjects. Because of the potential adverse effects of health surveys, the decision-making process must be conducted with extra care.

Treatments are now available which ensure that post-traumatic stress conditions do not become chronic. It is therefore appropriate to develop a screening instrument to identify those persons at greater risk of PTSD or other disaster-related disorders, and indeed various organisations are now engaged in doing so.

Such an instrument could, for example, be put to good use by general practitioners.

Although much is known about the treatment of depression, anxiety disorders and PTSD, far less is known about the appropriate treatment for medically unexplained physical symptoms (MUPS). Further scientific research is therefore required to arrive at guidelines for diagnosis and treatment.

Finally, there is a particular need for research into the effects of the interventions applied following a disaster, both in the acute phase and in the longer term. Such research may also include a scientific evaluation of the effects of establishing an IAC.

8.6 Concluding remarks

In the past, it has not been unknown for friction to develop between central government and local authorities with regard to certain initiatives. This creates the risk that victims will 'fall between two stools'. It is not for the Health Council to suggest ways in which to solve such organisational problems: the Committee merely wishes to point out that the problem does exist.

By far the most powerful means of mitigating longer-term health effects currently at the government's disposal is effective disaster management. After all, the main factor which will determine whether victims go on to suffer long-term health effects is the extent to which the disaster impinges upon their day-to-day lives: whether they are wounded, find themselves in mortal danger, suffer prolonged uncertainty about the fate of loved ones, or lose their home and property. The less extensive their confrontation with the disaster and the sooner safety can be assured, the less risk there will be of long-term health impact. If it is not possible to prevent the disaster happening at all, then every effort must be made to limit the number of fatalities and casualties. The number of (mental) health problems suffered by survivors will be in direct proportion to the number of lives claimed by the disaster. Because the safety chain can only be as strong as its weakest link, the government must devote due attention to all links in the chain. The resources it devotes to doing so will also be an investment in the medium and long term health of the nation.

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Annexes

Annex **A**

Request for advice

On 25 November 2002, the Netherlands Health Council received a letter (reference GVM/233 1336) from the State Secretary for Health, Welfare and Sport, Clémence Ross-van Dorp, requesting a status report on current scientific knowledge regarding the health impart of disasters in the medium and long term. The wording of this request was as follows (here in translation):

Dear Professor Knottnerus,

During the past decade, a number of disasters have occurred in the Netherlands, all of which had (and continue to have) far-reaching consequences for the people involved. Examples include the Bijlmermeer air disaster, the Enschede firework disaster, and the Volendam café fire. It has been observed that some victims still suffer poor physical and/or mental health even many years after the event. In the aftermath of the Bijlmermeer air disaster, the government's response came under particularly strong criticism. It is important to ask ourselves what can be learned from the experience which has since been gained, both in the Netherlands and elsewhere, in providing support to disaster victims. This will enable us to reduce potential health effects to the greatest extent possible should another disaster occur in future.

I therefore request you to produce a status report on the current scientific knowledge regarding the medium and long-term health effects of disasters. The report should address the following questions:

- What is known about the prevention, diagnosis, course and prognosis of disaster-induced health complaints?

- What is known about he effectiveness and efficacy of professional support and counselling services provided after a disaster?

I further request that your advisory report, which may be exploratory in nature, should devote attention to the following topics and questions:

- The types of health complaint that can emerge following a disaster, including 'medically unexplained physical symptoms' (MUPS). Is there any connection between the nature of the health complaints and the nature and cause of the disaster?
- Predictive factors and indicators for the emergence and persistence of such complaints. Are there any individuals or groups that are at greater risk of developing these complaints?
- The relationship between the symptoms and the ascribed cause (risk attribution).
- The influence of the media.
- An account of (Dutch and international) research into the effectiveness of victim support and counselling services, with a description of the findings of this research. Is there any scientific evidence that (longer term) adverse impact to (mental) health can be prevented or reduced by professional support and counselling services?
- Suggestions for effective interventions following disasters, classified according to the nature and cause of the disaster (where possible). The report may also devote attention to the opportunities for the government to anticipate likely health complaints among the risk groups, effective risk communication and information, health surveys and monitoring, and the professional support to be provided in the various phases following the disaster. Is it possible to formulate pre-requirements for adequate professional support and counselling?
- The point at which specific support structures and services should be discontinued. At what juncture after the disaster is it responsible to withdraw the specific support and assistance?

Yours sincerely,

The State Secretary for Health, Welfare and Sport,
(signed) Clémence Ross-van Dorp

Annex **B**

The Committee

- Prof. W.G. van Aken, *chair*
  Emeritus professor of medicine; University of Twente
- Dr G.A. van Essen
  General practitioner; Julius Centre for Health Sciences and Primary Care, University Medical Centre, Utrecht
- Prof. B.P.R. Gersons
  Professor of Psychiatry, member of the Executive Board of AMC de Meren; Academic Medical Centre, Amsterdam
- Dr J.M. Havenaar
  Psychiatrist, principle physician GGZ Buitenamstel; Amsterdam
- Prof. R.J. Kleber
  Professor of Psychotraumatology; Department of Clinical Psychology, University of Utrecht
- Dr E. Lebret
  Head of the Centre for Environmental Health Research; RIVM, Bilthoven
- Prof. G.J. Mulder
  Emeritus professor of toxicology; University of Leiden
- Prof. S.A. Reijneveld
  Professor of social health; University Medical Centre Groningen
- Prof. H.G.M. Rooijmans
  Emeritus professor of clinical psychiatry; University of Leiden

- Dr M. de Vries
  Health researcher; Impact, Amsterdam
- Dr J. Withuis
  Historical sociologist, senior researcher at the Netherlands Institute for War Documentation; Amsterdam
- Dr F Woudenberg
  Head of environmental health sciences; GGD Amsterdam
- Dr C.J.M. van den Bogaard, *adviser*
  Ministry of Housing, Spatial Planning and the Environment, The Hague
- Dr R.R.R. Huijsman-Rubingh, *adviser*
  Ministry of Health, Welfare and Sport, The Hague
- Dr Y.A. van Duivenboden, *adviser*
  Health Council of the Netherlands, The Hague
- Dr C.J. van de Klippe, *secretary*
  Health Council of the Netherlands, The Hague

The Health Council and interests

Members of Health Council Committees are appointed in a personal capacity because of their special expertise in the matters to be addressed. Nonetheless, it is precisely because of this expertise that they may also have interests. This in itself does not necessarily present an obstacle for membership of a Health Council Committee. Transparency regarding possible conflicts of interest is nonetheless important, both for the President and members of a Committee and for the President of the Health Council. On being invited to join a Committee, members are asked to submit a form detailing the functions they hold and any other material and immaterial interests which could be relevant for the Committee's work. It is the responsibility of the President of the Health Council to assess whether the interests indicated constitute grounds for non-appointment. An advisorship will then sometimes make it possible to exploit the expertise of the specialist involved. During the establishment meeting the declarations issued are discussed, so that all members of the Committee are aware of each other's possible interests.

Annex C

Diagnostic criteria for ASD and PTSD

309.81 Posttraumatic Stress Disorder

A. The person has been exposed to a traumatic event in which both of the following were present:

(1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others

(2) the person's response involved intense fear, helplessness, or horror. **Note:** In children, this may be expressed instead by disorganized or agitated behavior

B. The traumatic event is persistently reexperienced in one (or more) of the following ways:

(1) recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. **Note:** In young children, repetitive play may occur in which themes or aspects of the trauma are expressed.
(2) recurrent distressing dreams of the event. **Note:** In children, there may be frightening dreams without recognizable content.
(3) acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur on awakening or when intoxicated). **Note:** In young children, trauma-specific reenactment may occur.
(4) intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event
(5) physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event

C. Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by three (or more) of the following:

(1) efforts to avoid thoughts, feelings, or conversations associated with the trauma
(2) efforts to avoid activities, places, or people that arouse recollections of the trauma
(3) inability to recall an important aspect of the trauma

(4) markedly diminished interest or participation in significant activities
(5) feeling of detachment or estrangement from others
(6) restricted range of affect (e.g., unable to have loving feelings)
(7) sense of a foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)

D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by two (or more) of the following:

(1) difficulty falling or staying asleep
(2) irritability or outbursts of anger
(3) difficulty concentrating
(4) hypervigilance
(5) exaggerated startle response

E. Duration of the disturbance (symptoms in Criteria B, C, and D) is more than 1 month.

F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:

Acute: if duration of symptoms is less than 3 months
Chronic: if duration of symptoms is 3 months or more

Specify if:

With Delayed Onset: if onset of symptoms is at least 6 months after the stressor

308.3 Acute Stress Disorder

A. The person has been exposed to a traumatic event in which both of the following were present:

(1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others
(2) the person's response involved intense fear, helplessness, or horror

B. Either while experiencing or after experiencing the distressing event, the individual has three (or more) of the following dissociative symptoms:

(1) a subjective sense of numbing, detachment, or absence of emotional responsiveness
(2) a reduction in awareness of his or her surroundings (e.g., "being in a daze")
(3) derealization
(4) depersonalization
(5) dissociative amnesia (i.e., inability to recall an important aspect of the trauma)

C. The traumatic event is persistently reexperienced in at least one of the following ways: recurrent images, thoughts, dreams, illusions, flashback episodes, or a sense of reliving the experience; or distress on exposure to reminders of the traumatic event.

D. Marked avoidance of stimuli that arouse recollections of the trauma (e.g., thoughts, feelings, conversations, activities, places, people).

E. Marked symptoms of anxiety or increased arousal (e.g., difficulty sleeping, irritability, poor concentration, hypervigilance, exaggerated startle response, motor restlessness).

F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning or impairs the individual's ability to pursue some necessary task, such as obtaining necessary assistance or mobilizing personal resources by telling family members about the traumatic experience.

G. The disturbance lasts for a minimum of 2 days and a maximum of 4 weeks and occurs within 4 weeks of the traumatic event.

H. The disturbance is not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition, is not better accounted for by Brief Psychotic Disorder, and is not merely an exacerbation of a preexisting Axis I or Axis II disorder.

Annex **D**

Glossary

Abbreviations

AMC	Academic Medical Centre
APA	American Psychiatric Association
ASD	Acute Stress Disorder
BZK	Ministry of the Interior and Kingdom Relations
CBO	Dutch Institute for Healthcare
CBT	Cognitive Behavioural Therapy
CGOR	Centre for Health Impact Assessment of Disasters
CIDI	Comprehensive International Diagnostic Interview
DSM	Diagnostic and Statistical Manual of Mental Disorders
EMDR	Eye Movement Desensitisation and Reprocessing*:* a treatment method for traumatised patients
GGD	Municipal or Regional Public Health Services
GGVE	Enschede Firework Disaster Health Monitoring Project
GGZ	(Local) mental healthcare services
GHOR	Medical assistance in accidents and disasters
IAC	Information and Advice Centre
IAEA	International Atomic Energy Agency
ICD	International classification of diseases and related health problems
IGZ	Netherlands Health Care Inspectorate
IVC	Information and referrals Centre

IVP	Dutch Institute for Psychotrauma
MEV	Environmental Risk and Safety Division
MGO	Centre for Environmental Health Research
MNV	Mediant Aftercare Services (Enschede Firework Disaster)
MOD	Environmental Incident Service
MOVB	Medical Investigation into the Bijlmermeer Disaster
MUPS	Medically Unexplained Physical Symptoms
NHG	Dutch College of General Practitioners
NICE	National Institute for Health and Clinical Excellence
NIVEL	Netherlands Institute for Health Services Research
PTSD	Post-traumatic Stress Disorder
RCT	Randomised controlled trial
RIVM	National Institute for Public Health and the Environment
SSRIs	Selective serotonin re-uptake inhibitors: a group of antidepressant drugs
VWS	Ministry of Health, Welfare and Sport
WBO	Population Screening Act
WHO	World Health Organisation
WMO	Medical Research (Human Subjects) Act
WTS	Disasters and Serious Accidents (Compensation) Act

Terms

Agent
: A substance which brings about a chemical reaction; used here to refer to a substance which causes (adverse) health effects

Attribution
: Ascription of cause; see also somatic attribution and psychological attribution

Benzodiazepines
: Group of drugs (‘tranquillizers’) used to treat anxiety and tension

Beta blockers
: Group of drugs which inhibit the production of adrenaline, sometimes used to reduce the physical manifestations of anxiety

cerebral palsy
: General term of a group of conditions affecting the patient’s ability to control movement; can be congenital or induced by neurological damage

cognition
: The ability to recognise and know, used here to refer to the ability to form judgements and opinions

comorbidity
: co-existing conditions

compassion
: sympathy, empathy

congenital
: present at birth

contusion
: bruising

coping
: the ability to control or accept a given situation; also used in the sense of 'managing' in a given situation

corticosteroids
: hormones produced naturally in the adrenal cortex; synthetic corticosteroids are prescribed to repress allergies and inflammations

cortisol
: stress hormone produced in the adrenal cortex

debriefing
: a 'post-discussion', used here to refer to the intervention in which an expert moderator leads a meeting at which victims describe events and are able to express their emotions

dissociation
: process in which the coordinated combination of actions, thoughts and/or emotions becomes detached from the remainder of the personality

empathy
: the ability to understand the feelings and perspectives of others

empirical
: established by (practical) experiment

etiology
: the study of the causes of disease

fracture
: a broken bone

hypertension
: elevated blood pressure

imaginary exposure
: a method used in behavioural therapy whereby the patient recalls the traumatic (causative) event

incidence
: the number of new cases of a disease or condition noted within a given period and within a defined group of people

inhalation
: breathing in

longitudinal study
: research which considers events and developments over a (long) period

malignancy
: any growth or tumour that is capable of spreading (metastising) to other parts of the body

multifactorial
: depending on several factors

pandemic
: a disease which spreads across an entire region, country or continent

perception
: view or opinion of observed situation

peripheral neuropathy
: condition affecting one or more nerves outside the brain and spinal column, resulting in pain or loss of sensation and muscular weakness. Can be caused by diabetes mellitus, infectious diseases or alcohol abuse

perpetuating factors
: factors which prolong the duration of symptoms and which impair recovery

precipitating factors
: factors likely to prompt the emergence of a condition in susceptible persons

predisposing factors
: factors which account for the differences in individuals' susceptibility to certain complaints or conditions

prevalence
: number of cases of a condition noted at a specified moment in time or within a specified period, and within a defined group of people

psychological attribution
: the attribution of complaints to psychological causes

radionuclides
: substances which emit radiation

retrospective
: looking back on the past

scleroderma/systemic sclerosis
: a relatively rare condition in which connective tissue (such as that in the skin) becomes inflamed and thickens. Scleroderma can result in deformities of the joints, muscular weakness and abnormalities of the oesophagus, the gastro-intestinal tract and kidneys

secularisation
: social process whereby the influence of church and religion is diminished

significant
: permitting a statistically responsible conclusion to be drawn. (Also used here in the more general sense of 'important')

somatic
: physical

somatic attribution
: attribution of complaints to physical causes

somatoform disorders
: physical symptoms for which no organic or physiological cause can be demonstrated

stressor
: a factor which causes stress

substrate
: underlying level; culture medium

thorax
: chest