

Reference: WHO/NMH/PVI/00.2  
Distr.: Limited  
Original: English

Copies of this document are available from:  
Injuries and Violence Prevention Department  
World Health Organization  
20 Avenue Appia  
1211 Geneva 27  
Switzerland  
Fax: 0041 22 791 4332  
E-mail: [pvi@who.int](mailto:pvi@who.int)

The content of this document is available on the www at  
[http://www.who.int/violence\\_injury\\_prevention/index.html](http://www.who.int/violence_injury_prevention/index.html)

(C) World Health Organization, 2000

This document is not issued to the general public, and all rights are reserved by the World Health Organization (WHO). The document may not be reviewed, abstracted, quoted, reproduced or translated, in part or in whole, without the prior written permission of WHO. No part of this document may be stored in a retrieval system or transmitted in any form or by any means - electronic, mechanical or other - without the prior written permission of WHO.

# TABLE OF CONTENTS

## LIST OF ACRONYMS

### 1. BACKGROUND

- 1.1 Introduction
- 1.2 Scale of the problem
- 1.3 Policy context
- 1.4 Statement of the problem
- 1.5 Outline of the document

### 2. PURPOSE OF DOCUMENT

### 3. CASE DEFINITIONS

### 4. WHY COLLECT DATA

- 4.1 Uses of data collection
- 4.2 Local priorities

### 5. PRE-DATA COLLECTION REQUIREMENTS

### 6. DATA COLLECTION FORMS

### 7. EXPLANATORY NOTE FOR DATA COLLECTION FORMS

### 8. DATA ENTRY AND ANALYSIS

- 8.1 Data collection, accuracy and completeness
- 8.2 Data entry
- 8.3 Measurement of injuries and their consequences
- 8.4 Choice of population denominator data and type of study
- 8.5 Data analysis
- 8.6 Generalisability
- 8.7 Limitations

### 9. INTERPRETATION OF RESULTS AND PUBLIC HEALTH ACTION

- 9.1 Magnitude of the problem
- 9.2 Public health priority
- 9.3 Measures concerned with prevention
- 9.4 Improvements in the organization and delivery of trauma care
- 9.5 Evaluation and monitoring
- 9.6 Advocacy

### 10. DISSEMINATION

## REFERENCES

- Appendix I: Types of Mines, Their Common Uses and Potential Damage Inflicted
- Appendix II: Calculation of the Kampala Trauma Score
- Appendix III: Calculation and Uses of Common Epidemiological Measures

## ACKNOWLEDGEMENTS

The Injuries and Violence Prevention Department thanks the following persons and organizations for providing comments on the drafts of this publication: Anthony Zwi, London School of Hygiene and Tropical Medicine; Laurence Desvignes, International Committee of the Red Cross; James Cobey, Physicians for Human Rights; Marie Chuberre, Handicap International; Ron Lett and Olive Kobusingye, Injury Control Centre, Uganda; Sue Eitel, Landmine Survivors Network. The Department also acknowledges the contribution of Laura Sminkey for editing and formatting the document.

Cover photograph courtesy of Joel Chiziane, Agencia de Informacao de Mocambique

## EDITORS

Dr. Dinesh Sethi is Lecturer in International Public Health at the Health Policy Unit, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, Telephone: +44 (0) 171 9272122, Fax: +44 (0) 171 6375391, Email: [dinesh.sethi@lshtm.ac.uk](mailto:dinesh.sethi@lshtm.ac.uk)

Dr. Etienne Krug is Medical Officer with the Injuries and Violence Prevention Department, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland, Telephone: +41 (0)22 791 3535, Fax: +41 (0)22 791 4332, Email: [kruge@who.int](mailto:kruge@who.int)

## ACRONYMS

ICBL	International Campaign to Ban Landmines
ICRC	International Committee of the Red Cross
IMSMA	Information Management System for Mine Action
KTS	Kampala Trauma Score
NGO	Non-governmental organization
PHR	Physicians for Human Rights
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNMAS	United Nations Mine Action Service
UNOCHA	United Nations Office for the Co-ordination of Humanitarian Affairs
UXO	Unexploded ordnance
WHO	World Health Organization

# 1: Background

## 1.1 Introduction

**M**ines/UXOs are a public health problem not only because of the death and disability that they cause, but also because they render large tracts of land unusable and prevent whole communities from accessing essential commodities. The resulting disruption to economies and to disease prevention programmes leads to malnutrition and infectious disease, because access to curative services is rendered difficult.

The precise scale of the problem is not known; it is estimated that 26,000 people are killed or maimed by mines/UXOs every year (ICRC 1997). This figure is widely quoted and is an estimate from experience gained at hospitals of the ICRC. There is a need, however, for a more systematic collection of reliable and valid data (Krug 1998). Mines/UXOs are endemic in many countries, yet comprehensive information is not being collated from the health facilities where victims present. Similarly, few community surveys have been conducted to better understand the impact of mines/UXOs on people's lives.

This document is concerned with identifying the scale of the problem using hospital based information. It presents a tool which, if used widely, would lead to a better understanding of the size of the problem at a global level. Such a system could be integrated into existing health information systems and could be used for monitoring change resulting from variations in mine/UXO use and preventive interventions.

## 1.2 Scale of the problem

Despite an international treaty banning the use of landmines, it is estimated that the global stockpile is 250 million antipersonnel mines, and that about 60-70 million are actually in the ground in over 60 countries (ICBL 1999, US Department of State 1999). The scale of the suffering caused by mines/UXOs around the world is thought to be enormous. For example, sentinel site surveys showed that in Cambodia one out of every 236 people is an amputee and in Afghanistan nearly one out of every 10 adult males is a landmine victim (ICRC 1997, Andersson 1995). Other high risk countries with high mine densities include Angola, Bosnia, Croatia, Eritrea, Kosovo, Mozambique and Somalia.

Increasingly, civilians have become both the target and victims of weapons, whether these are landmines, fragmentation weapons or light arms (Smith 1999). There is ready availability of weapons in the aftermath of hostilities and mines/UXOs remain undetected in the ground for long periods (Garfield 1991, Meddings 1999). Men of economically active age make up most of those who have suffered mine/UXO incidents, but women and children make up a substantial proportion as well. This varies in different regions ranging from a ratio in adults of female to male of 1 in 4 in Mozambique to 1 in 35 in Cambodia (Andersson 1995).

Studies have shown that between a third and half of mine/UXO victims may die, many before receiving assistance (Ascherio 1995, Stover 1994). There is often no routinely available information on these deaths especially in areas of conflict. Mines/UXOs inflict severe wounds and damage the body by blast or by driving dirt, bacteria, clothing, metal and plastic fragments into the tissues. They may result not only in amputation of the affected limb, but also damage to genitals, face, eyes and ears. Mine/UXO victims are likely to need more blood transfusions and surgical operations than are victims of other injuries.

The hallmark of countries where most wars are fought is poverty, destroyed economic and social infrastructure and severely eroded health services (Sidel 1995). In this context, mine

injuries place a substantial burden on the health care infrastructure and compete for scarce resources, much needed for addressing other health problems.

Not only do mines/UXOs maim and kill, but they also have widespread public health consequences affecting whole communities. Livelihoods are severely compromised and land cannot be used for agriculture, livestock, gathering firewood and collecting water. There may be an increase in problems such as waterborne disease, malnutrition and infectious disease, because mines/UXOs block access to arable land, roads and health facilities (Kakar 1996). Mines/UXOs also prevent refugees and internally displaced people from returning to their lands. They therefore have far reaching consequences which severely delay redevelopment and reintegration in post-conflict societies.

### **1.3 Policy context**

In view of the scale of the humanitarian problem posed by mines/UXOs, a coalition of NGOs and other institutions under the banner of the ICBL lobbied governments and United Nations agencies to ban the production of landmines. This led to the signing by 122 nations of the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Landmines and Their Destruction (the Ottawa Treaty) in Ottawa, Canada in December 1997. As of February 2000, the number of signatories has risen to 137 and 91 nations have ratified the treaty. Some key military powers have still not signed the treaty including the USA, Russia, and China. Article 6 of the convention emphasises international co-operation and assistance, the provision of assistance for the care, rehabilitation and social integration of mine victims, and mine awareness programmes.

In May 1998 the Fifty-first World Health Assembly endorsed a resolution declaring the damage caused by landmines a public health problem. The resolution called for the better assessment and documentation of the health effects of mines/UXOs, promotion of preventive programmes, and the strengthening of emergency care and rehabilitative programs (World Health Assembly 1998). WHO has the mandate to develop appropriate standards and methodologies for data collection and to promote capacity building for victim assistance through the Ministries of Health. Its role is to provide technical assistance for mine action, and to co-operate closely with agencies such as UNICEF, ICRC and others.

In September 1998 at the first Inter-regional Workshop on a Concerted Public Health Response to Anti-Personnel Mines in Kampala, Uganda, representatives from the Ministries of Health of ten African countries agreed on the need to establish integrated surveillance systems for mines/UXOs and other injuries. The underlying principle of equity was agreed upon. This was to ensure a more just distribution of resources made available for these war torn and severely resource constrained countries. Under this principle all victims of trauma would benefit from an improvement in services, and mine/UXO victims would not be preferentially treated at the exclusion of those maimed by other causes. It was therefore agreed that victims of other injuries as well as mines/UXOs be included in both surveillance activities and the provision of assistance.

ICRC has been at the forefront of those agencies calling for the need for comprehensive data collection. It proposed the need for a Mine Information System which could be utilised to maximise efforts in medical assistance, prevention, advocacy and mine clearance (ICRC 1997).

Greater involvement of international and national public health agencies is necessary to reduce the burden of mines/UXOs. The approach has to be intersectoral and multidisciplinary involving policy makers, military leaders, public health officials,

epidemiologists, aid workers, ministry officials and many others, working together in order to solve this man-made disaster. This is because mine/UXO injury prevention and victim assistance is also in the remit of sectors other than health. For this collaboration to take place, a necessary starting point is the collection of data which are considered reliable and valid and which are shared among the agencies.

#### **1.4 Statement of the problem**

Current data collection on the problem of mines/UXOs is incomplete and much of that collected has been based on partial surveys and therefore does not give an accurate picture of the extent of the problem either at a country or global level (Krug 1998). The items of data collected may not be comprehensive and therefore represent a lost opportunity in maximising the potential gain from such activity. If the study populations from which the data are collected are not representative of the regional or national population, then the picture may not be generalisable. It would be misleading to extrapolate to the whole country from any one sub-group. In addition different agencies may use different case definitions which would invalidate comparisons. Bias may be unintentional, although it may serve the purpose of institutions such as political or military factions. It is in recognition of these difficulties that the present document has been written.

Experts from the following organizations were called together by WHO to contribute to the development of the data collection instrument presented in this document:

- ◆ ICRC
- ◆ PHR/ICBL
- ◆ Injury Control Centre of Uganda
- ◆ London School of Hygiene and Tropical Medicine
- ◆ Handicap International
- ◆ US Centres for Disease Control and Prevention

#### **1.5 Outline of the document**

In the next section the purpose of the document is explained. This is followed by the case definitions in Section 3. The public health reasons for collecting data are described in Section 4. The prerequisites which need to be in place before embarking upon data collection are discussed in Section 5. In Section 6 the data collection form with the minimum recommended dataset on landmine, UXO and other injuries is presented. There is a detailed explanatory account of these items and the rationale for collecting them in Section 7. Sections 8 to 10 deal with what to do with the data that have been collected and include data entry, analysis, interpretation and dissemination.

## 2: Purpose Of The Document

The purpose of this document is to provide a standardised tool for information gathering on mine/UXO victims as well as guidance on how to use this tool. There is also information on how to analyse and disseminate data so as to make the problem accessible and visible to policy makers and other key actors. This is to ensure that appropriate strategies are developed for prevention, treatment and rehabilitation.

The tools presented could be used for data collection on either:

- ◆ All injuries, including mines/UXOs
- ◆ Mine/UXO injuries alone

The document provides guidance on the systematic collection of data on mine/UXO and other injuries at health facilities. It is targeted at officers and health professionals from Ministries of Health and NGOs. The document is primarily intended for hospitals, health centres, health posts, mobile clinics and orthopaedic workshops. The forms and principles described in the document could also be used to conduct surveillance in the community, using community workers. It is, however, not the focus of this document to cover community based surveys (which might also be considered and) which are described elsewhere (PHR 2000).

## 3: Case Definitions

The International Classification of Diseases lists injuries under external causes. An injury can be defined as the damage to a person due to the sudden or excessive transfer of physical, chemical, radiation or thermal energy. Mines/UXOs cause damage by the sudden release of thermal and physical energy. It is very important to define who should be included in the data collection system. For example: For a system collecting information only on mine/UXO victims, the case definition could be: any human who sustains directly or indirectly a fatal or non fatal injury, caused by the explosion of a landmine or explosive ordnance in country/region X as of date Y.

Two data collection tools are presented which are intended for use together. Section 6A is a tool which is derived from WHO's injury surveillance guidelines (WHO 2000). It comprises the minimum dataset which should be collected on **all** injuries, whether intentional or unintentional. The tool in Section 6B is a module which is exclusively for use in collecting data on mine/UXO. Whereas cases with non-mine/UXO injuries could be excluded from the surveillance exercise, it is recommended that the minimum data presented in Section 6A are collected on all injuries, so long as this is in keeping with the local requirement. Once a decision on the inclusion criteria is made, then data collection should proceed using the relevant tool.

The mechanism of injury in the case of mines/UXOs is due to the blast, fragments and other debris being driven into the tissues. The type of injury resulting from a mine blast will be governed by the type of mine, its size and destructive capacity and the environment in which the individual is at the time of injury. The various types of mines, their common uses and the potential damage they inflict are described in Appendix I.

## 4: Why Collect Data

### 4.1 Uses of data collection

Sound epidemiological data, whether collected at health facilities or on the basis of surveys, are essential for properly quantifying the magnitude of a public health problem. This is a crucial first step in a public health approach to the mine/UXO problem. The results of such studies facilitate the planning of interventions, the allocation of resources and aid in evaluating the impact of interventions. The use of a standardised data collection tool and data collection methodology will ensure that: a) data collection is scientifically robust, b) data may be compiled centrally from different agencies, and c) data may be compared between different regions and countries. Information can then be accessible for the key players to mount an intersectoral response.

Surveillance is the on-going systematic collection, analysis, interpretation, and dissemination of outcome specific data for use in planning, implementation, and evaluation of public health interventions. This can be done at a national level or at a few sentinel sites, depending on the local context. The uses of such data are summarized in the table below.

**TABLE 1: REASONS FOR STANDARDISED DATA COLLECTION ON MINE/UXO INJURIES**

- ◆ Define the scale of the problem
- ◆ Identify the needs of the people, not only in terms of health care, but also rehabilitation and reintegration
- ◆ Evaluate the effectiveness of pre-hospital care
- ◆ Monitor the different parts of health care and psychosocial response to ensure it is co-ordinated and in so doing identify any weak links in the continuum of care for patients from pre-hospital, hospital to rehabilitative care
- ◆ Define the need and priorities for de-mining
- ◆ Highlight groups and behaviours to target for mine awareness
- ◆ Contribute to evaluating the effectiveness of de-mining and mine awareness programmes
- ◆ Contribute to determining the socio-economic and health care costs
- ◆ Assist in setting priorities regarding health care and other interventions
- ◆ Raise awareness about the impact of mines/UXOs on society

### 4.2 Local priorities

In the acute phase of a conflict, mine/UXO injuries may constitute a smaller proportion of the overall combat related injuries and the majority of the casualties may be soldiers. This may change in the post-conflict phase when civilians will likely make up the majority of those injured and, depending on the context, mines/UXOs may contribute to a larger burden of disease. In certain situations other weapons may be readily available and may cause a larger number of civilian casualties than mines/UXOs. Similarly road traffic accidents and other non-conflict related injuries might be responsible for greater premature life loss and disability than mines/UXOs. In these scenarios it would be fairer, more useful and more cost effective to collect information on all injuries rather than only on mine/UXO injuries. This holds true particularly because the needs in terms of pre-hospital and hospital care and rehabilitation are similar irrespective of the cause of the injury. The context therefore needs to be taken into account before deciding upon the priorities for collecting information. This decision would need to be taken by the Ministry of Health, NGO or institution concerned.

## 5: Pre-Data Collection Requirements

One of the first activities to conduct is to define the objectives of the data collection. In some cases agencies will be interested in collecting data to describe the magnitude, in others it will be to facilitate intervention, to plan resources for rehabilitation or to advocate. In many cases, it will be a combination of several reasons. Defining clearly the objectives will influence many of the steps outlined below. It will for example orient the selection of partners, the choice of issues on which to collect data and what type of analysis to conduct.

Surveillance requires strong commitment from the government, particularly the Ministry of Health and other health care providers. Data collection requires access to clinical records and hospital documents and permission is needed from the Ministry of Health, district medical offices, hospital superintendents and NGOs as appropriate. The local authorities and the Ministry of Defence also need to be informed. Any data collected should be stored securely to guard the confidentiality of victims. Permission needs to be obtained regarding the handling of data that might be sensitive, and it may be unwise to collect data such as names, identification numbers and addresses of combatants if there is on-going conflict. The security of staff involved in data collection needs to be assured.

A situation analysis may be conducted to identify stakeholders and potential information sources. Collaboration with other organizations involved with mine action in the country is desirable; they may already have data on mine/UXO injuries and their experience may be valuable. Such agencies could be identified by the government, the WHO country representative's office, ICRC, ICBL, UNOCHA, UNMAS, UNICEF, other UN agencies and international NGOs such as Handicap International, Médecins Sans Frontières, Mines Advisory Group, Save the Children Fund and the local mine action group.

Resources are also needed as data collection for surveillance is an on-going activity. It requires the time and training of staff to collect data on forms, enter them in databases, and analyse, interpret and disseminate the results to appropriate agencies for action. The time frame for data collection needs to be agreed upon. It is recommended that this should be for a year or more. This is because mine/UXO injuries are relatively rare. Data should be collected for a period long enough to ensure that the number of victims will allow for meaningful statistical analysis. Population denominator data with the age and sex distribution need to be obtained. The latest census figures with projections may be available from district or central offices or from the UN bodies in war zones. Detailed maps of areas will be needed in order to understand the distribution of hospital catchment populations. Mass migration due to conflict may render some of the estimates unreliable and appropriate alternatives may need to be sought. If data analysis is going to be conducted at a hospital level then hospital annual reports and routine information on age, sex and cause of all admissions and fatalities need to be obtained.

The logistics of data collection, analysis and dissemination should be clearly established before data collection starts. It is crucial to agree on a minimum dataset, such as the one presented in Section 6 before commencing surveillance. This minimum dataset should be defined in order to meet the objectives of the data collection system. The resources and facilities available for surveillance need to be defined and explored. These include personnel, training needs, storage of data collected, computers, printing, availability of supervisory support, requirement for technical support in the way of a consultancy. A plan of action that indicates who will be responsible for the budget, staff training, staff supervision, co-

ordination of data collection, data entry, data analysis, dissemination, ownership and evaluation should be written. This should also include a work schedule with time scales for key points such as data collection, entry, analysis, workshops and report writing. A clearly outlined budget which lists cost items and its components will help in obtaining the approval of institutions and donors.

In the next section a minimum data collection form is presented. This consists of two parts: Section 6A in which the minimum recommended dataset for **all** injuries is presented and Section 6B which is the extra module with specific data items on landmine, UXO and other similar injuries. Section 7 has a detailed explanatory account of the items on the data collection form and should be used as a guide for daily use and for staff training.

**6A: MINIMAL RECOMMENDED DATASET FOR SURVEILLANCE OF ALL INJURIES<sup>1</sup>**

a1. Registration or identification number:.....

a2. Patient name:.....

a3. Date of birth (or age): .....

a4. Sex:    1  Male        2  Female        9  Unknown

a5. Intent:

- |                                                 |                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------|
| 1 <input type="checkbox"/> Unintentional        | 5 <input type="checkbox"/> Operations of war and civil insurrection |
| 2 <input type="checkbox"/> Intentional – others | 8. <input type="checkbox"/> Other .....                             |
| 3 <input type="checkbox"/> Intentional – self   | 9. <input type="checkbox"/> Unknown                                 |
| 4 <input type="checkbox"/> Legal intervention   |                                                                     |

a6. Mechanism: How was the person hurt? Or how was the injury inflicted?

- |                                              |                                                |                                                 |
|----------------------------------------------|------------------------------------------------|-------------------------------------------------|
| 1 <input type="checkbox"/> Traffic injury    | 6 <input type="checkbox"/> Stab/Cut            | 11 <input type="checkbox"/> Landmine/UXO *      |
| 2 <input type="checkbox"/> Sexual Assault    | 7 <input type="checkbox"/> Choking/hanging     | 98 <input type="checkbox"/> Other(specify)..... |
| 3 <input type="checkbox"/> Other Blunt Force | 8 <input type="checkbox"/> Drowning            | 99 <input type="checkbox"/> Unknown             |
| 4 <input type="checkbox"/> Fall              | 9 <input type="checkbox"/> Poisoning           |                                                 |
| 5 <input type="checkbox"/> Gun Shot          | 10 <input type="checkbox"/> Fire, scalds, heat |                                                 |

\* If landmine/UXO injury skip remaining questions and go to question b1, Section 6B

a7. Place of occurrence:

- |                                                  |                                                  |
|--------------------------------------------------|--------------------------------------------------|
| 1 <input type="checkbox"/> Home                  | 7 <input type="checkbox"/> Countryside           |
| 2 <input type="checkbox"/> Street/highway/road   | 8 <input type="checkbox"/> Commercial            |
| 3 <input type="checkbox"/> School/Education      | 9 <input type="checkbox"/> River/lake/pool       |
| 4 <input type="checkbox"/> Sportsfield           | 10 <input type="checkbox"/> Other transport area |
| 5 <input type="checkbox"/> Farm                  | 98 <input type="checkbox"/> Other (specify)..... |
| 6 <input type="checkbox"/> Industry/construction | 99 <input type="checkbox"/> Unknown              |

a8. Nature of Injury:

- |                                                  |                                                |
|--------------------------------------------------|------------------------------------------------|
| 1 <input type="checkbox"/> Fracture              | 6 <input type="checkbox"/> Concussion          |
| 2 <input type="checkbox"/> Sprain/strain         | 7 <input type="checkbox"/> Organ System Injury |
| 3 <input type="checkbox"/> Cut, bite, open wound | 8 <input type="checkbox"/> Other(specify)..... |
| 4 <input type="checkbox"/> Bruise                | 9 <input type="checkbox"/> Unknown             |
| 5 <input type="checkbox"/> Burn                  |                                                |

<sup>1</sup>Corresponds to LEVEL I INJURY SURVEILLANCE INSTRUMENT (WHO 2000)

**6B: MINIMAL RECOMMENDED DATASET FOR SURVEILLANCE ON LANDMINE/UXO INJURIES**

b1. Name of hospital/clinic:.....

b2. Registration or identification number:.....

b3. Patient name:..... b4. Date of birth (or age):.....

b5. Sex: 1  Male 2  Female 9  Unknown

b6. Patient's address (with district of residence):.....

b7. Patient's occupation:.....

b8. Nationality: 1  National 2  Other 9  Unknown

b9. Status: 1  Civilian 2  Military 9  Unknown

b10. Displacement status:

1  Not displaced 3  Refugee 9  Unknown  
2  Internally Displaced Person 4  Returnee

**CIRCUMSTANCES OF INJURY:**

b11. Place of occurrence:

1  Home 5  Factory 9  Surroundings of 11  Sportsfield  
2  Street/Highway 6  Field government building 98  Other.....  
3  School 7  Riverbank 10  Surroundings of 99  Unknown  
4  Village 8  Footpath military building

b12. Location (please specify by name):

Village/municipality .....  
Province/state .....  
Road/highway.....

b13. Activity at time of injury: What was the person doing when he/she was injured?

1  De-mining 4  Farming/Herding 7  Travelling in 98  Other  
2  Tampering with 5  Fishing/Hunting vehicle/by animal (specify):.....  
mine 6  Collecting 8  Walking 99  Unspecified/  
3  Playing/Sports wood/water/food 9  Standing nearby unknown

b14. Cause of injury:

1  Anti-Personnel mine 4  Unexploded Ordnance 8  Other  
2  Anti-Tank mine 5  Booby trap (specify):.....  
3  Cluster bomb 6  Fuse

**ARRIVAL SEQUENCE:**

b15. Date and time of injury: Date . . / . . / . . . . Time . . : . .

b16. Date and time of arrival at health facility: Date. . . / . . / . . . . Time. . . : . .

b17. Date and time of arrival medical staff: Date. . . / . . / . . . . Time. . . : . .

b18. Type of facility: 1  Hospital 2  Health centre 3  Health post

b19. Mode of arrival:

1  Ambulance 4  By animal 9  Unspecified  
2  Other vehicle 8  Other  
3  By foot (specify):.....

b20. Patient was referred from another health facility: 1  Yes 2  No

If yes, specify name: .....

b21. If yes specify type of facility: 1  Hospital 2  Health centre 3  Health post

**CLINICAL FEATURES:**

b22. Pulse:..... /min b23. Respiratory rate:...../min. b24. Systolic blood pressure:.....mmHg

**b25. level of consciousness (select one):**

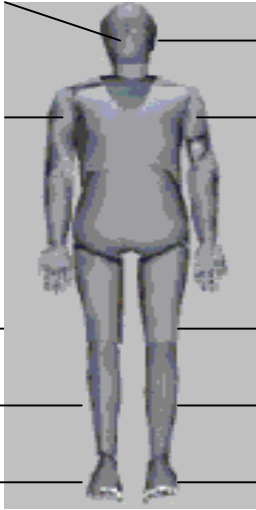
- 4  Alert    3  Responds to verbal stimuli    2  Responds to painful stimuli    1  Unresponsive

**b26. Initial patient disposition from emergency department / examination room:**

- 1  Treated and sent home    4  Dead on arrival  
 2  Admitted    5  Died in Emergency Department  
 3  Transferred to other facility. If transferred, specify where.....

**b27. Fill in site of injuries or impairment:**

**7.1 Loss of:**



**Right side**

Eye sight

Hearing

Arm

Hand/Finger

Leg Above Knee

Leg Below Knee

Foot/Toes

**Left side**

Eye Sight

Hearing

Arm

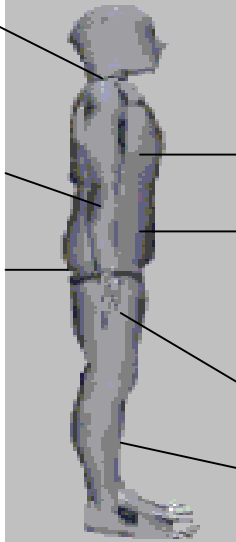
Hand/Finger

Leg Above Knee

Leg Below Knee

Foot/Toes

**7.2 Other injuries:**



Head/Neck

Back

Pelvis/Buttocks

Chest

Abdomen

Upper Limbs

Lower Limbs

**b28. Status of patient (at discharge):**

- 1  discharged alive  
 2  died  
 3  transferred  
 8  Other (specify).....  
 9  Unknown

Date of discharge from hospital .....  
 If dead, date of death.....  
 If transferred, date of transfer.....  
 If transferred, specify place.....

**b29. Was patient referred to rehabilitation centre?**

- 1  Yes    2  No  
 If yes, specify where.....

**ADDITIONAL INFORMATION:**

**b30. Was the area known to be mined?**    1  Yes    2  No

**b31. Was the area marked?**    1  Yes    2  No

**b32. Had the person received mine awareness training?**    1  Yes    2  No

**b33. How often did the person go to the affected area?**

- 1  More than once a day    3  Several times a week or less  
 2  Once a day    4  Never before

**b34. Were there any other victims in the same blast?**    1  Yes    2  No

**b35. Specify number of other persons killed:.....**

Names:.....    Names:.....  
 Names:.....    Names:.....

**b36. Specify number of other persons injured:.....**

Names:.....    Names:.....  
 Names:.....    Names:.....

**b37. Severity scale:** It is recommended that a severity score be used. (Please refer to Appendix II for details.)

Severity score: (optional) .....

Form filled by:.....    Date completed:.....

## 7: Explanatory Note For Data Collection Forms

The local policy decision made on the inclusion criteria - all injuries or landmines only - will govern which cases are included for data collection. If the decision is to collect information on *all* injuries then *Section A* should be used for each patient and *Section B* only for patients with *landmine/UXO injuries*. If the decision is to *exclude* all non-mine injuries then data should be collected only on landmine injuries on *both* Sections A and B. Section A should be filled out in the emergency department or examination room, and may need the help of an accompanying person (questions a1-a8). Section B should be filled in two stages: upon arrival in the emergency department or examination room (questions b1-b25, b30-b36) and then upon discharge from hospital (questions b26-29). Some questions may need to be filled with the help of an accompanying person, particularly if the victim is severely injured. *A mechanism needs to be established to ensure that data collection is fulfilled at both stages.*

Data should be collected on the data collection forms presented in section 6. This section provides detailed instructions on the data items to be collected and the rationale for doing so. To ensure uniform high standards, training sessions will need to be held with health care staff involved in data collection to familiarise them with the forms. A secure place will be needed for storage of completed forms to ensure patient confidentiality. A regular supply of new forms will also be needed. Codes for entering the responses into a database have been suggested on the data collection form. These appear to the left of the response box.

### Section 6A: To be filled in all cases

#### Questions a1-a4: Patient information

These data need to be obtained in order to cross-reference with other records to monitor and follow-up patients and to avoid duplication (name and identification number). The patient's sex and age should be obtained as it is desirable to describe the age and sex pattern of injuries and to target sub-groups for prevention. If security is an issue, it may be necessary to refrain from collecting the patient's identification or to ensure that this can be protected.

#### Question a5: Intent

This defines the role of human intent in the causation of the injury. Most so-called 'accidental' injuries such as traffic injuries will be classified as unintentional. Landmines will be classified under 'operations of war and civil insurrection'.

#### Question a6: Mechanism of the injury

This defines how the injury was inflicted or the cause of the injury which resulted in the person being hurt. If it is a landmine/UXO injury, then the last two questions should be skipped. The next question to be answered is b1 in Section 6B.

#### Question a7: Type of place of occurrence

This defines the category of the place where the injury event occurred and gives further information about the circumstances of the injury.

#### Question a8: Nature of the injury

This refers to the damage resulting to the person due to the injury. Some injury causes result in more than one injury. In this instance the most serious injury should be noted.

## **Section 6B: To be filled only for landmine/UXO injuries**

**Question b1:** State name of hospital/clinic.

**Question b2:** State registration or identification number.

**Question b3:** State patient's name.

**Question b4:** State patient's date of birth (or age).

**Question b5:** State patient's sex.

**Question b6:** State patient's address, including district of residence.

**Question b7:** Enter patient's occupation.

### **Question b8: Nationality**

- ◆ Nationals are patients from the country being surveyed
- ◆ Others are those from another country

### **Question b9: Patient status**

- ◆ A local civilian refers to non-military personnel who would normally reside in the region near the site of injury
- ◆ Military refers to combatant

### **Question b10: Displacement status**

Mark whether the person has been displaced by war or not. If displaced, then select between the following:

- ◆ Internally displaced person indicates a citizen/national who has had to move within country due to conflict
- ◆ Refugee refers to citizens of another country who fled
- ◆ A returnee indicates a national who fled the current country

Patient status provides important information regarding the population to which the individual belongs. Whether the patient is a local civilian, returnee, refugee or internally displaced person provides useful information regarding the population sub-group at risk, so that preventive activity can be targeted.

### **Question b11: Type of place of occurrence**

The closest approximation of the location of the injury should be recorded.

- ◆ Village indicates that the injury occurred in the village proper
- ◆ Road/roadside injuries occur during travel on or by road

Data on the type of area will indicate those locations most likely to be mined and pose a threat and will indicate whether mines may hinder resettlement (incident occurs in villages), travel (roads and footpaths), cultivation (field), military/government activity (buildings), or other daily activities (riverbank). These could be targeted for mine awareness and clearance.

### **Question b12: Place of occurrence**

It is important to specify the locality of the incident by name in order to collate evidence of the need for, and to evaluate existing, preventive activities. This may well be different from the district of residence. Precise information may not be available, however, even the closest approximation possible may be useful. For example, the closest village might be recorded and, if uncertain, then only the sub-district or district may be listed.

**Question b13: Activity at time of injury**

This is important information in order to establish the circumstances of the mine injury in order to target areas and activities for prevention. If mines play a large role in daily or economic activities, priority might be given to de-mining arable land or routes to water supplies. Similarly, mine awareness and education might focus on these areas. (Please refer to Section 3.)

**Question b14: Cause of injury**

This provides additional information on the type of landmine/UXO, etc., that led to the injury.

- ◆ In cases of anti-personnel, anti-tank mine, UXO, booby trap or fuse related injuries the precise type should be specified
- ◆ This information may be difficult to obtain from the survivor unless pictures are used

**Questions b15-b17**

- ◆ Date and time of injury
  - ◆ The date and time of attention by medical staff should be specified, whenever possible
- This is of importance as delays in patient transfer and delays in receiving medical attention can have a bearing on outcome. Time to transfer a patient can be used to assess ease of access to health care and will help determine whether pre-hospital programmes are needed. The duration to receiving medical attention can provide useful information about the organization of services.

**Question b18: Type of facility**

- ◆ A health post serves the equivalent of one village, may not have medically trained personnel and may be manned by village health care workers with few medications on-site
- ◆ A health centre serves an area greater than one village, either a district or sub-district; most likely has some level of trained medical personnel, such as a nurse, and basic medications, such as antibiotics; and may be an outpatient facility
- ◆ A hospital indicates in-patient care manned by doctors and nurses

**Question b19: Mode of arrival**

Most war torn countries lack ambulance transport, especially for civilians. Mode of arrival may explain some of the delays due to inadequate transport. If the injury occurred long before treatment at the first health facility and transport method is by foot or animal, the access problem may be due to inadequate transport facilities.

**Questions b20-b21: Referral of patient from another health facility**

- ◆ This will only apply if the patient has been transferred or has come from another health facility
- ◆ Information on whether this is the case, the name and type of facility should be recorded

This will provide useful information on the organization and access of services. It is important that patients are treated at an appropriate facility i.e. a hospital with a surgeon. However, life saving first aid may be provided at lower level facilities which might be more immediately accessed. Access is an important issue; delays in transfer for appropriate treatment may have grave consequences. If a large percentage of injuries are first seen at health posts and the time interval for referral to a hospital (second health facility) is long, then improved transport and training in pre-hospital care may be needed.

### Questions b22-b25: Clinical features

- ◆ The clinical parameters listed represent those which are routinely measured in the assessment of trauma victims and which are related to the severity of the injury and therefore have a bearing on clinical outcome
- ◆ Heart rate, respiratory rate, systolic blood pressure (higher number of blood pressure figure: systolic/diastolic) and level of consciousness should be recorded on arrival
- ◆ One of the options on the scale for level of consciousness should be selected

The level of consciousness scale represents a gradation of worsening level of consciousness from alert, responsive to verbal stimuli, responsive to pain and unresponsive. It is similar to the Glasgow Coma Scale and has been selected for its simplicity. Consciousness would be impaired in the event of a head injury, but also due to physiological or pharmacological causes. Injury severity scales have been developed which employ these parameters to determine the severity of the injury and can be used as a basis for standardisation when considering comparative outcomes of different institutions. These ensure that like is being compared with like. Such a scale is described in Appendix II.

### Question b26: Initial patient disposition

- ◆ This should be recorded when the patient is released from the emergency department or examination room
- ◆ Discharged alive indicates mildly injured patients sent home after treatment
- ◆ Those admitted would be more severely injured
- ◆ Patients may die in the emergency department with overwhelming injuries or may be dead on arrival having died during transport

This information provides an indirect measure of the severity of injury. It is particularly important to record data on those who die as this information may otherwise be lost, and death is an important outcome. If the hospital facilities were inadequate to deal with the injury then the patient would be transferred. Unexpected deaths may be used to assess quality issues and training needs for pre-hospital and emergency department care.

### Question b27: Site of injury or impairment

- ◆ The **left** body map is for recording loss of sensory function or amputations of limbs; the appropriate box should be ticked taking care to address both sides of the body
- ◆ On the **right** body map the anatomical site of serious (**penetrating**) injuries should also be recorded: head/neck, back, chest, abdomen, buttocks and pelvis, upper limb and lower limb injury

Traumatic amputation of a lower extremity affects approximately 35% of victims who survive; they will require a prosthesis along with substantial rehabilitation in order to fully reintegrate into society. Information on other injuries and disabilities (deafness, blindness, paraplegia, etc.) will also be useful in targeting health and social interventions for landmine victims.

### Question b28: Status of patient at discharge

- ◆ This should be recorded in the hospital at discharge
- ◆ The length of stay can be calculated from the date of discharge and may be an indicator of the severity of the injury; it determines the resources consumed in terms of bed days (mine victims may stay for three weeks or longer)
- ◆ Death is an important outcome indicator and must be recorded should the patient die; it is the basis for calculating case fatality ratios
- ◆ The patient may be transferred to another facility on discharge; if so, the date of transfer should be recorded

**Question b29: Rehabilitation**

- ◆ Referral for rehabilitation should also be recorded, as well as the name of the institution

**Question b30: Area known to be mined**

This will assess the level of mine awareness in the community and willingness to take risks. Pressures for survival may force people to seek food and water despite knowledge about landmines in a locality. Preventive strategies can then be planned appropriately e.g. speeding up de-mining, better food distribution.

**Question b31: Markings of area**

This will highlight whether the area was entered despite markings and will inform preventive strategies e.g. better markings, increased awareness raising within populations of affected areas.

**Question b32: Level of awareness training of patient**

If persons are being affected despite awareness training programmes, this may provide useful information on whether all the population is being included in training or on the effectiveness of the training programme.

**Question b33: Frequency of visits to affected area**

This may provide useful information on the movements of the affected person and on new placement of mines.

**Questions b34-b36: Other victims**

- ◆ The number of other victims who were killed and injured should also be recorded. This figure represents an invaluable source of information on cases which may not otherwise be ascertained. This information can be used to extrapolate the scale of the problem and inform preventive strategies.

**Question b37: Severity scale**

Severity scores can be used to analyse outcomes by severity. Appendix II provides an example: the Kampala Trauma Score. This proposes a methodology for calculating the score, which uses the age, pulse, systolic blood pressure, respiratory rate, level of consciousness and number of serious injuries. Such a scoring method should be used in those instances in which data are collected on all injuries. It is best to calculate the score during the analysis phase. Other scores are available in the literature (Yates 1990).

## 8: Data Entry And Analysis

**8.1 Data collection, accuracy and completeness**

**R**egular checks on completeness and accuracy (validity) need to be made to ensure that data collected are of high quality. This may be done on a 20% (or greater) sample by a staff member in a supervisory role. The sample should cover the initial period. It should be verified that data are being collected during non-office hours (nights, weekends) as well. Problems in interpretation and completeness can therefore be identified early. Any omissions can be corrected by referring to patient records and hospital registers. Particular problem areas might include data around the arrival sequence, place and activity at time of occurrence, physiological data and status of the patient at discharge.

**8.2 Data entry**

A database needs to be established in order to enter all the items of data collected on the instrument in Section 6. Codes have been suggested on the actual form. The choice of

software used will be influenced by local knowledge and availability. Epi-Info is widely known and available. Alternatively, software (IMSMA) using ACCESS is under development jointly by UN agencies and others. Quality assurance checks can also be made after data entry. These can be on completeness of the forms by running the frequency command of Epi-Info. Missing data can then be identified and entered after checking the forms and case notes. Accuracy of data entry can be checked by double entering data and running the double entry command in Epi-Info. Any discrepancies between the two datasets can then be addressed by examining the forms. Alternatively, accuracy can be assessed by rechecking data entry and correcting any errors identified. Coding may be required for free text responses (e.g. when other alternatives to the ones listed are entered) and a clear record of the codes used should be made.

### **8.3 Measurement of injuries and their consequences**

To understand the occurrence and pattern of injury events, health outcomes or deaths from mines/UXOs in populations, statistical and epidemiological methods need to be used to compare disease frequencies across different populations. Standardised definitions of health outcomes are necessary to make comparisons either across time or between populations. Deaths, disabilities such as amputations and loss of quality of life are possible health outcomes that could be used for mine/UXO injuries. To measure the amount and distribution of injuries and their consequences in a population, the individuals with injury outcome need to be related to a population base. The size, source population from which the cases are drawn (e.g. hospital patients, community sample, district population, national population) and the time period in which the information was collected also need to be known. Results are normally expressed as rates or as proportions.

A rate is a measure of frequency of a specified event (mine/UXO injuries in this case) in a defined population. A rate is composed of: a numerator (number of events); a denominator (average population at risk for the event); a specified time in which the events occur; and a multiplier (usually 100,000) to convert the fraction into a whole number. A proportion is the measure of the number of specified events divided by the number of persons in the specified population from which the cases were derived. Proportion is often expressed as a percentage. An explanation on the calculation of rates and proportions and their uses is provided in Appendix III.

### **8.4 Choice of population denominator data and type of study**

Population based studies are more valuable than health facility based studies because these represent the whole population rather than only those people who have sought health care. A more robust understanding of the public health problem can therefore be obtained by identification of sections of the population at risk, alterable risk factors and surveillance to detect trends over time. It may not be practical to conduct properly designed population studies. The type of study design that might be selected will be governed by factors such as resources and expertise available, security in the area, the objectives for gathering information, data needs of organizations, and the availability of denominator data. Similarly, if the occurrence of mine/UXO injuries is infrequent then a very large survey would have to be undertaken to detect sufficient cases. Clearly, it is important to ensure that the population denominator used in calculating a rate is accurate.

This guidance is concerned with using hospital based data for surveillance. The advantages and disadvantages of hospital based data are summarised in the table below. The most frequent uses of hospital based surveillance would be to describe trends in frequency of cases and deaths, to calculate hospital presentation rates and hospital case fatality rates, to describe proportionate mortality and less commonly to estimate incidence and prevalence.

There are two main problems that need attention when using hospital based data to draw conclusions about the local population. The first is to do with the denominator and whether there is reasonable certainty about the catchment population of the particular hospital (the population from which patients would go exclusively to that hospital) and its demography. This might arise in a situation where all patients in a district access the surveillance hospital(s). In this case the district population could be used as the denominator and the data can be used to calculate population based rates. Hospital presentation rates could be estimated; for example, the number of mine/UXO injuries presenting to hospital per 100,000 population per year.

The second is to do with the numerator and ensuring completeness of ascertainment of cases. This may be incomplete because deaths occurring in the community may not be notified to the hospital, there may be outflow of some severely injured patients to hospitals outside the district, and mildly injured patients may only present to health outposts or not at all.

**TABLE 2: ADVANTAGES AND DISADVANTAGES OF HOSPITAL BASED SURVEILLANCE**

ADVANTAGES	DISADVANTAGES
Readily accessible patients	
Uses clinical data	May underestimate incidence because: <ul style="list-style-type: none"> <li>◆ May miss deaths occurring outside hospital</li> <li>◆ Will miss cases seeking help at hospitals outside district</li> <li>◆ Will miss mild cases who seek treatment at health post/centre or don't seek treatment at all</li> </ul>
Captures severe cases	
Useful for case fatality rates	
Useful for hospital proportionate mortality	Difficult to define catchment population
Relatively inexpensive to conduct as can use existing hospital resources	
Can be used for on-going surveillance and can therefore identify trends	
Useful for highlighting demand, resource constraints and improving quality of health care	
Useful to estimate incidence if surveys are impractical	
Useful for reasons of safety when it may be unsafe to do a survey	

Caution has to be exercised in interpreting results. Clearly a database that only records patients presenting to the hospital will have a certain amount of imprecision with respect to estimates of the incidence rate, because it is only measuring patients that present and there may not be information on all new patients. Efforts can be made to complete the dataset by using data from other sources: deaths can be ascertained through community based surveillance, from the military or police; hospitalised patients from neighbouring hospitals; and mildly injured patients from health outposts. Questions b34-b36 on the form have been devised to capture information on patients which might potentially be missed.

In situations where the above conditions are not fulfilled and population based data are required then a community survey might be conducted. The advantages of a community survey are that it gives a snapshot picture or a point prevalence of a condition, can be used in a population over a short duration, and is dependent on recall rather than health service data, and so is likely to be more inclusive of all levels of severity of injuries. The disadvantages are that it requires a complex sampling technique in order to ensure that the study population represents the population from which it is derived, is resource intensive, may be subject to recall bias especially for events that are distant in time and would require large sample sizes if mine/UXO injuries were relatively rare. Other limitations would include ensuring the safety of personnel if there were insecurity in the region. One such method for sampling is cluster sampling (Bennet 1991). A protocol for conducting a community survey is available in the document *Landmine Assistance Manual* (PHR 1999).

Population based denominator data are usually derived from a census. This may be at a district or national level and can be obtained from the district or national statistics office. It is best to obtain data on age and sex specific bands. These are usually available in five or ten year bands. This is of importance because different age and sex groups may be at different risks and experience different rates of mine/UXO and other injuries. It is important to compare populations within age and sex specific bands as the population demography may be different.

A major constraint in a region with conflict is that refugees, internally displaced persons, or returnees may have migrated after the most recent census. Population projections may therefore be unreliable. In this situation population estimates of refugees or internally displaced persons may be obtained from UNHCR, WHO or UNDP and district offices for the national population. The uncertainty of these estimates has to be borne in mind.

### **8.5 Data analysis**

The purpose of descriptive data analysis is to provide frequencies of disease (mine/UXO injuries) and to determine if changes in time or differences between populations are of significance. Differences can be tested statistically to determine if the likelihood of the difference occurring is greater than that by chance. The outcome of interest, which in the case of mines/UXOs may be injuries, amputations, disabilities or deaths, will need to be described as frequencies and rates or ratios for each period or study population. In the first instance frequencies of the different variables of interest in the age and sex subcategories should be described. For example, one may wish to describe the percentage of mine/UXO injuries in young men aged 15-40 years which result in deaths or amputations, and the percentage of all mine/UXO injuries which require hospitalisation for greater than three weeks.

The definitions and formulae for calculating rates and ratios were presented in Section 8.3. These can be calculated manually, but computer programmes such as Epi-Info can also be used. These are referred to as crude rates and can be used to compare two populations if the age and sex characteristics do not differ widely.

In some cases it is useful to compare rates across populations in the same or in another country. When these populations differ from each other in characteristics such as age and sex, it is important to adjust or standardise for these differences. The age and sex distribution of the population needs to be known as do the rates specific for these categories.

There are two methods for standardisation, the direct and indirect method. They both require knowledge of certain characteristics in a standard population. The remit of this document is to highlight the importance of collecting age and sex specific data in order to allow for the adjustments to be made subsequently. It is advisable to obtain statistical advice.

The strength of an association between explanatory and outcome variables can be tested using univariate analysis. An example would be if one wanted to determine whether being brought into hospital after 6 hours (explanatory variable) is associated with greater odds of dying (outcome variable) than if the transfer time is less than 6 hours. This is easily done using a statistical package and is called cross tabulation. If other explanatory variables such as age, sex, type of mine also have an association (or influence) with death, then adjustment would have to be made for these other factors. One method for doing this is logistic regression analysis. Advice from a statistician may be sought.

### **8.6 Generalisability**

The generalisability of the results is the possibility to extrapolate the results from one surveillance system based on one population to another, usually larger, population, for example, drawing conclusions for a whole province based on the data collected in one district. The generalisability of the study or report will depend upon the sampling and analysis procedures. The results would present a picture of the study population. If the study population were representative of a larger population, then the results would be generalisable to that population. In the case of a hospital based study the results will be generalisable to hospital populations with similar characteristics.

### **8.7 Limitations**

No study is perfect. There may be weaknesses in the sample selection, underascertainment of cases, misclassification of cases, incomplete measurement of outcomes, mistakes in analysis, inadequate sample size, etc. It is important to try to keep these to a minimum, but to be honest about them in the narrative, to inform others how they might be overcome and whether these weaknesses preclude generalisability.

One of these limitations is in the interpretation of frequency data: as this is hospital based data, frequencies will be influenced by access - this may be influenced by geography, transport, ability to pay, user fees, civil status, or referral practices. This can be double-checked by local knowledge of referral practices and by examining referral data for other diseases.

## 9: Interpretation Of Results And Public Health Action

### 9.1 Magnitude of the problem

The magnitude of the problem can be determined from the absolute or relative number of injuries, deaths and disabilities from mine/UXOs. Increasing trends with time would be a cause for concern and in a surveillance system would be a trigger for public health action. Specific measures and some of the ways of using the information are discussed.

- ◆ **Case fatality rate:** The proportion of mine/UXO injuries which result in death should be monitored. Increases may be indicative of increasing proportion of severely injured patients, or, alternately, declining quality of care. Comparisons could be made with other institutions as a way of improving quality of care.
- ◆ **Proportion of patients who are amputees, paraplegic, deaf or blind:** This is a measure of the disability caused by mines/UXOs and the need for rehabilitation. The proportion referred for rehabilitation should also be measured, as under referral would indicate an unmet need.
- ◆ **Length of stay:** This will be governed by severity of injuries and factors such as medical care and availability of rehabilitation facilities. This is closely related to health service costs.

### 9.2 Public health priority

The magnitude of the problem would be one of the factors influencing the priority given for public health action. Other measures are discussed.

- ◆ **Proportionate mortality:** The proportionate mortality represents the proportion of deaths that could be averted if mine/UXO deaths could be prevented. It is a measure of the public health importance that could be attached to a particular intervention. For example, mines/UXOs may constitute a larger proportion of deaths (and therefore a higher priority) during conflict relative to traffic-related deaths, whereas in the post-conflict phase the proportion of deaths due to traffic injuries may be much higher.
- ◆ **Costs:** Factors influencing societal burden other than the human cost of suffering due to death, injury, disability, loss of quality of life and psychosocial morbidity are the health service costs and costs to the individual, family and society in expenditure and lost production. The use of this survey instrument to build up a database contributes to defining the burden to society.

### 9.3 Measures concerned with prevention

- ◆ **Frequencies of characteristics of the injured and circumstances of injury:** Results of the patient's characteristics, cause of injury and circumstances at the time of injury give an indication of the risk factors that could be targeted for prevention, as inferred in section 7. For example, if the frequency data suggest that a large proportion of injuries are occurring among civilian women from a particular village whilst farming in fields, then de-mining and educational activities should be targeted to this group and area. If on the other hand injuries mainly affect young men of combative age who are military personnel, then preventive activities should be targeted to a greater degree towards that population.

- ◆ **Hospital attendance rates:** These are useful to monitor changes over time, between subgroups or between areas. Inter-hospital comparison can be made between similar hospitals with defined populations. Increases in attendance rates would need action.

#### **9.4 Improvements in the organization and delivery of trauma care**

Information from a surveillance system could also be used to assess quality of care and could be a trigger for improvements in injury care. Weaknesses and constraints around the organization of trauma care could be identified as an initial step.

- ◆ **Delays in transfer times, and attendance by medical staff:** Long transport times from the scene of the incident or for inter-facility transfer indicate poor transport facilities. There is evidence to suggest that survival for mine/UXO injuries is adversely affected if transport times are greater than 6 hours. The public health response to this may be to strengthen the community's capacity to deliver first aid. Long delays before assessment by medical staff at a health facility may indicate manpower constraints. A possible solution might be to introduce a system of triage where the severely wounded receive priority attention.

#### **9.5 Evaluation and monitoring**

There is little evidence on the effectiveness of the educational activities being practised. The establishment of databases gives an opportunity to evaluate effectiveness by determining whether there is a fall in morbidity and mortality. Similarly such a database or register could be used as an information source for the long-term follow-up of patients to determine their quality of life and degree of access to rehabilitation and reintegration.

#### **9.6 Advocacy**

Such information would be useful to raise awareness about the mine/UXO problem and to lobby governments, donors and other key actors.

## 10: Dissemination

There should be clear plans for disseminating the findings of the surveillance. This can be done in the form of reports, publications, workshops and seminars and discussions with key stakeholders, such as officials and health workers from the Ministry of Health, Ministry of Social Welfare, Ministry of Defence, the military, UN bodies such as WHO, UNICEF, the local Mine Action Centre, other de-miners, NGOs, donors, community leaders and district officials.

It is important to write and distribute reports which document the scale of the problem. Such a report should be explicit about its purpose, case definitions used, methods, results and interpretations in terms of highlighting key areas for action. The authors should be candid about the limitations as this will help others in overcoming constraints and avoid over interpretation of the results. Such a report should be disseminated widely to advocate preventive activities and improvements in the quality of care. It is particularly important to feed back information to those involved in data collection in order to ensure their information as well as their continued co-operation and motivation. The sharing of information facilitates intersectoral working and fosters ownership amongst the health staff who have collected it. In addition papers should be written for NGO, policy and peer review journals.

## REFERENCES

- Andersson N, Palha da Sousa C, Parades S. Social cost of land mines in four countries: Afghanistan, Bosnia, Cambodia, and Mozambique. *BMJ*, 1995, 311:718-721.
- Bennet S, Woods T, Linyanage WM, Smith DL. A simplified general method for cluster-sample surveys of health in developing countries. *World Health Statistics Quarterly*, 1991, 44:98-106.
- Coupland RM, Samnegaard HO. Effect of type and transfer of conventional weapons on civilian injuries: a retrospective analysis of prospective data from Red Cross hospitals. *BMJ*, 1999, 319:410-412.
- Garfield RM, Neugut AI. Epidemiological analysis of warfare: a historical analysis. *JAMA*, 1991, 226:688-692.
- International Campaign to Ban Landmines. *Landmine monitor report 1999: toward a mine-free world*, New York, Human Rights Watch, 1999.
- International Committee of the Red Cross. *Assistance for victims of anti-personnel mines: needs, constraints and strategy*, Geneva, International Committee of the Red Cross, 1997.
- Kakar F, Bassani F, Romer CJ, Gunn SWA. The consequence of landmines on public health. *Prehospital Disaster Med*, 1996, 11:2-10.
- Krug EG, Ikeda RM, Qualls ML, Anderson MA, Rosenberg ML, Jackson RJ. Preventing land mine related injury and disability: a public health perspective. *JAMA*, 1998, 280:465-466.
- Meddings DR, O'Connor SM. Circumstances around weapon injury in Cambodia after departure of a peacekeeping force: prospective cohort study. *BMJ*, 1999, 319:412-415.
- Physicians for Human Rights. *Landmine assistance manual*, Boston, Physicians for Human Rights, 1999.
- Physicians for Human Rights. *Summary of survey tools for measuring the magnitude of the landmine problem for victim assistance*, Boston, Physicians for Human Rights, 1999.
- Sidel VW. The international arms trade and its impact upon health. *BMJ*, 1995, 311:1677-1680.
- Smith C. Who gets hurt by all these weapons? Non-combatants outside formal conflicts. *BMJ*, 1999, 319:395.
- United Nations Mine Action Service. Mine action and effective co-ordination: the United Nations policy. [Http://www.un.org/Depts/Landmine/Policy/policy.htm](http://www.un.org/Depts/Landmine/Policy/policy.htm) (22.9.99)
- US Department of State. *Hidden killers: the global de-mining crisis*, Washington DC, US Department of State Publication 190575, 1995.
- World Health Assembly. *Concerted public health action on anti-personnel mines*, Geneva, World Health Organization, Publication WHA 51.8, 1998.
- World Health Organization. *Injury surveillance guidelines for less-resourced environments*, Geneva, World Health Organization, 2000 (in preparation).
- Yates DW. Scoring systems for trauma. *BMJ*, 1990, 301:1090-1094.

## APPENDIX I. TYPES OF MINES, THEIR COMMON USES AND POTENTIAL DAMAGE INFLICTED

- ◆ **Anti-Personnel Landmines:** These devices are designed to explode when a person walks on, or, in some cases, near them. They are often laid to protect military installations from enemy approach and may delay and inconvenience enemy forces. In some countries, anti-personnel mines are placed strategically around anti-tank minefields to prevent their removal. Anti-personnel landmines are the variety which have been utilised to terrorise and demoralise civilian populations and to sabotage their livelihood by mining to block access to water supplies, firewood, grazing and agricultural lands, and travelling paths. There are three patterns of injuries relating to the effects of anti-personnel mines:
  - ◆ Pattern 1: related to stepping on a buried anti-personnel landmine and typically results in traumatic or surgical amputation, with possible damage to other limbs, genitalia, face, eyes and ears. This tends to be the most severe.
  - ◆ Pattern 2: caused by the triggering of a fragmentation device and, if not killed immediately, victim may have fragments in almost any part of the body. This pattern is also caused by UXOs.
  - ◆ Pattern 3: caused by detonation whilst handling or tampering with a mine. This leads to extensive hand and facial injuries (ICRC 1997).
- ◆ **Anti-Tank Mines:** These are larger devices that explode when vehicles drive over them and are commonly used on main supply routes to limit and deter the movement of enemy troops. These often result in multiple casualties.
- ◆ **Unexploded Ordnance:** Missiles, rockets, grenades and other explosives that fail to explode upon impact, are referred to as Unexploded Ordnance. These are often an even greater problem than landmines in areas where heavy and continuous fighting has occurred. Most of these devices may still be active years or even decades after being released. As many as 10% of explosives in armed conflict do not explode, and the injuries caused are not dissimilar to those caused by mines. UXOs also have to be handled like mines, thus complicating any de-mining process. It is important therefore to also consider UXOs, as their impact is similar.
- ◆ **Improvised Explosive Devices or Booby-Traps:** These are designed to explode when a person opens a door, picks up or handles a particular object such as a toy. Although less common, these are included here as the injuries caused are similar.

## APPENDIX II: CALCULATION OF THE KAMPALA TRAUMA SCORE (KTS)

The KTS is included in this document as an example of an instrument to use to classify the severity of injuries. It is currently in use in some low-income settings. Other trauma scores exist and can equally be used.

The KTS is best conducted by a designated person after data collection has been completed. The data collection form has items on age, number of serious injuries, systolic blood pressure, level of consciousness and respiratory rate.

Item	Coded value	Score
<b>Age</b>		
<5	1	
5-55	2	A _____
>55	1	
<b>Number of serious injuries</b>		
None	3	
One	2	B _____
Two or more	1	
<b>Systolic Blood Pressure (mm Hg)</b>		
>89	4	
50-89	3	
1-49	2	C _____
Undetectable	1	
<b>Respiratory Rate (breaths/minute)</b>		
10-29	3	
>30	2	D _____
<9	1	
<b>Level of Consciousness</b>		
Alert	4	
Responds to Verbal Stimuli	3	E _____
Responds to Painful Stimuli	2	
Unresponsive	1	
<b>KTS TOTAL SCORE = A+B+C+D+E = _____</b>		

## APPENDIX III: CALCULATION AND USES OF COMMON EPIDEMIOLOGICAL MEASURES

**Rates:** A rate is a measure of frequency of a specified event (mine/UXO injuries in this case) in a defined population. A rate is composed of: a numerator (number of events); a denominator (average population at risk for the event); a specified time in which the events occur; and a multiplier (usually 100,000) to convert the fraction into a whole number. There are various types of rates used in different circumstances such as:

*Incidence rate* which is the number of *new* events (mine/UXO injuries) in a given population at risk for a specified period of time. It is the measure that may be obtained in a cohort study where a population cohort is being observed for a period of time. For mines/UXOs this would be:

$$\text{Incidence rate} = \frac{\text{Number of new mine/UXO injuries during specified period of time}}{\text{Population at risk}} \times 100,000$$

In this instance care would have to be taken to ascertain all cases in the population cohort being studied over the whole period of time. Incidence rates are usually measured in cohort studies, where a defined population cohort is observed over a period of time, either prospectively or retrospectively. This would be difficult if the population at risk were a district population in a war zone being studied over a year because of forced migration. Care would have to be taken to ensure that all cases were captured, including deaths as well as outflow from the district who might seek treatment at other hospitals.

The *mortality rate* from mines/UXOs is the proportion of deaths from mine/UXO injuries for a given population at risk over a specified period of time. The formula would be:

$$\text{Mortality rate} = \frac{\text{Number of mine/UXO injury deaths during specified time period}}{\text{Population at risk}} \times 100,000$$

*Point Prevalence rate* is the proportion of the population that has a health problem (e.g. disability from a mine/UXO injury) measured at a specific point in time, *irrespective* of the period of time for which they have had it. It is the measure that is obtained in a cross-sectional survey. For amputees from mine/UXO injuries this would be:

$$\text{Point prevalence rate} = \frac{\text{Number of mine/UXO amputees at a specified point in time}}{\text{Total population studied}} \times 100,000$$

*Case fatality rate* is the number of deaths due to a health problem divided by the number of persons diagnosed with the same problem during a specified time period. Thus the case fatality rate from mine/UXO injuries at a given hospital H over a specified period of time would be:

$$\text{Case fatality rate} = \frac{\text{Number of mine/UXO deaths of cases admitted to hospital H}}{\text{Number of mine/UXO injuries admitted to hospital H}} \times 100$$

*Morbidity* refers to illness or damage to the person not resulting in death. Both incidence and prevalence are measures of morbidity.

It is important that the numerator and denominator reflect the same population e.g. same hospital. If the numerator is confined to a certain age and sex e.g. adult males age 15 to 50 years then the denominator should be similarly restricted. A rate is a proportion over a specified time period.

**Proportion:** A proportion is the measure of the number of specified events divided by the number of persons in the specified population from which the cases were derived. It is often expressed as a percentage. A commonly used proportion is the *proportional mortality* which measures the relative importance of a specific cause of death relative to all deaths in a population. It is an estimate of the proportion of lives that could be saved by preventing a specific cause of death. In a hospital setting, it

would be a measure of the burden of disease from deaths due to mines/UXOs versus all other causes and would give an idea of the public health importance of mine/UXO injuries. For mine/UXOs the proportional mortality would be:

$$\text{Proportional mortality} = \frac{\text{Number of deaths due to mine/UXO injuries within specified time}}{\text{Total number of deaths in that population within the specified time period}} \times 100$$

The *proportional mortality ratio* is the ratio of two proportional mortalities and is a comparison of two different populations.