

## SHORT REPORT

## Landmine related injuries in children of Bosnia and Herzegovina 1991–2000: comparisons with adults

S Kinra, M E Black

*J Epidemiol Community Health* 2003;**57**:264–265

Each year landmines kill and maim an estimated 26 000 people worldwide.<sup>1</sup> About 10%–40% of these victims are children, most of whom are affected long after the cessation of hostilities.<sup>2,3</sup> These deaths and injuries are potentially preventable but planning measures are hampered by the lack of data on determinants of landmine injuries in children; consequently mine awareness programmes for children are routinely designed using adult data.<sup>4</sup> To overcome this gap, we have studied the determinants of landmine related injuries in Bosnia and Herzegovina during 1991–2000, and compared children with adults.

## SUBJECTS, METHODS, AND RESULTS

Since 1996, the International Committee of the Red Cross (ICRC) and the Red Cross Society of Bosnia-Herzegovina have maintained an active surveillance system for collecting data on mine related injuries.<sup>4</sup> Red Cross field workers based in each municipality (n=128) actively seek out any reports of mine related incidents through local information, hospitals, and organisations involved in such activities. Each report is followed up by a personal visit to the victim's household by the field worker who then completes a standardised questionnaire. These questionnaires are returned monthly and entered

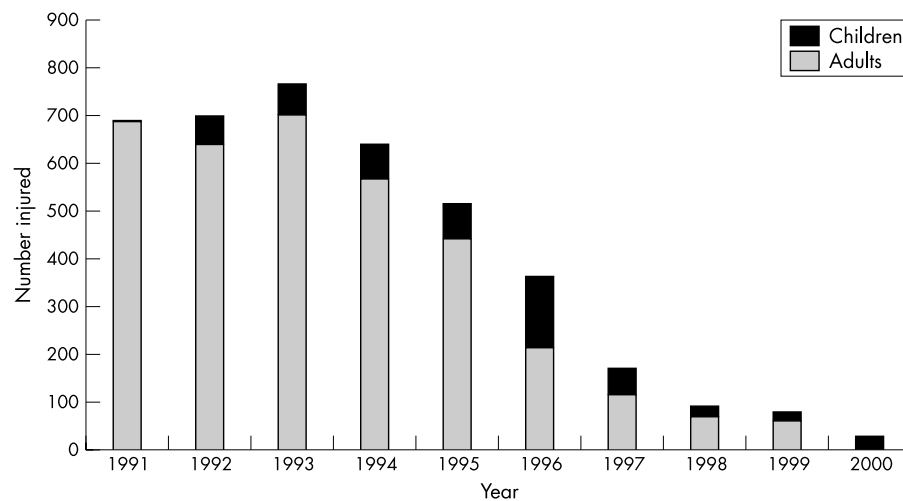
on the ICRC database in Sarajevo. The database is validated by reports from other sources involved in mine related activities. Data for post-war years (1996–2000) were collected prospectively and are complete while that from the war years (1991–95) are retrospective data likely to be incomplete in coverage. It is impossible to validate data from the time of conflict.

From this database, we retrieved data on determinants of landmine injuries for all the victims of landmines during the period 1991–2000. Data retrieved were broadly under the categories of demographic data, knowledge and background of the victim, nature of the device, timing and activity at the time of the injury, and outcome of the incident. Data on all the determinants were used as such except one relating to activity at the time of incident, which was categorised into three groups on the basis of potential for modification by mine awareness activities: (a) preventable (modifiable)—leisure and handling device out of curiosity; (b) partially preventable (partially modifiable)—economic, returnee, and mobility activity; and (c) non-preventable (limited potential for modification)—de-mining and military/police activity. We analysed the data by carrying out simple comparisons of proportion of children and adults affected for each of the determinants; children were defined as those under the age of

**Table 1** Determinants of landmine related injuries in Bosnia and Herzegovina 1991–2000: children compared with adults

	During war (1991–1995)			Post-war (1996–2000)		
	Children % (n=277)	Adults % (n=2605)	p Value	Children % (n=272)	Adults % (n=910)	p Value
Nature of the population						
Male sex	88.1	96.6	<0.001	93	90.8	0.247
Returnees	20.3	17.9	0.356	30.5	253	0.737
Nature of the device						
Device type IED/UXO*	50.2	8.3	<0.001	54.8	20.5	<0.001
Outcome of the incident						
(a) Dead	14.8	14.9	0.967	24.4	27.0	0.394
(b) Amputations	28.9	26.3	0.362	27.2	22.1	0.080
(c) Eye injuries	14.1	8.1	0.001	9.9	9.6	0.858
(d) Fragment injuries	48.7	44.7	0.197	53.3	44.0	0.007
Timing of the incident						
Spring season (March–April)	9.4	12.9	0.009	36.4	29.7	0.036
Weekend (Fri–Sun)	47.3	43.4	0.216	47.8	43.3	0.190
Knowledge and behaviour of victims						
First visit to site	41.6	61.9	<0.001	34.8	37.1	0.540
Knew that site was mined	4.4	16.7	<0.001	19.6	35.3	<0.001
Incident considered†						
(a) Preventable	52.4	1.0	<0.001	62.0	6.0	
(b) Partially preventable	32.9	17.8		33.2	72.3	
(c) Non-preventable	14.7	81.2		4.8	21.7	<0.001
Others involved in the same incident						
(a) Injured (yes)	30.7	20.0	<0.001	36.8	27.1	0.002
(b) Killed (yes)	15.2	8.3	<0.001	20.2	12.6	0.002

\*UXO, unexploded ordnance; IED, improvised explosive device. †Based on the nature of activity's potential for modification by mine awareness activities, incidents were classified as: (a) preventable (activity modifiable): leisure activities (swimming, playing, recreation), and handling device out of curiosity; (b) partially preventable (activity partially modifiable): economic activity (farming, tending livestock), returnee activity (returning home, reconstruction), and mobility (travelling, walking, driving); (c) non-preventable (limited potential for activity modification): de-mining and military/police activities.



**Figure 1** Landmine related injuries in Bosnia and Herzegovina 1991–2000.

18 years. Statistical significance for these comparisons was tested by  $\chi^2$  tests using the statistical package Stata version 6.0.

There were 4064 victims of mine related injuries reported to the ICRC overall (1991–2000), of which 549 (14%) were children. Children were more likely to be injured during peacetime as compared with adults (children: 50%, adults: 26%;  $p < 0.001$ ), see figure 1. Greater predisposition for male sex and spring season were determinants common to both adults and children; however, children differed significantly from adults in their knowledge of the nature of the device and the site being mined, and in the incident being considered “preventable”. By far the commonest activity for children at the time of incident was recreational (44%), unlike adults who were involved in military/police activities (48%). Children are also more likely to be killed or injured in groups than adults (table 1).

## COMMENT

This study highlights important differences between children and adults in the determinants of landmine related injuries, including a large modifiable behavioural component. Marking of mined areas, information, and mine awareness need to begin very early in the peacetime when sudden freedom of movement results in a large number of injuries. Preventive programmes need to be tailored appropriately for children with greater emphasis on knowledge of non-classic explosive devices. Such programmes also need to be more active in early springtime possibly targeting boys more than girls. Clearly identified safe play areas and addressing group behaviour are important as most incidents in children follow recreational activities in groups.

Anti-personnel landmine associated mortality and morbidity in children remains one of the unmet challenges of preventative medicine despite significant potential for saving years of life lost and disability. A total ban on landmines is welcome; however, at the present rate it would still take a long

time to clear the existing landmines today.<sup>5</sup> Greater commitment and resources from the international community are required to expedite this important public health measure. In the meantime, there is an urgent need for effective and multi-faceted public health strategies, covering elements of mine awareness, education, and health services, to safeguard children living with mines. Above all, these strategies will need to be focused by using accurate and recent local data to make best use of limited resources.

## ACKNOWLEDGEMENT

We are grateful to The International Committee for the Red Cross (ICRC), Sarajevo, for making the dataset available to us for analyses. However, the views expressed in this paper are of the authors alone and do not necessarily reflect the views of their respective organisations or ICRC.

## Authors' affiliations

S Kinra, M E Black, Unicef, Sarajevo, Bosnia and Herzegovina

Funding: none.

Conflicts of interest: none.

Correspondence to: Dr S Kinra, Department of Social Medicine, University of Bristol, Canynge Hall, Whiteladies Road, Bristol BS8 2PR, UK; Sanjay.Kinra@bristol.ac.uk

Accepted for publication 26 September 2002

## REFERENCES

- 1 Burkhalter H. Landmines: time for a ban. *Lancet* 1997;**350**:63.
- 2 Andersson N, Palha da Sousa C, Paredes S. Social cost of land mines in four countries: Afghanistan, Bosnia, Cambodia and Mozambique. *BMJ* 1995;**311**:718–21.
- 3 Hanevik K, Kvale G. Landmine injuries in Eritrea. *BMJ* 2000;**321**:1189.
- 4 Coupland RM. *Assistance for victims of antipersonnel mines: needs, constraints and strategy*. Geneva: ICRC, 1997.
- 5 Cobey JC, Raymond NA. Antipersonnel land mines: a vector for human suffering. *Ann Intern Med* 2001;**134**:421–2.