

# Health implications of small arms and light weapons in eastern Uganda

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## **Introduction**

Small arms and light weapons (SALW), or “conventional weapons”, are those that can be operated by one or two individuals and include handguns, assault rifles, machine guns, grenades and landmines<sup>1-3</sup>. It is estimated that there are 639 million small arms globally and more than half the world’s countries are involved in producing the 7.5-8 million new weapons and 10-14 billion rounds of ammunition annually<sup>1</sup>. These weapons are known to cause the majority of deaths in conflict globally and increase the number of deaths occurring during robbery or assault, as well as enhancing the lethality of suicide. Estimates of the direct death toll due to SALW range widely from 80,000 to 500,000 per year and occur predominantly in the developing world<sup>2;4-8</sup>. However, indirect deaths due to SALW are likely much higher than this as they provoke and prolong conflicts<sup>5;9-14</sup>, precipitate genocide<sup>15</sup> and disrupt the provision of humanitarian assistance and development initiatives<sup>16-20</sup>, especially affecting women and children<sup>21</sup>.

Attempts to control and limit trade in SALW, or track weapons and ammunition, have proven to be near impossible<sup>1-3;5</sup>. To understand the severity of the problem and assist with advocacy efforts, groups such as the International Action Network on Small Arms (IANSA) have called for more research into the impact of SALW on health<sup>22</sup>. Such information, as well as prospective injury surveillance, would assist with the monitoring and evaluation of preventative interventions<sup>23</sup>. Evidence from “disorganized settings” is difficult to obtain, which include areas of active conflict or recent conflict and low-resource areas<sup>24</sup>. These locations are often the most affected by SALW. Public health officials, physicians and peace activists often do not, or cannot, collect sufficient information on health and development indices, which would permit an assessment of the impact of the conflict on health and the role of SALW. International Physicians for the

Prevention of Nuclear War (IPPNW) has echoed this in its "Aiming for Prevention" campaign which notes that the paucity of data on the direct and indirect health effects of SALW was hampering regional efforts to curb their use<sup>9;10</sup>, especially in low-resource areas<sup>25</sup>.

Uganda is a potential area to study the health effects of SALW. It is a country that has suffered from conflict since independence in 1962. Currently, an eighteen-year war continues in the northern region, with the government fighting the Lord's Resistance Army (LRA), an insurgency group characterized by brutal human rights abuses, the abduction of children for use as soldiers and an apocalyptic religious vision<sup>26;27</sup>. This conflict has been fueled by SALW<sup>28;29</sup>, leftover from previous Ugandan conflicts, from the conflict in the Democratic Republic of Congo<sup>18;30</sup> as well as from sources within the Sudanese government. Sudan provided military aid to the LRA, in response to the Ugandan government's backing of the Sudanese People's Liberation Army/Movement (SPLA/M), an insurgency group in southern Sudan<sup>26;31-33</sup>. In addition, ongoing conflict is occurring in the east involving the border region with Kenya, between pastoralist tribes known as the Karamojong, the tribe predominantly in Ugandan territory, the Pokot and the Turkana. Cattle rustling, as well as disputes over limited resources, have existed for many years, but have greatly increased in the damage done by the ready availability of SALW<sup>34;35</sup>. Government forces have also fought the pastoralists, during efforts to disarm them forcibly, when a voluntary disarmament program only netted 10,000 of 30,000-100,000 estimated weapons<sup>34;36</sup>. Ironically, in a recent effort to enlist the assistance of the Karamojong against the LRA, who have pushed further east, the government has begun arming these pastoralist groups once again<sup>37</sup>, as well as Local Defense Units (LDUs) of civilians<sup>38;39</sup>.

Only limited information is available about the availability of SALW in Uganda, mostly from the Small Arms Survey<sup>1</sup>. It is estimated that there are 630,000 to 950,000 small arms in Uganda, or 3 to 4.5 small arms per 100 persons. While this is a low prevalence as compared to the global situation, the majority, or 60.1%, (475,000) are in civilian hands, while armed forces hold 34.2% (270,000) and police 3% (24,000). Armed insurgents and tribal populations are estimated to only have 2.7% (21,000). This last figure is likely an underestimate as it is based on predicted numbers of insurgents and tribals and uses a multiplier of small arms per person derived from other situations. As noted above, other sources suggest the Karamojong possess possibly 100,000 small arms alone<sup>36</sup>. Truly accurate numbers are impossible due to the constant flow of arms in and around Uganda [Figure 1]. It is known that a significant number of weapons came into Kramojong possession when they raided the Moroto armory as the government of Idi

Amin fell<sup>34</sup>. Regardless of the actual number of SALW, the destructive power of even a single weapon is significant as it can be used in multiple instances.

Eastern Uganda was chosen as a site to study the impact of SALW on health for several reasons. It is currently a safe location, with sufficient infrastructure to support research, but is in close proximity to the northern conflict and to the conflict involving the Karamojong. Many of the cases of injuries and deaths from these conflicts present to Mbale Regional Hospital. Cases of small arms injuries and deaths due to robbery, assault, accidents and other non-conflict situations also present to these hospitals. Mbale Regional Hospital is one of only ten regional referral healthcare facilities in the country. It serves a catchment area of approximately 3 million people<sup>40</sup>. No previous study of injuries due to SALW has been carried out in this region.

The purpose of this study was to describe and quantify the burden of injuries and deaths due to small arms in eastern Uganda within a six-year time span as documented by hospital records. In addition, to investigate the numbers, availability and sources of small arms in the region, the characteristics of incidences involving small arms and the cost to society of such incidences.

### **Methods**

Ethics approval was obtained from the Medical Superintendent of Mbale Regional Hospital. A review of patient charts of all cases of injuries and deaths due to small arms presenting to Mbale Regional Hospital was carried out. Charts were identified by reviewing discharge records from the surgical wards of the hospital for all admissions in the period between January 1998 and December 2003. This time period was chosen due to the completeness of the records and it was felt that six years of data would present a reasonable picture of the impact of SALW on health in the region. Cases were cataloged at discharge by ICD-9 and ICD-10 codes and for this study, code W34 for "gunshot injuries" was used to identify potential charts. Charts were also similarly reviewed from the private wing of the hospital. This was to examine if there were any substantial differences between the cases presenting to either the public or private system. However the discharge records were not coded using the ICD system, but rather it was necessary to scan the descriptions of "reason for admission" for any indication of a gunshot wound or other injury due to SALW. A "case" was defined as a person who has been injured or killed in a single incident involving a small arm. A unique case number was assigned to each case. This information was corroborated with emergency department records, ward discharge reports, and public health statistics that were collected on patients with injuries due to all causes presenting to local health units and hospitals.

Charts were then retrieved and reviewed by two of the authors (ADP and PO-O). Data was collected using a standardized form for case analysis. This form follows previously published forms used in similar studies<sup>41;42</sup> as well as WHO recommendations for injury surveillances<sup>43</sup>. All forms were processed at Mbale Regional Hospital by one investigator (ADP) and analyzed using Microsoft Excel. The out of pocket cost of healthcare was estimated by recording details of medications prescribed, the number of radiographs and transfusions. This does not include other personal expenses while in hospital. One investigator (PO-O), who was a staff physician at the hospital and familiar with the costs of these items, calculated the total expense incurred by each patient. Thus a "patient perspective" on the impact of the injury was estimated. The cost per day of inpatient care was calculated by consulting with the hospital administration and other local physicians. An approximation of 25,000 USH (\$14 USD) per day was arrived at, including nursing care, room stay and dressing changes. This figure does not include "hotel costs" or the expense of running the hospital on a day to day basis, including utilities, rent, equipment, physician salaries and administrative costs.

## **Results**

Using discharge records, 294 distinct cases of injuries due to SALW were identified over the six year period, or an average of 49 per year with 229 receiving public health care and 65 receiving private health care. Of these, 206 charts (70.1%) were located and analyzed (190 public, 16 private). A trend of increasing incidence can be seen from 1998 to 2003[Figure 2]. This trend was consistent with data from the Casualty Department records that showed a similar number of cases being brought to their department. Unfortunately the records kept were insufficient to provide information such as the number of patients with injuries due to SALW who were admitted, passed away or were discharged. The trend of increasing incidence was also concurrent with independent data collected by another researcher studying surgical patients. With an average of 2515 admissions per year to the surgical wards, injuries due to SALW represented 2%. Public health records of injuries demonstrated approximately 1915 injuries being identified in the region and hence these 49 injuries due to SALW represent 2.6% of all injuries.

The 206 charts reviewed revealed that 88% of victims were male and had an average age of 31 years old (range: 1 – 70). More than 50% did not record occupation, but of those that did, most belonged to lower socioeconomic groups, likely dependent on casual labor and odd jobs, who could ill afford to miss work or pay for health care expenses. Nearly all of the patients were

from a village or town in the region and likewise most injuries occurred in the catchment area for the hospital.

Approximately 35% of cases were referred from a smaller centre where most received basic first aid treatment. Only a few cases received more extensive treatment such as debridement, oral antibiotics and splinting or casting of a fracture.

Details regarding the intent of the injury were recorded in 79% of cases reviewed. Of these, the vast majority were intentional injuries by one party on another, with only 8% recording an unintentional injury and only one case of intentional self-injury. Details about the perpetrator were recorded in 75% of cases and usually indicated the person was a complete stranger, a combatant or a member of the security forces. A weapon was identified in only one out of 206 cases. Approximately 40% of injuries occurred in the context of an assault or robbery and 23% occurred during armed conflict [Table 1]. Of the armed conflict victims, Mbale Regional Hospital received mostly victims of the eastern border conflict (88%) and very few northern conflict victims. Most injuries occurred near or in the home or in the street or highway.

Looking at the specifics of the injuries, fractures occurred in over 50% of cases and significant organ damage in 20% of cases. Most victims presenting to hospital had injuries to their extremities or chest region. Approximately 66% of patients had more than one injury, most commonly lacerations, fractures and internal organ injury in 11% of cases. The average number of surgeries per patient was 1.34. The average length of stay was 14 days (range: 0 – 100). Final outcomes are summarized [Table 2] with the vast majority being discharged home and only 8% dying in hospital.

Amongst the patients in the public hospital, on average victims paid 104,000 USH (\$58 USD) out of pocket for medications, dressings and radiographs. Each victim, based on the average length of stay cost the hospital 373,000 USH (\$207 USD) for nursing care and their stay in hospital. Per patient, surgical costs amounted to 33,500 USH (\$19 USD). Hence the average direct total cost per victim was approximately 510,500 USH (\$284 USD), approximately 80% of which is paid for by the government. This is comparable to the average cost, out of pocket, per patient in the private hospital wing of 634,647 USH (\$353 USD), which includes a profit for the hospital. If there are approximately 50 cases presenting to Mbale Regional Hospital per year the direct costs of patients with injuries due to SALW amount to at least \$17,650 USD per year.

## **Discussion**

Little information exists on the burden of disease of injuries due to SALW, especially in developing countries such as Uganda. This paper presents retrospective data from a six-year period of patients presenting to a regional hospital. It has been found that injuries due to SALW are increasing in incidence in the Mbale region of Uganda and are mostly related to assault and robbery or armed conflict in the region. This is similar to a study by the Injury Prevention Initiative for Africa (IPIFA) which looked at injuries due to SALW in several parts of Uganda, namely the capital, Kampala, and three hospitals in areas affected by the northern conflict with the LRA. In Kampala, an increasing incidence of fatal injuries due to SALW was found, as well as a similar gender ratio and incident profile to what this study has demonstrated<sup>1</sup>.

There are several limitations to this study that may impact the conclusions made. As this was a retrospective study it is problematic to draw conclusions or make predictions from the findings. The incidence of injuries due to SALW was likely greatly underestimated. Many cases in the catchment region would not present to Mbale Regional Hospital or possibly any healthcare facility. One study from Ghana noted that only 31% of persons with fatal injuries received any medical treatment at all and only 51% of persons with non-fatal injuries in rural regions received care at a hospital or clinic<sup>44</sup>. This would also explain the surprisingly low mortality rate of patients with injuries due to SALW at Mbale Regional Hospital of 8%. It was hoped that data would be obtained from local mortuaries, police stations and other hospitals nearby to provide a better understanding of injuries due to SALW. However no such information was available and no coroner or mortuary functions in eastern Uganda. In addition, poor record keeping, improper coding and labeling and lost, illegible and incomplete records have likely further decreased the incidence presented here. It is possible that a large proportion of the 25% of cases where no record could be found were those who died in hospital and hence a record was not kept. There were also significant challenges in categorizing cases analyzed into "armed conflict" versus "assault". Often assault and robbery may occur as part of long-standing armed conflict such as that which exists in both the northern Ugandan conflict and in the pastoralist conflict on the eastern border. It is also possible that victims from the pastoralist community may have been reluctant to present to Mbale Regional Hospital due to long-standing racist treatment. Likewise there may have been some bias against the LRA and over-reporting of the details of these situations. The calculation of the cost of health care, or direct costs, were only estimates and did not include all possible expenses and overhead.

Injuries due to SALW are a significant burden, socially and economically, in eastern Uganda. This study has attempted to measure the direct costs of each injury due to SALW. This study has shown that health care costs are quite significant for both the patient, who is usually from a lower SES group, and the government which has already inadequate resources. It is very difficult to estimate a true incidence of SALW from this study in this region. An average of 50 cases per year were found presenting to Mbale Regional Hospital, but this likely only represents 40% of all cases. Based on the population of the catchment region this gives a prevalence of injuries due to SALW of 4.17 per 100,000. This is comparable to the IPIFA study which found an incidence of 4.45 per 100,000 in Lacor and 11.46 per 100,000 in Kampala<sup>1;45</sup>. Averaging these incidence rates and extrapolating to the entire population allows one to estimate that there are at least 1470 injuries due to SALW per year in Uganda.

If the direct costs were 510,500 USH (\$284 USD) per victim receiving health care in the public system, this equals a minimum total direct cost to Uganda for injuries due to SALW of 750 million USH (\$416,666 USD) per year. As noted above this is likely a significant underestimate as it does not include hotel costs or other missed overhead expenses, other personal costs such as the expense of food or other amenities while in hospital nor the cost of those patients receiving care in smaller health facilities nor the cost of rehabilitation. It is also vital to understand these direct costs to the patient in the context of poverty. For most victims the out-of-pocket costs of care of \$58 USD represents more than several months salary and hence are a significant burden.

It was also found that approximately 80% of these direct costs are borne by the government. This is comparable to the findings of Mansingh and Ramphal who looked at interpersonal violence in Jamaica and found that 90-94% of the cost of managing trauma victims was borne by the taxpayer<sup>46</sup>.

In addition, the indirect costs are likely far greater than these direct costs and include lost days of work, long-term disability and the psychological burden of disease<sup>1</sup>. Very little research exists on quantifying the indirect costs of injuries. An economic theory has proposed that direct medical costs represent only 23% of the overall costs of injury<sup>47</sup>. This study would then indicate a total cost per SALW injury of 2,219,565 USH (\$1233 USD). In one year, these injuries cost the Ugandan people 3.26 billion USH (\$1.8 million USD). This can be compared to the total budgeted health care spending per person per year of \$77 (international dollars) in Uganda<sup>48</sup>.

These calculated costs highlight the importance of prevention as a cost-effective solution. While there are many potential approaches to prevention, limiting the “vector” of disease, i.e. SALW, is the perhaps the best solution to this problem<sup>13</sup>. In this study, scant details were available on the weapons used in each incidence. However, leftover military firearms are highly suspected as being used in most cases<sup>8;34</sup>. The IPIFA study was able to obtain information on the type of weapon used in many circumstances and found that 83.5% of injuries involved assault rifles, such as those used by armed forces. Understanding the root causes of the proliferation of SALW, including social and economic driving forces, can help diminish the flow into the region and in distinguishing “causes” of proliferation versus “agents”<sup>34</sup>. It is very important to study political violence and the context around death and injury and face the challenge of connecting human rights movements with health researchers for an accurate assessment of the problem<sup>24</sup>. Violent conflict is driven by politics and economics and context is crucial. As important is to listen to the voices of those most affected and to understand how these groups cope with violence in their communities<sup>49</sup>.

Continuous and detailed monitoring of injuries and costs can help with planning and evaluating interventions<sup>23;50</sup>. While various prevention programs with interpersonal violence have been attempted, they have not been well evaluated<sup>51</sup>. The health sector can contribute to peace by describing the problem and focusing limited resources towards interventions that demonstrate benefit<sup>49</sup>. Evaluation is crucial and Hodge provides a good outline, including developing an evidence base, removing blame, multi-level involvement and promoting an understanding of injury causation amongst health professionals<sup>52</sup>. More research is needed to understand the psychological, social and environmental factors that lead someone to harm another<sup>51</sup>.

This study was an attempt to document the effects of SALW. It is hoped that this information will assist with advocacy campaigns for limiting the use and spread of SALW. Such information is only part of a movement that includes addressing all levels of government, challenging external bodies and corporations to act responsibly, and engaging the energy and creativity of the public. In addition, this work will hopefully form the basis of long term continuous injury surveillance project in eastern Uganda. Public health has a role to play in violence prevention including in changing behavior, social and environmental forces and bringing to bear a multidisciplinary and scientific approach<sup>53</sup>.



### **Contributors**

AD Pinto assisted with designing the study, collecting and analyzing the data and preparing the manuscript. P Olupot-Olupot assisted with designing the study, collecting the data and preparing the manuscript. VR Neufeld assisted with designing the study and preparing the manuscript.

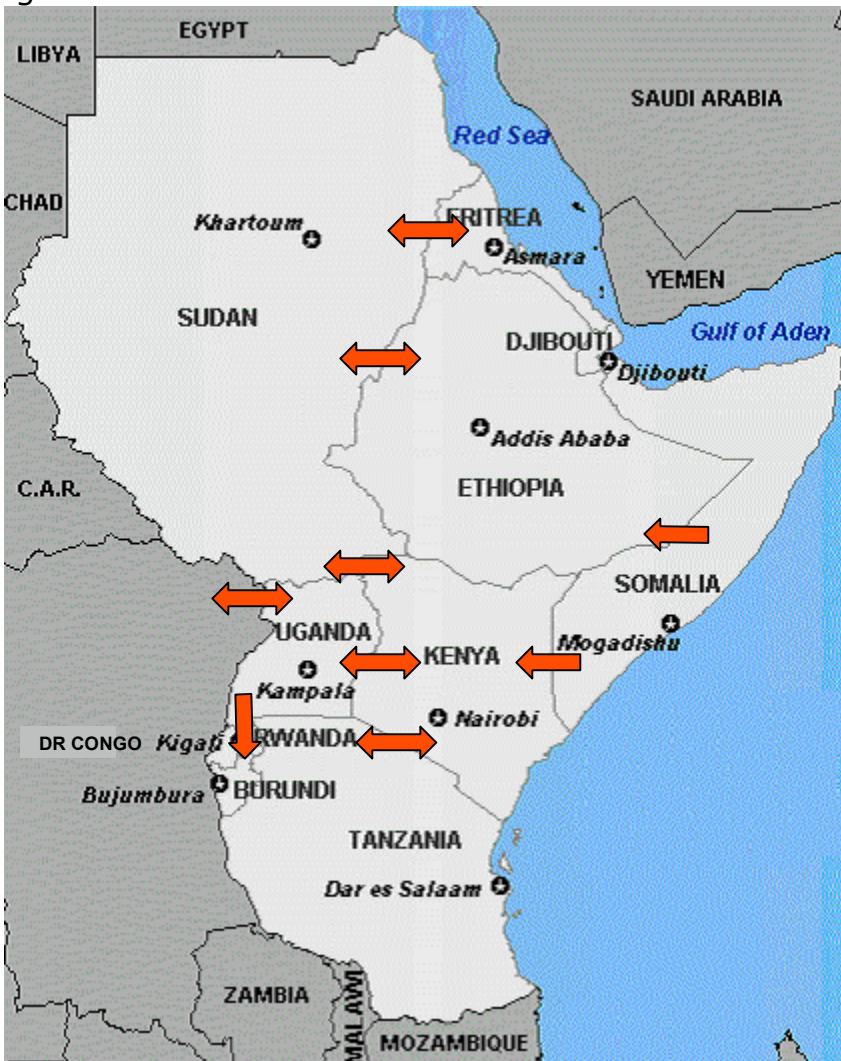
### **Conflict of interest**

None

### **Acknowledgements**

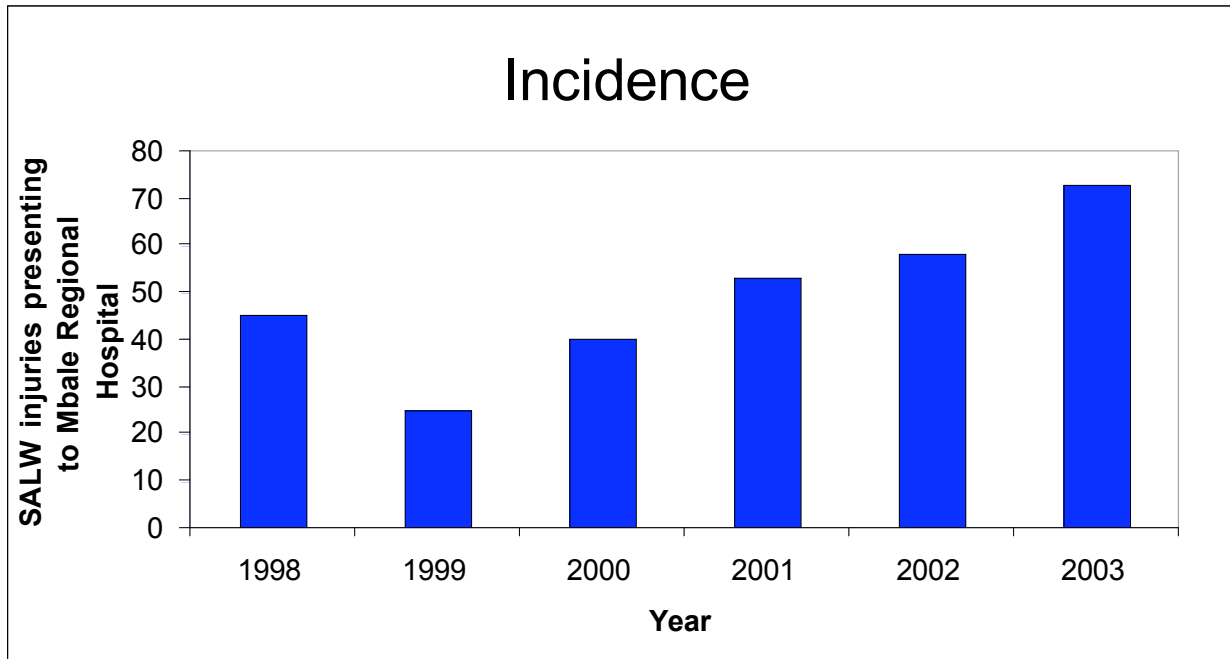
We are grateful for assistance from multiple physicians, administrators and clerical staff at Mbale regional hospital. Valuable input was received from Drs. Edison Mworozzi, Sam Luboga, Joanna Santa Barbara, Neil Arya, Sheila Harms, as well as Debbie Grisdale, Monica Hau and Sonia ter Kuile. This study was funded by the Medical Alumni Association of the University of Toronto, Physicians for Global Survival (Canada) and the International Physicians for the Prevention of Nuclear War.

Figure 1



**Figure 1:** This map illustrates the flow of SALW around Uganda within the Horn of Africa based on reports of active trading, arms markets and documented transfers. Weapons remain in circulation long after a conflict and continue to be purchased from abroad by governments in the region and insurgent groups {Small Arms Survey, 2003 91 /id; Small Arms Survey, 2005 124/id} <sup>19;30;34;54</sup>.

Figure 2



**Figure 2:** An increasing incidence of injuries due to SALW are seen being treated in Mbale Regional Hospital. Likely causes of this include the growing availability of weapons and worsening of the conflict in northern Uganda as well as within pastoralist communities in eastern Uganda.

Table 1

	<b>Number</b>	<b>%</b>
Unknown	51	25
Armed conflict	47	23
Physical assault	48	23
Robbery	35	17
Accidental	14	7
Other	11	5
Sexual assault	0	0
Suicide	0	0
Abduction	0	0
Other crime	0	0
	206	100

<b>Armed conflict</b>		
Karamoja/cattle rustling	41	87%
LRA/northern conflict	5	11%
Other	1	2%

**Table 1:** This table shows the context in which each documented case of an injury due to SALW occurred. Below is a sub-group analysis of those labeled “armed conflict” showing that Mbale Regional Hospital receives mostly those injured in the pastoralist conflict on the eastern border.

Table 2

	<b>Number</b>	<b>%</b>
Discharged home	163	77
Transferred	17	8
Died in hospital	17	8
Runaway	5	2
Unknown	4	2
In hospital	0	0
	206	100

**Table 2:** This table shows the final outcome recorded in the patient chart. An unusually low number of deaths in hospital may reflect the high mortality of injuries due to SALW before patients reach hospital and hence only relatively “well” patients being analyzed in this study.

## References

1. Small Arms Survey. Small Arms Survey 2003: Development denied. Geneva: Graduate Institute of International Studies, 2003.
2. Sidel V. The international arms trade and its impact on health. *British Medical Journal* 1995;**311**:1677-80.
3. Regehr E. Militarizing despair: The politics of small arms. *Ploughshares Monitor* 1997.
4. Arya N. Confronting the small arms pandemic. *British Medical Journal* 2002;**324**:990-1.
5. Cukier W, Chapdelaine A. Small arms: A major public health hazard. *Medicine & Global Survival* 2001;**7**:32.
6. World Health Organization. Small arms and global health: WHO contribution to the UN Conference on Illicit Trade in Small Arms and Light Weapons July 9-20, 2001. 2001. World Health Organization.
7. Arya N, Cukier W. The International Small Arms Situation: A Public Health Approach. *Ballistic trauma: a practical guide*, Springer-Verlag, 2004.
8. Small Arms Survey. Small Arms Survey 2005: Weapons at war. Geneva: Oxford University Press, 2005.
9. International Physicians for the Prevention of Nuclear War. Conference final report: Aiming for prevention - Small arms, gun violence and injury. September 28-30, 2001. Helsinki, Finland. 2001. IPPNW.
10. Rawson B. Aiming for Prevention: Medical and public health approaches to small arms, gun violence, and injury. *Croatian Medical Journal* 2002;**43**:379-85.
11. Sishi E. Small arms in southern Africa. *Peace Magazine* 1998;16-8.
12. Smith C. Who gets hurt by all these weapons? *British Medical Journal* 1999;**319**:395.
13. Woodhouse T. Preventive medicine: can conflicts be prevented? *British Medical Journal* 1999;**319**:396-7.

14. Meek S. Putting theory into practice: Light weapons and early warning in Southern Africa. In Lawrence E, ed. *Arms Watching: Integrating SALW into the early warning of violent conflict*, International Alert, 1999.
15. Goose S, Smyth F. Arming genocide in Rwanda. *Foreign Affairs* 1994;**73**:86-96.
16. Muggah, R and Berman, E. Humanitarianism under threat: The humanitarian impacts of small arms and light weapons. 2001. Small Arms Survey.
17. Ojambo Ochieng, R. A gendered reading of the problems and dynamics of SALW in Uganda. brief 24, 60-77. 2003. Bonn International Center for Conversion.
18. Great Lakes: Light arms, a scourge for peaceful development. IRIN News . 2-6-2004.
19. Gebre-Wold, K and Masson, I. Small arms in the Horn of Africa: Challenges, issues and perspectives. 23. 2002. Bonn International Center for Conversion.
20. Cukier, W. Gender and small arms. 2001. SAFER-Net. (Unpublished Work)
21. Albertyn R, Bickler S, van As A, Millar A, Rode H. The effects of war on children in Africa. *Pediatric Surgery International* 2003;**19**:227-32.
22. International Action Network on Small Arms. About IANSA. IANSA . 6-7-2004. 6-7-2004.
23. Krug E. Injury surveillance is key to preventing injuries. *Lancet* 2004;**364**:1563-6.
24. Zwi A. Studying political violence: We should push for more from epidemiology. *International Journal of Epidemiology* 2002;**31**:585-6.
25. Christ M, Valenti M. IPPNW's 'Aiming for Prevention' campaign on small arms and light weapons. *Medicine, Conflict & Survival* 2005;**21**:245-9.
26. Lomo, Z and Hovil, L. Behind the violence: The war in Northern Uganda. 2004. Refugee Law Project.

27. McCarthy, S. A mother's plea for a missing daughter. *Globe and Mail* . 1-26-2004.
28. Kobusingye O. The effects of SALW proliferation and abuse in Gulu District, Uganda: A public health approach. *Bonn International Centre for Conversion Briefs* 2002;**24**:73-7.
29. Ojambo Ochieng, R. Medical interventional study of war affected Gulu District, Uganda. 2001. ISIS-WICCE. Research Reports.
30. DRC: Focus on the proliferation of small arms in northeast. *IRIN News* . 3-11-2003.
31. Uganda: LRA rebels resorting to crude weapons, army says. *IRIN News* . 5-29-2002.
32. Gersony, R. The anguish of Northern Uganda: Results of a field-based assessment of the civil conflicts in Northern Uganda. 1997. USAID.
33. Khadiagala, GM. The role of the Acholi Religious Leaders Peace Initiative (ARLPI) in peace building in northern Uganda. 2001. Greater Horn of Africa Peace Building Project, USAID.
34. Mirzeler M, Young C. Pastoral politics in the northeast periphery in Uganda: AK-47 as change agent. *The Journal of Modern African Studies* 2000;**38**:407-29.
35. Halderman, M, Jenner, H, Karuru, N, Ong'ayo, M, Smith, S, Smith, Z, and Carter, L. Assessment and programmatic recommendations: Addressing pastoralist conflict in the Karamoja cluster of Kenya, Uganda and Sudan. 2002. Greater Horn of Africa Peace Building Project, USAID.
36. UGANDA: Disarmament exercise leads to clashes in Karamoja. *IRIN News* . 5-21-2005.
37. UGANDA: Recruitment of Karamojong warriors to fight rebel group. *IRIN News* . 9-9-2003.
38. Uganda: Army supports using militia to fight rebel group. *IRIN News* . 9-8-2003.
39. Gough, D. Uganda: Feature - Eastern Teso region stands up to the LRA. *IRIN News* . 9-30-2003.



40. Uganda Ministry of Health. Uganda Ministry of Health Online - Health Infrastructure. [http://www.health.go.ug/health\\_units.htm](http://www.health.go.ug/health_units.htm) . 2005.
41. Kobusingye O, Lett R. Hospital-based trauma registries in Uganda. *Journal of Trauma: Injury, Infection and Critical Care* 2000;**48**:498-502.
42. Njeru, EK, Mutiso, VM, Hassan, S, Mak'Anyengo, K, and Gakuru, JN. An exploratory survey on injuries resulting from small arms in Kenya. 2004.
43. Holder, Y, Peden, M, Krug, E, Lund, J, Gururaj, G, and Kobusingye, O. Injury surveillance guidelines. 2001. Geneva, World Health Organization.
44. Mock C, Nii-Amon-Kotei D, Maier R. Low utilization of formal medical services by injured persons in a developing nation: health service data underestimate the importance of trauma. *Journal of Trauma* 1997;**42**:504-13.
45. Mutto, M. SALW in Uganda. 2004. (Unpublished Work)
46. Mansingh A, Ramphal P. The nature of interpersonal violence in Jamaica and its strain on the national health system. *West Indian Medical Journal* 1993;**42**:53-6.
47. Rice D, Hodgson T, Kopstein A. The economic costs of illness: A replication and update. *Health Care Financing Review* 1985;**7**:61-80.
48. World Health Organization. WHO - Uganda. World Health Organization . 2006.
49. Zwi A. How should the health community respond to violent political conflict? *PLoS Medicine* 2004;**1**:e14.
50. Mulder S, Meerding W, van Beeck E. Setting priorities in injury prevention: The application of an incidence based cost model. *Injury Prevention* 2002;**8**:74-8.
51. Mock C, Quansah R, Krishnan R, Arreola-Risa C, Rivara F. Strengthening the prevention and care of injuries worldwide. *Lancet* 2004;**363**:2172-9.
52. Hodge M. Evaluating injury prevention interventions. *Injury Prevention* 2002;**8**:8-9.

53. Krug, EG, Dahlberg, LL, Mercy, JA, Zwi, AB, and Lozano, R. World report on violence and health. 2002. Geneva, World Health Organization.

54. Flew, C and Urquhart, A. Strengthening small arms controls: An audit of small arms control legislation in the Great Lakes region and the Horn of Africa. 2004. SaferAfrica & SaferWorld.

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