

Firearm Injuries in Nairobi, Kenya: Who Pays the Price?

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ABSTRACT

Because firearm injuries affect the health and social fabric of Kenya, we investigated the problem in collaboration with Kenya's affiliate of International Physicians for the Prevention of Nuclear War. This public health problem has its roots in the civil strife and prevalence of small arms and light weapons in the Horn of Africa. We studied persons with firearm injuries who reached Kenyatta National Hospital in Nairobi during a 6-month period in 2006. We describe their demographic characteristics and speculate that many people injured with guns die before they reach the hospital. The people of Nairobi would benefit from better pre-hospital care, including ambulance transportation, and a public health insurance system to redistribute the burden of medical services.

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INTRODUCTION

Firearm injuries have come to be recognized as a global public health problem (see the companion papers in this Special Section). Located in the Horn of Africa, Kenya is in a region ravaged by armed conflict. The Kenyan affiliate of International Physicians for the Prevention of Nuclear War (IPPNW) targeted the uncontrolled proliferation of firearms and its consequences within the country. Making use of the respect given to medical doctors, this group developed the centre-piece of IPPNW's *Aiming for Prevention* campaign to highlight the human face of suffering caused by small arms and light weapons (SALW). The first *One Bullet Story* – a graphic documentary of a

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young boy from the Democratic Republic of Congo who was shot in the face by diamond thieves – has been made into a CD-ROM for civil society use in public education.

To supplement these stories, we began to collect quantitative data to characterize the patients and describe the consequences of gun violence in Kenya. Observations by one of us (FH) that gunshot wound patients usually arrived in a relatively stable condition prompted this study in Kenya's largest hospital, Kenyatta National Hospital (KNH). Hospital staff at KNH, when FH rotated through surgery as an exchange medical student from Germany, believed they were observing an increase in the number of firearm injuries. We hoped that information on billings for the cases associated with firearm injuries would suggest the magnitude of costs and the consequences for the victims and their families.

A leader of IPPNW-Kenya, also a lecturer at the University of Nairobi, College of Health Sciences (WO), supervised the study. We obtained permission to conduct the study from the standards and ethics committee of the hospital. The authors collected data from March until July 2006, and presented the preliminary results at the 17th IPPNW World Congress held in Helsinki, Finland, in September 2006.

KNH is a National Referral and University Teaching Hospital with a bed capacity of 1,800. Other major hospitals in Nairobi are the Aga Khan University Hospital (254 beds) and the Nairobi Hospital (about 200 beds), both private. Both charge inpatients more than \$70 USD per day, while KNH charges \$6.2USD (1).

THE HEALTH SITUATION AND FIREARM PROBLEM IN KENYA

With an area of 582,646 km² (about twice as large as Germany), Kenya has a population of about 34.4 million. Life expectancy at birth is 47.2 years, infant mortality is 79 per 1000 live births, and maternal mortality is 1000 per 100,000 live births. The last is very high compared to western countries (e.g. Germany: 9 per 100,000.) In 2003, the official HIV prevalence declined to 6.7%. Tuberculosis, other infectious diseases, and malnutrition remain some of the country's biggest public health problems (2–5).

In 2001–2002, Kenya spent 5.1% of its Gross Domestic Product (GDP) in the health sector or \$19.2 USD per capita. The Ministry of

Health operates 52% of health institutions; private parties run the other 48%. Patients paid privately for 45% of all health expenses, the Ministry of Health paid 35%, and international donors, nongovernmental organizations (NGOs), churches, or other sources paid for the rest (6). Kenya's GDP per capita in 2005 was \$530USD, and the country ranked 153 of 177 in the United Nations Development Programme (UNDP) development index (3,7).

Kenya borders Somalia, Ethiopia, Sudan, Uganda, Tanzania and the Indian Ocean. Because of a long history of conflicts among neighbouring countries in East Africa, the illegal firearms trade there is substantial. Rebel groups, militias, and refugees, as well as government forces, sell guns and ammunition to anyone who will pay. Easy availability and continuously decreasing prices mean that in nearly all areas suffering from frequent tribal and ethnic clashes, SALW are omnipresent. The *African Security Review* 12(2), 2003 estimated that there were 5 million SALW in the rural areas and with pastoral tribes in East Africa and Horn of Africa (8–10).

Since independence from Britain in 1963, Kenya has not been officially at war. The country attributes the high availability of SALW to illegal cross-border flow rather than internal conflicts. In Kenya, rules governing the possession of firearms are very strict (11). Guns flow in from the ongoing civil wars in Somalia, Ethiopia, and Southern Sudan. Frequently, refugees (estimated by the United Nations Refugee Agency to number 250,000 in 2004) cross the border with their weapons and sell them to organized gun-runners (7). These guns are re-sold in Nairobi and other cities (12,13). The *ITDG-EA Peace Bulletin* for January 2005 estimated that 50,000–200,000 firearms were held by pastoral tribes in the Kenyan–Ugandan border region (14). According to the *Small Arms Survey 2001*, 90–95% of the households in northern Kenya are armed (10). Armed conflict occurs between refugee groups, pastoral tribes, the Kenya police, and the armed forces. Cattle rustlers and other criminal groups frequently cross national borders to attack local villages.

Disarmament has met with little success (10,15). In 2000, East African states signed the “Nairobi Declaration” to strengthen their efforts against the illegal trade of SALW. The international health community encouraged the efforts by providing data about the high number of victims and the destabilizing effects of SALW in many East African regions.

GUN VIOLENCE IN NAIROBI

Nairobi is Kenya's biggest city, with a population of four million, but the borders are poorly defined. Large formal and informal low-income slum- and slum-like settlements comprise most of the city, except for the high-income areas in Nairobi's north. East Africa's largest such informal settlement, the Kibera slums, houses nearly one million inhabitants. As a multicultural urban centre, social disparities in Nairobi are huge. Crime has risen over the past decade. According to a United Nations-Habitat study, between May 2000 and April 2001, 37% of the population had been victims of robbery, while 16% were victims of physical assault (16). In another 2001 study, 22% of Nairobi citizens questioned reported hearing gunshots "often or all the time," while 40% reported hearing gunshots "sometimes" (17). In both studies, most interviewees felt that the number of firearms and their use in violent acts had increased. In 2005, Kenya police documented 12,300 criminal acts in Nairobi Province. The report did not indicate the number of cases involving firearms (18).

RESULTS

Kenyatta National Hospital admitted 120 patients with firearm injuries between 1 January and 30 June 2006 and we reviewed the recorded information. On the end date, 93 patients (77.5%) had been discharged alive, 11 patients (9.17%) died in the hospital, while 16 patients (13.3%) remained in the hospital. One hundred and nine males and 11 females (ratio: 9.91:1) had been admitted; the mean and median age was 32 years (range 5–66 years). The cause of the firearm injuries was described as follows: 94 "shot by criminals" (85.5%); six "shot by police" (5.5%); five "hit by stray-bullets from police and criminal shoot-outs" (4.5%); and four "shot under unknown circumstances" (3.6%). One accidental shooting was recorded and in 10 cases no information was available. No self-inflicted gun wounds were recorded.

The fifty patients we studied (41.7%) had completed primary school or less; 27 patients (22.5%) had some secondary school education; and five (4.17%) had some college or university level of education. Eleven patients reported no formal education. Education information was missing in 29 records (24.17%).

Of the 80 patients for whom this information was recorded, 70 (87.5%) had at least one child living in their household. The average number of children in the household was 3.84, and a median of 4. Ten of the 80 patients had no child living in their household.

For 105 patients (87.5%), the place of attack was documented. Sixty-seven (70%) were injured within the inner city area of Nairobi. Of these, 55 (82%) occurred in low-income areas, four (6%) in medium-income areas, and eight (12%) in high-income areas.

Eighty-four of 91 (92.3%) of the reported and documented firearm injuries were evaluated as being “fully conscious” (Glasgow-Coma-Scale 15/15) on arrival at the accident and emergency department (Casualty). Seventy-six of 80 (95%) had an initial Mean Arterial Pressure of 70 mmHg or above.

For 104 patients, the mode of arrival in hospital was recorded; 79 (75.6%) were brought in by friends, relatives, or unknown people; 17 (16.3%) by the police; and only eight (7.7%) by ambulance. Eighteen patients (25.4%) arrived in Casualty within 1 h of the shooting, 18 (25.4%) within 2 h, 19 (26.8%) within 6 h, nine (12.7%) within 24 h, and seven (9.9%) more than 24 h after the shooting. In 49 cases, this information was not documented.

FINANCIAL BURDEN TO PATIENT

As firearm injuries are costly to treat, we tried to understand who paid the costs and how the burden fell on victims and their families. Private hospitals often turn away people, some in a critical condition. Public health insurance is limited in Kenya.

In Nairobi, 44% of the residents live below the official urban poverty line (2648 Kenyan shillings/Ksh or \$36.3USD) per month. KNH is the only somewhat affordable tertiary referral hospital for the vast majority (19). KNH often detains patients in hospital even after medical discharge until they settle their bills. For every additional hospital day, KNH adds 450 Ksh (\$6.2USD) to the patient’s bill (June 2006 conversion rate).

To supplement the information available in patient records, we interviewed 62 of the 120 firearm injury patients (51.7%) soon after admission and clinical stabilization. We obtained both demographic data and financial status: area of residence, size of the family, monthly household income, and the amount of hospital bill on

discharge. Household income was determined through personal interviews. Many of the patients could not state the exact household income; therefore, we used ranges. Income was grouped into three categories: low income (below 5,000 Ksh or \$68.5 USD); middle income (5,000–10,000 Ksh or \$137 USD); and higher income (10,000 Ksh and above).

Sixty-two patients provided information on family household income: 29 (47.5%) had a household income of less than 5,000 Ksh per month; 15 (24.6%) earned 5,000 Ksh – Ksh10,000; four (6.6%) patients earned 10,000–15,000 Ksh or \$205.5 USD; while four other patients (6.6%) had a monthly household income exceeding 15,000 Ksh. Nine (14.8%) patients had no regular income.

Eighty-eight patients' hospital bills were available for analysis. Among them, the portion of the bill charged to the patients averaged 16,401 Ksh (\$224.7 USD), with a range of 120 Ksh (\$1.64 USD)–94,040 Ksh (\$1288.2 USD). The median bill was 11,117 Ksh (USD152.3). For 37 patients for whom we had family income information, we compared it to the average hospital bill. Patients who stated they had no income were excluded.

How does the average hospital bill compare to family income? The bill averaged between 2.92 and 5.24 times and individually up to 26.56 times the monthly income. The average hospital bill was 6.2 times the official urban poverty income for Nairobi (2648 Ksh or \$36.3 USD per month) and the median bill was 4.2 times this amount. A person whose income is below the poverty line would have to set aside all his household income for at least 6 months just to pay the average KNH hospital bill.

DISCUSSION

In Nairobi, we surmise that many firearm injury victims die without reaching KNH, as the hospital mortality is comparatively low, and patients who arrive are in a fairly stable condition, usually out of immediate danger. In his Master's thesis (Muhinga MN. A study of gunshot wounds as seen at Kenya National Hospital July 1994–June 1999 MMED (surgery) Thesis, University of Nairobi, 2000), Muhinga retrospectively analysed all firearm injury-related hospital admissions to KNH over a 5-year period between 1994 and 1999. He counted 225 firearm injury cases, with an overall in-hospital

mortality of 2.2%. Saidi *et al.* reported from the Aga Khan Hospital, Nairobi, where they found a mortality of less than 6% over a 6-year period between 1993 and 1998 (20). Gotsch *et al.* evaluated mortality in about 115,000 cases in the United States between 1993 and 1998 for the US. Centers for Disease Control and found an overall firearm injury mortality of about 30% (21). Thus, Muhinga and Saidi's findings suggest lower firearm injury mortality once the patient is in the hospital. In a study conducted in Cordoba, Argentina, where Biasuto *et al.* evaluated 1,326 cases of firearm injuries over a 2-year period, they found that fewer than a quarter of all fatal firearm-related injuries reached hospital alive while 6.18% died in the hospital, a number comparable to Saidi and Muhinga's findings. Another 21.1% died at the scene, yielding an overall mortality of 27.3% for firearm-related injuries in Cordoba (22).

In Nairobi, unfortunately, little information exists about the speed and quality of pre-hospital care. In 2003, Saidi *et al.* reported that only 44.5% of all patients reached KNH within 1 h, and only 65.4% within 2 h after having been involved in road traffic accidents in Nairobi. They reported that only 9% were rescued and transported by ambulance services or military medical staff. Three quarters were brought to hospital by private cars or taxis (23). As in Cordoba, it is likely that most severely injured firearm injury patients in Nairobi die at the scene. The overall number of firearm-related admissions to KNH may have increased five-fold compared to the 1994–1999 period (20). In his Masters thesis, WA Odhiambo found a similar trend for the years 2004 and 2005 (MMED thesis, WA Odhiambo, University of Nairobi, 2006).

Our finding that 7.7% of firearm injury survivors were brought in by ambulance, and only one-quarter arrived within 1 h after the event, fit well with what Saidi found in 1999 for road traffic injuries in Nairobi (23). Putting together the comparatively low hospital mortality (9.17%), an ineffective ambulance system, attacks occurring in low-income areas, and most victims having arrived in a stable medical condition strongly suggest that the most severely injured patients do not reach KNH alive. Poor pre-hospital care in Nairobi, including ambulance service, affects principally those of low income who are unable to afford private emergency transport.

The size of hospital bills compared with family income, in conjunction with the practice of keeping patients with unpaid bills in hospital is just a suggestion of the consequences of firearm injuries for people in Nairobi. Most of the injured are young men with an average of four dependent children. The financial impact puts the family of the injured in a desperate situation, which may itself lead to a cycle of crime. Pinto *et al.* have mentioned the impact of the hospital bill for patients with firearm injuries in Uganda (24), but other than this publication, it appears that this aspect has so far been largely neglected in the international literature.

CONCLUSIONS AND RECOMMENDATIONS

A better picture of the prevalence and incidence of firearm injuries in Nairobi requires comprehensive data including police records, hospital admissions, and mortuary records. Better data could support useful policy guidance and help abate gun violence and related morbidity and mortality.

We believe that pre-hospital trauma care, especially for the poor, needs improvement. Possibly, Kenya could establish decentralized evacuation points in local health stations, such as governmental or non-governmental (NGO) clinics, police stations, or other public facilities to which the public has ready access. Ambulances and a radio-communication system might provide a rapid link to the hospital emergency department (casualty). Kobusingye *et al.* found that in Kampala, Uganda, more than 60% of all trauma victims reach hospitals within 60 min (25). This should be achievable in Nairobi.

Because any state must provide security for its citizens, we believe that when it cannot guarantee security, victims of crime-related injuries deserve free treatment in public hospitals. We have described the burdens on the Kenyan health care system that, like others in sub-Saharan countries, is overwhelmed by malaria, TB, and HIV/AIDS, and other diseases. How can Kenya provide the medical care that firearm injury victims deserve? In our minds, a public health insurance system that guarantees everybody basic treatment in public hospitals is a possible option.

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