Original Article

Firearm Injuries Received in Emergency Room of a Nigerian Teaching Hospital: Analysis of Pattern, Morbidity, and Mortality

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ABSTRACT

Background: The morbidity and mortality associated with civilian firearm injury in developing countries is appreciable. The increasing incidence of gunshot casualties received in hospital emergency rooms is an emerging concern. The aim of this study was to determine the pattern and outcome of firearm injuries in a civilian setting of a developing country. **Materials and Method:** This was a retrospective analysis of data on the entire patients with firearm injury received in the emergency room of Federal Teaching Hospital Abakaliki from January 2005 to December 2014. **Results:** There were 214 casualties, male-to-female ratio was 8:1, and mean age was 31.7 ± 0.80 years. The causes of injuries were armed robbery (59.9%), assault (33.6%), and accidental (6.5%). The incidence of armed robbery–related injury peaked in May and was higher in rainy season ($P < 0.018$), urban areas ($P < 0.001$) and at night-time ($P < 0.033$), whereas the incidence of assault-related injury peaked in April and was higher in dry season in rural areas and at day-time. Duration of hospital admission ranged from 1 to 184 days and mean was 16 days. Prolonged duration of hospital admission correlated with perforating wound ($P < 0.001$), high-velocity gunshot ($P < 0.001$), fractures ($P < 0.001$) and wound infection ($P < 0.001$). Preventable death rate was high, although mortality rate was 5.6%. A high mortality rate correlated with visceral injury ($P < 0.001$) and hypovolaemic shock ($P < 0.001$). **Conclusion:** The temporal distribution of firearm injury varies in location and aetiology of gunshot. This and the factors for relatively high morbidity and preventable death rate observed call for preventive strategies as well as improvement in pre-hospital and emergency room care.

Keywords: *Firearm, gunshot, injury, morbidity, mortality emergency room, Nigeria, pattern*

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Introduction

The morbidity and mortality associated with firearm injury is a component of the increasing global burden of armed violence.[1] In USA, 78,622 sustained non-fatal firearm injuries in 2008, firearm weapons was involved in 67% of homicide and the firearm-related death was 10.2 per 100,000 people per year in 2007.[2] In South Africa, firearm weapon was involved in 30% of armed violence and homicide in 2008.[3] Firearm injury is also associated with enormous socioeconomic burden. It is the third most costly aetiology of injury and first among the causes of fatal injury and the fourth most expensive form of hospitalization.[4] These dire consequences are inevitable in any nation without appropriate policy response to curb the menace of firearm violence.

Firearm injury encountered in civilian practice is usually due to low-velocity weapon that results in focal tissue destruction and relatively low rate of morbidity and mortality compared with high-velocity weapon seen in war trauma setting.[5] However, in low-income nations, the burden of firearm injury in civilian trauma setting is enormous due to lack of emergency pre-hospital care

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services and appropriate infrastructure and equipment in the hospitals to manage casualties that presented in the emergency room.[6,7] The increasing incidence of high-velocity gunshot injury in civilian setting of developing countries from insurgency and in the aftermath of civil wars and politically motivated violence[8-10] has further aggravated this burden. The pattern of firearm injury with respect to population characteristics, aetiological factors, type of weapon and temporal distribution varies from and within countries depending on prevailing socioeconomic and geopolitical conditions.[11-22]

Knowledge of pattern and outcome of firearm injuries in a given civilian trauma setting can facilitate preventive strategies and measures aimed at achieving optimum care of the casualties. The aim of this study was to determine the pattern and outcome of firearm injuries received in emergency room of a teaching hospital in a developing country.

Patients and Methods

This was a retrospective analysis of data on the entire patients with firearm injury received in the emergency room of Federal Teaching Hospital Abakaliki from January 2005 to December 2014. With the approval of hospital Ethics and Research Committee, the case notes of patients were used as the sources of data. Information such as demographic data, aetiology and mechanism of injury, location and setting of injury, date and time of injury, interval between injury and presentation to the hospital, pre-hospital care, type of gunshot, co-morbidities, associated injuries and trauma score parameters, treatment, length of hospital stay, outcome and complications, were extracted from the patient case notes.

The type of gunshot wound was classified into two (perforating and penetrating) based on the presence or absence of exit wound. The type of gunshot involved was classified into low and high velocity based on documented history (patients' description of the type of weapon), the type and severity of injury on clinical assessment and the type of missiles and pellets observed on radiographs as well as intra-operatively. The injury severity score (ISS) and trauma injury severity score (TRISS) for each patient was computed using the trauma score parameters derived from the case notes. The aetiology of firearm injury was categorized into three (armed robbery, assault and accidental) for data analysis. The assault group comprises all cases of firearm injury due to interpersonal or domestic violence, communal clash and police and security agent intentional shooting. Accidental injuries include all cases of accidental discharge and stray bullets. The time of injury was categorized into four categories: 12–5.59 a.m., 6–11.59 a.m., 12 noon to 5.59 p.m. and 6–11.59 p.m. In Nigeria, night-time refers to 6–11.59 p.m. and 12–5.59 a.m., while day-time refers to 6–11.59 a.m. and 12 noon to 5.59 p.m.

Data analysis was carried out using Statistical package for Social Sciences (SPSS) version 16 (SPSS Chicago). Frequency tables, cross-tabulation, Fisher exact test and Pearson's chi-square test of significance were used. For all statistical analysis, P value less than 0.05 was considered significant.

Results

Within the 10-year period, there were 214 casualties. The ages ranged from 4 to 74 years, with a mean of 31.7 ± 0.80 years. The male-to-female ratio was 8:1. In [Figure 1], the peak period of incidence of firearm injuries for immediate location of injury varies from 6–11.59 p.m. on the road 12–5.59 a.m. at home. In [Figure 2], the peak period of incidence also varies with respect to the aetiology of gunshot, it was 6–11.59 p.m. for armed robbery and 12–5.59 p.m. and 6–11.59 p.m. for assault-related injury. One hundred and seventeen (54.7%) of the gunshot occurred during the night-time, while 97 (45.3%) was in the day-time. In 128 armed robbery–related injury, 79 (61.7%) occurred at night and 59 (39.3%) during the day ($P < 0.033$). In 72 assault-related injury, 31 (43%) occurred at night and 41 (56.9%) during the day ($P < 0.033$). The day and night incidence was equal in accidental injury. In [Figure 3], the incidence of firearm injuries from armed robbery increases from the month of November tripled in December, remained high, and reached its peak in the month of May. The incidence of injury from assault tripled in December, decreased by half in January, tripled in February, and got to its peak in April.

The causes of injuries were armed robbery (59.8%), assault (33.6%) and accidental (6.5%). In the 72 assault-related injuries, communal clashes, politically motivated violence, police/security agent, secret cultism, assassination, land dispute and others accounted for injury in 14 (19.4%), 14 (19.4%), 14 (19.4%) 13 (18.1%), 10 (13.9%), 4 (5.6%) and 3 (4.2%), respectively. In accidental injuries, discharge from the guns of police/security agents, ceremonial ground, hunting and others accounted for eight (57.14%), four (28.6%), 1 (7.14%) and 1 (7.14%) of the injuries, respectively. The incidence of armed robbery was more in the middle-aged (71.7%) than in the young-aged group (51.4%), whereas the incidence of assault was more in the young aged (37.4%) than the middle aged (17.4%) as shown in [Table 1]. In the rainy season, the incidence of firearm injuries from armed robbery (68.0%) and accidental discharge (8.2%) was significantly higher than 53 and 5.1%, respectively,

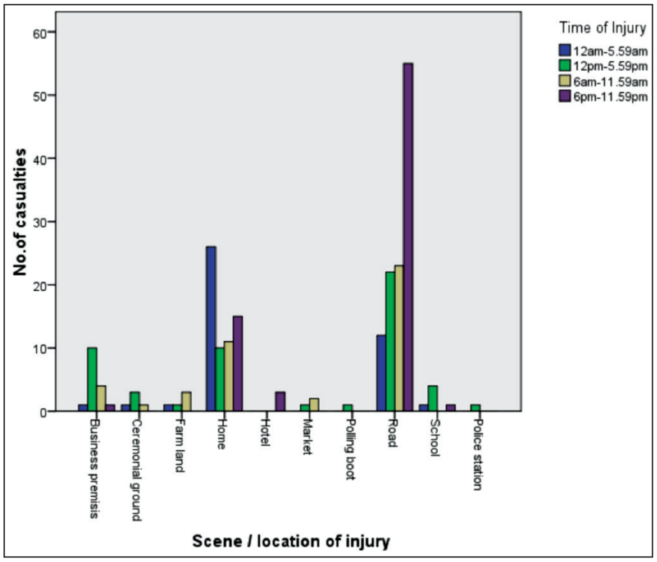

Figure 1: Firearm injury by time and scene/location of injury

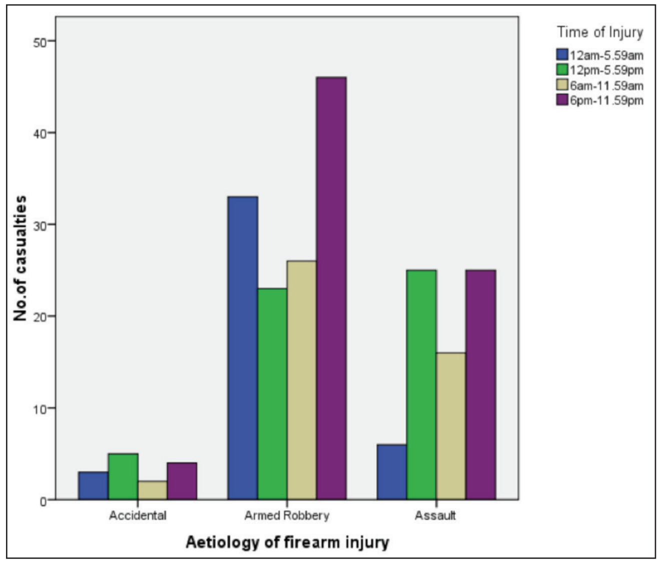

Figure 2: Firearm injury by aetiology and time of injury

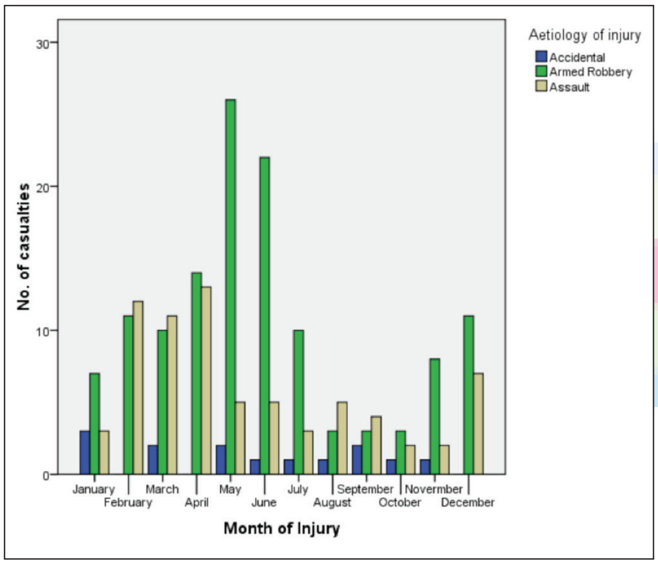

Figure 3: Incidence of firearm injury by aetiology and month of injury

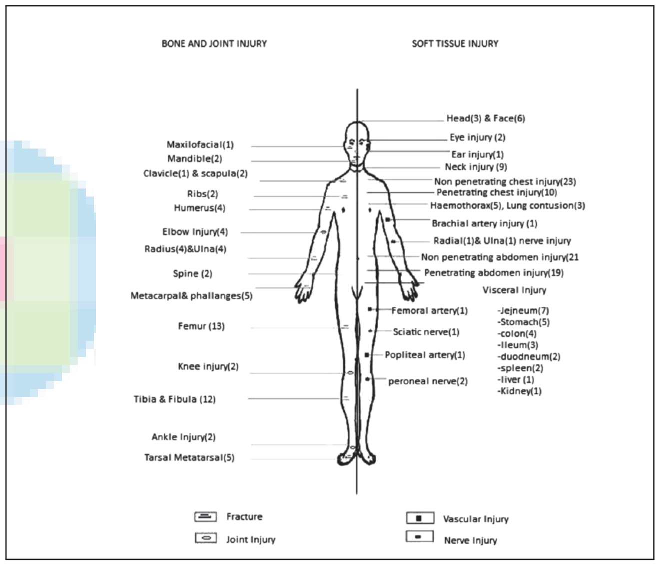

Figure 4: Firearm injury by type and anatomical site

observed in dry season [Table 2]. On the other hand, the incidence of injury from assault (41.9%) was significantly higher in the dry season than 23.7% observed in the rainy season ($P < 0.018$). In [Table 2], injury from assault and accidental discharge was significantly more in the rural than in urban area, conversely injury from armed robbery attack occurred more in urban areas. High-velocity gunshot accounted for injury in 25 patients (11.7%), whereas low-velocity gunshot was involved in injury in 189 (88.3%). Student, traders and civil servants were the three top occupational groups involved as casualties as also shown in [Table 1].

The lower and upper extremities were the two top anatomical regions involved, and each accounted for 36.4 and 18.2% as shown in [Table 2]. In [Figure 4], there were 57 fractures, femur and tibia were the two top bones involved and each accounted for 13 and 12 of the fractures, respectively. The elbow joint accounted for four out of the eight joint injuries observed. The jejunum was the commonest hollow visceral injured, whereas the duodenum was the least injured. The ISS ranged from 1 to 24, the mean was 8.2. Forty-nine patients (22.9%) presented with ISS more than 15.

One hundred and sixty-nine patients (79.9%) had no pre-hospital care. The average interval between injury and arrival to the hospital was 36 hr. All the patients had resuscitation in the hospital emergency room (ATLS protocol). Forty-eight (22.4%) patients with simple multiple puncture/penetrating injury were treated by

Table 1: Aetiology of gunshot injuries by population characteristics

	Aetiology			Total (%)	χ2	*P* value
	Accidental (%)	Armed robbery (%)	Assault (%)			
Age						
0--17	1 (8.3)	6 (50.0)	5 (41.7)	12 (5.6)	9.73	.136
18--39	8 (5.2)	89 (57.4)	58 (37.4)	155(72.4)		
40--65	5 (10.9)	33 (71.7)	8(17.4)	46 (21.5)		
>65	0 (0.0)	0 (0.0)	1 (100)	1 (0.5)		
Sex						
Male	12(6.3)	115 (60.5)	63 (32.2)	190 (88.8)	0.396	.820
Female	2(8.3)	14(58.3)	8 (33.3)	24 (11.2)		
Marital status						
Single	4 (3.7)	57(53.3)	46 (43.0)	107 (50.0)	9.66	.008
Married	10 (9.3)	71 (66.4)	26 (24.3)	107 (50.0)		
Occupation						
Students	2 (3.4)	27 (45.8)	30 (50.8)	59 (27.6)	29.031	.023
Traders	4 (7.4)	33 (61.1)	17 (31.5)	54 (25.2)		
Civil servants	2 (8.0)	19 (76.0)	24(16.0)	25 (11.7)		
Drivers	1 (4.2)	17 (70.8)	6 (25.0)	24 (11.2)		
Police/security men	0 (0.0)	13 (76.5)	4 (23.5)	17 (7.9)		
Farmers	2 (11.8)	7 (41.2)	8 (47.1)	17 (7.9)		
Artisans	2 (13.3)	11 (73.3)	2 (13.3)	15 (7.0)		
House wives	1 (50.0)	0 (0.0)	1 (50.0)	2 (.0.9)		
Clergy	0 (0.0)	1(100)	0 (0.0)	1 (0.5)		

Table 2: Aetiology of firearm injuries by location, season, weapon and anatomical site

	Aetiology			Total (%)	χ^2	*P* value
	Accidental (%)	Armed robbery (%)	Assault (%)			
Location						
Rural	11 (10.3)	49 (45.8)	47(43.9)	107(50)	18.325	0.001
Urban	3 (2.8)	79 (73.8)	25(23.4)	107(50)		
Season						
Dry	6 (5.1)	62(53.0)	49 (41.9)	117 (54.7)	8.000	0.018
Wet	8(8.2)	66 (68.0)	22 (23.7)	97 (45.3)		
Type of gunshot						
Low velocity	10(5.3)	116 (61.4)	63 (33.3)	189 (88.3)	7.05	0.029
High velocity	4(16)	12 (48.0)	9 (36.0)	25 (11.7)		
Anatomical region						
Head and neck	0(0.0)	11 (84.6)	2 (15.4)	13 (6.1)	17.774	0.059
Trunk (chest)	0 (0.0)	11 (64.7)	6 (35.3)	17 (7.9)		
Trunk (abdomen)	4 (13.8)	15 (51.7)	10 (34.5)	29 (13.6)		
Upper limb	0 (0.0)	29 (74.4)	10 (25.6)	39 (18.2)		
Lower limb	9 (11.5)	39(50.0)	30 (38.5)	78 (36.4)		
Multiple	1 (2.6)	23 (60.5)	14 (36.8)	38 (17.8)		

wound irrigation and simple wound dressing, antibiotics and tetanus immune prophylaxis and discharged from A and E. One hundred and sixty-three (76.2%) and three (1.4%) were admitted into surgical ward and ICU, respectively. One hundred and fifteen patients with complex contaminated penetrating/perforating injury underwent wound exploration, judicious debridement and lavage with adequate amount of normal saline. Sixteen of the 40 patients with abdominal injury underwent exploratory laparotomy, two of which were negative. Five of the patients with chest injury were managed with under water seal drainage, while one patient underwent thoracotomy. None of the 41 patients with fractures had open reduction internal fixation. Skeletal traction or external fixation and cast were used to immobilize the fractures. Two patients with extremity compartment syndrome had fasciotomy.

In [Table 3], wound infection in 58 patients (27.1%), severe anaemia in 20 (9.35%) and hypovolaemic shock in 16 (7.48%) were the top three complications of injury observed. The duration of hospital admission ranged from 1 to 184 days, the mean and median was 16 and 5 days, respectively. In [Table 4], prolonged duration of hospital admission correlated significantly with injury involving the lower extremities ($P < 0.004$), perforating wound ($P < 0.001$), high-velocity gunshot wound ($P < 0.001$), presence of fracture ($P < 0.001$), injury to debridement interval later than 12 hr ($P < 0.001$) and wound infection ($P < 0.001$).

One hundred and eighty-five patients (86.4%) recovered following treatment, 13 (6.1%) discharged themselves

Table 3: Complications of firearm injuries (*N* = 214)

Complications	Number of patients	(%)
Wound infection	58	27.1
Severe anaemia	20	9.35
Hypovolaemic shock	16	7.48
Peripheral nerve palsy	5	2.34
Septic shock	4	1.87
Extremity amputation	4	1.87
Hemiplegia	2	0.94
Peritonitis	2	0.94
Joint stiffness	2	0.94
Disorders of fracture union	2	0.94
Compartment syndrome	2	0.94
Chronic osteomyelitis	1	0.47
Wound dehiscence	1	0.47
Incisional hernia	1	0.47
Empyema thoracis	1	0.47
Total	121	56.59

Table 4: Duration of hospital admission by injury characteristics, intervention-related factor and complication

	Duration of hospital admission (days)			Total (%)	χ^2	*P* value
	1--14 *N* (%)	15--28 *N* (%)	>28 *N* (%)			
Anatomical region						
Head and neck	11 (84.6)	1 (7.7)	1 (7.7)	13 (6.10)	25.98	0.004
Trunk (chest)	15 (88.2)	1 (5.91)	1 (5.9)	17 (7.9)		
Trunk (abdomen)	24 (82.8)	5 (17.2)	0 (0.0)	29 (13.6)		
Upper limb	24 (61.5)	8 (20.5)	7 (17.9)	39 (18.2)		
Lower limb	43 (55.1)	11 (14.1)	24 (30.8)	78 (36.4)		
Multiple	31 (81.6)	4 (10.5)	3 (7.9)	38 (17.8)		
Type of wound						
Penetrating	116 (84.1)	14 (10.1)	8 (5.8)	138 (64.5)	44.71	0.000
Perforating	32 (42.1)	16 (21.1)	28 (36.8)	76 (35.5)		
Fracture						
No	130 (80.2)	23 (14.2)	9 (5.6)	162 (75.7)	62.18	0.000
Yes	18 (34.6)	7 (13.5)	27 (51.9)	52 (24.3)		
Visceral injury						
No	136(69.7)	25 (12.8)	34(17.4)	195(91.1)	2.18	0.349
Yes	12(63.2)	5(26.3)	2(10.5)	19(8.9)		
Type of gunshot						
Low velocity	138 (73.0)	28 (14.8)	23 (12.2)	189 (88.3)	25.03	0.000
High velocity	10 (40.0)	2 (8.0)	13 (52.0)	25 (11.7)		
Injury--hospital interval (hr)						
0--6	115 (74.2)	14 (9.0)	26 (16.8)	155 (72.4)	12.033	0.002
>6	33 (55.9)	16 (27.1)	10 (16.9)	59 (27.6)		
Injury-debridement interval (hr)						
1--12	109 (88.6)	7 (5.7)	7 (5.7)	123 (57.5)	51.45	0.000
>12	39 (42.9)	23 (25.3)	29 (31.9)	91 (42.5)		
Hypovolaemic shock						
No	136 (69.0)	27 (13.7)	34 (17.3)	197 (92.0)	0.460	0.795
Yes	12 (70.6)	3 (17.6)	2 (11.8)	17 (7.9)		
Wound infection						
No	133 (85.3)	12 (7.7)	11 (7.1)	156 (72.9)	70.66	0.000
Yes	15 (25.9)	18 (31.0)	25 (43.1)	58 (27.1)		

Table 5: Mortality by injury characteristics, intervention-related factors and complication

	Mortality		Total (%)	χ2	*P* value
	Yes (%)	No (%)			
Anatomical region					
Head and neck	0 (0.0)	13 (100.0)	13 (6.1)	8.96	0.111
Trunk (chest)	1 (5.9)	16 (94.1)	17 (7.9)		
Trunk (abdomen)	4 (13.3)	25 (86.2)	29 (13.6)		
Upper limb	0 (0.0)	39 (100.0)	39 (18.2)		
Lower limb	3 (3.8)	75 (96.2)	78(36.4)		
Multiple	4 (10.5)	34 (89.5)	38 (17.8)		
Type of wound					
Penetrating	8 (5.8)	130 (94.2)	138 (64.5)	0.023	0.871
Perforating	4 (5.3)	72 (94.7)	76 (35.5)		
Fracture					
No	9 (5.6)	153 (94.4)	162 (75.7)	0.003	0.954
Yes	3(5.8)	49 (94.2)	52(24.3)		
Visceral injury					
No	6(3.1)	185 (96.9)	191 (89.3)	20.419	0.000
Yes	6 (26.1)	17 (73.9)	23 (10.7)		
Type of gunshot					
Low velocity	11 (5.8)	178 (94.2)	189 (88.3)	0.138	0.710
High velocity	1 (4.0)	24(96)	25 (11.7)		
Injury--hospital interval (hr)					
0--6	9 (5.8)	146 (94.2)	155 (72.4)	0.042	0.838
>6	3 (5.1)	56 (94.9)	59 (27.6)		
Injury--debridement interval (hr)					
1--12	7 (5.7)	116 (94.3)	123 (57.5)	0.004	0.951
>12	5 (5.5)	86 (94.5)	91 (42.5)		
Hypovolaemic shock					
No	6 (3.0)	191 (97.0)	197 (92.1)	30.748	0.001
Yes	6 (35.5)	11 (64.7)	17 (7.9)		
Wound infection					
No	8 (5.1)	148 (94.9)	156(72.9)	.250	0.617
Yes	4 (6.9)	54 (93.1)	58 (27.1)		

against medical advice and four (1.9%) were referred out. Twelve of the 214 casualties died during hospitalization (mortality rate of 5.6%). Eight out of the 12 (67%) who died presented to the hospital within 6 hr of injury. The duration of hospital admission at the time of death was less than 1 hr in one patient, 1–6 hr in three patients, 7–72 hr in five patients and more than 72 hr in two patients. The cause of death was hypovolaemic shock in six (6), septic shock in four (4) and pulmonary contusion in two (2) patients. In [Table 5], a higher mortality rate correlated with presence of visceral injury ($P < 0.001$) and hypovolaemic shock ($P < 0.001$). The mortality rate was highest in patients that sustained abdominal injury. Ten (83%) of the patients who died had a probability of survival (TRISS) of 50% or more.

Discussion

Firearm injury in civilian trauma setting of developing countries is an emerging public health concern. The result of this study indicates that the casualties were predominantly young active male and this correlated with the findings in previous published reports.[6,8,10,12,14-18] The negative socio-economic impact of this pattern of age and sex distribution is an additional burden to the morbidity and mortality associated with firearm injury.

The peak period incidence of firearm injury that varies with the scene/immediate location is a reflection of the prevailing pattern of life style. In the setting of this study, most people retire early to their homes, the level of late night-life activity is relatively low, the roads are virtually empty of people from 12 to 5.59 a.m. (midnight to dawn) and are usually busy with people heading home from market, business premises, workshops, offices, recreational spots, etc., from dusk to night period. This is perhaps an explanation for the peak period of incidence of gunshot at homes (12–5.59 a.m.) and on the roads (6–11.59 p.m.) observed in this study. The peak period of incidence of gunshot in business premises, schools and farmlands also correlated with the peak period of activities in respective locations.

The predominance of night-time firearm injuries in this study is similar to the finding recorded by Chalya *et al.* in Tanzania[18] but differs from the predominance of day-time injuries reported by Ilo *et al.* in another Nigerian setting.[6] The preponderance of night-time incidence of armed robbery-related injury also correlates with the finding of Abbas *et al.* in Maiduguri.[23] In this series, a higher incidence of armed robbery was significantly related to night-time, whereas higher incidence of injury from assault was related to day-time ($P < 0.033$). The incidence of armed robbery–related injury (59.9%) is at variance with 31.1% reported by Ilo *et al.*[6] and might be the reason for the differences in time of gunshot observed.

The temporal distribution of injury in this study correlates with the finding of high and peak incidence of gunshot in the months of April and May reported by Nzewuihe *et al.*[17] in another Nigerian setting. The months with high and peak incidence of injury correlated with festive and general election periods. There were two general elections (2007 and 2011) in the period under review. In Nigeria, the high level of politically motivated violence associated with general election and availability of guns in wrong hands thereafter[17] are plausible explanations for the month of April observed as peak month of incidence for assault-related injury and months of May/June for armed robbery–related injury. Land dispute and communal clashes that are common in the post-harvest period (December–March) when farmers have enough time to engage themselves in civil conflicts further explains the pattern of monthly distribution of assaulted-related injury observed in [Figure 3].

In this study, armed robbery attack was the major cause of firearm injury. This is similar to the findings in other published studies from Nigeria[8,9,11,12,22,23] and Tanzania[18] but is at variance with the preponderance of assault-related injury reported from Pakistan[20] and Cameroon.[21] However, in a recent study, Ilo *et al.*[6] reported preponderance of assault-related injury as an emerging trend in civilian firearm injury in south-eastern Nigeria. The preponderance of armed robbery in the sub-region has been attributed to poverty and high level of unemployment.[12,18] In [Table 1], the higher incidence of armed robbery in middle-aged population compared with the youth suggests that the former is in better economic and financial standing than the latter. On the other hand, the higher incidence of assault-related injury among young people is in keeping with youthful aggressiveness and adventurous nature. In our environment, communal clashes, land dispute and politically motivated election violence often occur in rural setting and may be an explanation of higher incidence of assault-related injury in rural areas observed in [Table 2]. The higher volume of economic and financial activities in urban area compared with rural area may also explain the higher incidence of armed robbery in urban area.

The incidence of high-velocity gunshot injury in this study, though within the range in published reports from other civilian setting in developing countries,[11,13,17,18] is higher than the incidence reported from developed countries.[14] The relatively higher incidence of high-velocity gunshot injury in civilian practice of developing countries has been attributed to influx of military riffles in the aftermath of civil wars, and politically motivated violence.[9,10]

The preponderance of extremity injury correlates with the finding in previous published reports.[11,12,17,18,21] This is expected because the casualties that are likely to make it to the emergency room alive are those with extremity injury, while those with injury to the head, neck and trunk are more likely to die on the spot of shot or enroute to the hospital. This pattern of injury with respect to anatomical site also suggests that the intention of gunshot was to demobilize victims rather than to kill in majority of cases. In this study, there was more gunshot fracture involving the long bone of the lower extremity than those involving the upper extremity (as shown in Figure 4), and this is similar to the finding in other studies.[8,12,18] The preponderance of small bowel injury in abdominal gunshot injury in this study also correlates with the finding reported by Adesanya *et al.*[19]

In Table 3, wound infection was the most common complication, an observation that is similar to the finding reported by other workers in civilian trauma setting.[18]

The duration of hospital admission is directly related to the morbidity and cost of care in firearm injury. The average duration of hospital stay in this study, though within the range reported for developing countries,[12,18,24] was higher than the average in a published report from developed country.[25] In this study, the duration of hospital admission correlated directly with the incidence of wound infection complicating injury as shown in Table 4. In a recent published report, gunshot wound infection rates in a civilian setting of developing countries were higher than those in the developed countries.[26] In a recent report from a similar setting, other factors significantly associated with prolonged duration of hospital admission in Table 4 were all significantly high-risk factors for gunshot wound infection.[26] This implies that wound infection has a pivotal role in the factors associated with morbidity of firearm injury. Thus, the relatively higher wound infection rate associated with these factors is perhaps an explanation for their significant role in prolonged duration of hospital admission observed in this study. Therefore, the importance of prevention and control of wound infection in the measures aimed at reducing morbidity associated with firearm injury cannot be overemphasized.

The mortality rate for gunshot injury in this study is within the range in the published reports worldwide.[11,12,16,18] However, the result of this study indicates that 10 (83%) of those who died had a greater than 50% probability of survival, implying a preventable death rate of 83%. Appreciable preventable death rate has also been documented for road traffic injury-related mortality in previous published reports from Nigeria.[27,28] This was attributed to dearth of pre-hospital care services and trained personnel who can give emergency care at the scene/enroute to the hospital as well as facilitate rapid evacuation of casualties to hospital emergency room. In this study, there was no pre-hospital care given to about 80% of the casualties. Medical care at the scene and enroute to the hospital could have prevented death from haemorrhagic shock, which was a significant factor and accounted for 50% of the mortality observed.

The limitations of this study are that it is (1) a retrospective study and (2) a single-centre hospital-based study.

Conclusion

In our environment, the temporal distribution of firearm injury varies in location and aetiology of gunshot; this calls for preventive strategies based on the observed pattern. The relatively high morbidity and preventable death rate also call for improvement in pre-hospital and emergency room care as well as measures aimed at preventing wound infection that has a pivotal role in the factors associated with morbidity.

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Conflicts of interest

There are no conflicts of interest.

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