# *Original Research Article*

## Gunshot Injuries in Port Harcourt: The University Teaching Hospitals' Experience


### ABSTRACT

**Background:** Gunshot injuries constitute significant contributor to morbidity and mortality of the healthcare in most societies. The global burden of gunshot injuries seems to be on the rise with the increase in violent crimes and unrest across the world.

**Aim:** The aim of this study was to determine the pattern of gunshot injuries seen in the surgery departments of the two Teaching Hospitals in Port Harcourt from January 2010 to January 2019.

**Materials and Methods:** A descriptive retrospective study was carried out using data obtained from registers for patients who had gunshot injuries from January 2010 to January 2019 in two government-owned tertiary healthcare facilities in Port Harcourt.

**Results:** A total of 1138 cases of gunshot injuries was recorded within the ten-year study period, with relatively higher number of cases seen during the 2011/2012 (122/116), 2015 (134), and 2019 (138). The age range 20 - 44 years are more involved in these injuries, and abdominal injuries (205 cases) top the record followed by lower limb injuries (132 cases).

**Conclusion:** Gunshot injury is a significant contributor to morbidity and mortality among patients in Port Harcourt, with a total of 1138 cases seen within the ten-year study period. Males were six times affected than females. There is need to equip these reference hospitals for trauma care, and reduce election-related violence in Port Harcourt as this appears to be taking a toll on the citizens.



**Keywords:** Gunshot Injuries, Experiences, Teaching Hospitals, Port Harcourt, Nigeria




### INTRODUCTION

Gunshot injuries constitute significant contributor to morbidity and mortality in healthcare in most societies. The global burden of gunshot injuries seems to be on the rise with the increase in violent crimes and unrest across the world.[1] An evaluation done in the United States in 1994 reported a total of 109,465 - 159,425 gunshot injuries, with mean medical cost per injury of $17 000, and a lifetime medical costs for gunshot injuries was $2.3 billion.[2] The leading cause of death among African -Americans aged 15-34years has been reported to be gunshot injuries.[3] A United Kingdom trauma center report documented a four-fold increase in gunshot injuries with high occurrence of extremity involvement.[4] Seasonal variation in firearm injuries have been reported in some countries, with a higher occurrence in the summer.[5,6,7] Among the pediatric population, out of every mortality, four children are known to suffer some form of morbidity from gunshot injuries.[8,9]

Gunshot wounds vary from simple penetrating wound to that of crushing, stretching, and combustive forces.[10] Tissue damages may be limited to the path of the accelerating bullet as seen in low velocity handguns, or may be extensive involving surrounding tissues from cavitation effect of high-velocity

riffles.[11,12] Several factors are therefore known to determine the degree of tissue damage or extent of injury from gunshots - these include: the velocity, shape, and mass of the bullet, the compositional makeup of the bullet, nature of the tissue, and the distance of the firing source from the target.[13]

A chronicle of gunshot injuries in a Northern Nigerian city more than 15 years ago recorded a 27:1 male preponderance, ages 20 to 44 being most commonly involved, and the lower limb most commonly affected.[14] Another study in northern Nigerian setting also supports these findings.[15] A similar report in Calabar Nigeria in 2006 showed similar findings with a male to female ratio of 48: 1.[16] A more recent study among children and adolescents in eastern Nigeria reported male-female ratio of 1.8:1 with a predominance of lower limb involvement, and a prevalence of 1.2 per thousand emergency department patients.[17] The consequences of violent crimes are being witnessed in our practice as gunshot injuries among others. This may be traceable to peculiarity with the Nigerian democratic / electoral transitions and acquisition of power, criminal actions of citizens, secret cult/gang clashes, agitations for economic or resource control, and outright self-determination groups with consequent governmental crack-down among others.[17,18,19] Most of these activities are associated with the use of firearms, whose after-effect are witnessed in hospitals, for those fortunate to be alive to receive healthcare assistance. The aim of this study was to determine the pattern of gunshot injuries seen in the surgery departments of the two Teaching Hospitals in Port Harcourt from January 2010 to January 2019.

## MATERIALS & METHODS

**Study Area:** The study was carried out at the Rivers State University Teaching Hospital, and the University of Port Harcourt Teaching Hospital, being State and Federal Government tertiary healthcare facility in Port Harcourt, the capital of Rivers State, South-South of the Federal Republic of Nigeria.

**Study Sites:** The study site / setting was the Accident & Emergency Department, and the Surgical Operating Theatre of the Surgery Department of the Rivers State University Teaching Hospital and the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

**Research Design:** A descriptive retrospective cross-sectional study was carried out.

**Study Population:** All patients with gunshot injuries seen at the Surgery Departments of the Rivers State University Teaching Hospital and the University of Port Harcourt Teaching Hospital, within the study period constituted the study population.

**Sample Size Determination:** All patients identified were included in the study.

**Sampling Method:** All gunshot injury cases found in the registers of the Accident & Emergency Department, and Operating Theatre (Total Sample) were used.

**Study Instrument:** Data obtained from the registers were imputed into a proforma designed for the study.

**Data Analysis:** Data was obtained on demographics, total number of cases per year, region of the body affected by gunshot, and the centre from which data was collected; then entered into Excel Spreadsheet, and formed into tables.

**Validity/Reliability of Instrument:** The study data was scrutinized by all the authors for authenticity or otherwise before use.

## RESULTS

The demographic characteristics of patients as shown in Table 1 demonstrates that there was a total of 1138 cases of gunshot injuries within the study period, with 979 males and 159 females. The age group between 20 and 44 years was most affected with figures in three digits (20 – 24 = 183; 25 – 29 = 205; 30 – 34 = 228; 35 – 39 = 179; 40 – 44 = 105). There were less than 79 patients within the pediatric age group.

TABLE 1: DEMOGRAPHIC DATA OF GUNSHOT PATIENTS (RSUTH & UPTH)

| S/NO | AGE RANGE | ACCIDENT AND EMERGECY | | |
|---|---|---|---|---|
| | | M | F | TOTAL |
| 1 | < 5 | - | - | - |
| 2 | 5 - 9 | 1 | 1 | 2 |
| 3 | 10 - 14 | 11 | 3 | 14 |
| 4 | 15 - 19 | 56 | 7 | 63 |
| 5 | 20 - 24 | 151 | 32 | 183 |
| 6 | 25 - 29 | 180 | 25 | 205 |
| 7 | 30 - 34 | 203 | 25 | 228 |
| 8 | 35 - 39 | 154 | 25 | 179 |
| 9 | 40 - 44 | 94 | 11 | 105 |
| 10 | 45 - 49 | 48 | 9 | 57 |
| 11 | 50 - 54 | 32 | 7 | 39 |
| 12 | 55 - 59 | 22 | 8 | 30 |
| 13 | 60 - 64 | 11 | 4 | 15 |
| 14 | 65 - 69 | 12 | 1 | 13 |
| 15 | ≥70 | 4 | 1 | 5 |
| | Total | 979 | 159 | 1138 |

Table 2 shows the age and year summary for gunshot injuries. There were relatively higher total number of gunshot injury cases recorded during the 2011/2012 (122/116), 2015 (134), and 2019 (138). Also, the age range 20 - 44 years are more involved in these injuries. The patients within the pediatric age bracket were less than 79.

TABLE 2: AGE-YEAR SUMMARY OF GUNSHOT INJURIES (RSUTH & UPTH)

| S/N | AGE (YEARS) | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ,< 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 5 - 9 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 |
| 3 | 10 - 14 | 5 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 3 | 14 |
| 4 | 15 - 19 | 5 | 7 | 6 | 9 | 5 | 5 | 3 | 12 | 7 | 3 | 62 |
| 5 | 20 - 24 | 12 | 16 | 20 | 11 | 22 | 21 | 21 | 17 | 15 | 24 | 179 |
| 6 | 25 - 29 | 15 | 15 | 21 | 9 | 14 | 22 | 27 | 23 | 30 | 25 | 201 |
| 7 | 30 - 34 | 22 | 24 | 30 | 19 | 23 | 39 | 18 | 19 | 24 | 38 | 246 |
| 8 | 35 - 39 | 9 | 16 | 13 | 23 | 10 | 26 | 17 | 24 | 23 | 14 | 175 |
| 9 | 40 - 44 | 16 | 14 | 6 | 9 | 5 | 10 | 14 | 7 | 5 | 11 | 97 |
| 10 | 45 - 49 | 11 | 9 | 4 | 5 | 8 | 2 | 1 | 2 | 2 | 9 | 53 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 50 - 54 | 9 | 5 | 8 | 0 | 3 | 5 | 4 | 0 | 1 | 4 | 39 |
| 12 | 55 - 59 | 3 | 8 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 28 |
| 13 | 60 - 64 | 2 | 2 | 3 | 0 | 3 | 0 | 3 | 0 | 1 | 0 | 14 |
| 14 | 65 - 69 | 2 | 6 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 13 |
| 15 | ≥ 70 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 5 |
| TOTAL | | 112 | 122 | 116 | 89 | 96 | 134 | 113 | 107 | 111 | 138 | 1138 |

Table 3 shows the regions of the body affected by gunshot injuries during each year within the study period. The most affected parts of the body were the abdomen with a total of 517 cases, followed by the lower limb with 130 cases.

TABLE 3: YEAR-BASED REGIONAL GUNSHOT INJURIES IN PORT HARCOURT (RSUTH & UPTH)

| Rivers State University Teaching Hospital (RSUTH) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S/N | REGION | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | TOTAL |
| 1 | Head & Neck | 10 | 10 | 4 | 10 | 9 | 11 | 5 | 12 | 15 | 7 | 93 |
| 2 | Chest | 2 | 3 | 5 | 6 | 4 | 7 | 5 | 7 | 7 | 16 | 62 |
| 3 | Abdomen | 54 | 56 | 50 | 33 | 47 | 69 | 56 | 33 | 36 | 83 | 517 |
| 4 | Spine | 2 | - | 7 | - | 1 | 3 | - | 4 | 4 | - | 21 |
| 5 | Upper Limb | 6 | 14 | 16 | 8 | 7 | 14 | 8 | 12 | 18 | 12 | 115 |
| 6 | Lower Limb | 35 | 38 | 32 | 28 | 26 | 28 | 37 | 37 | 29 | 40 | 330 |
| TOTAL | | 109 | 121 | 114 | 85 | 94 | 132 | 111 | 105 | 109 | 158 | 1138 |

The total number of gunshot injuries seen in the two teaching hospitals is presented in Table 4. There were 667 cases seen at the University of Port Harcourt Teaching Hospital (UPTH), and 471 recorded at the Rivers State University Teaching Hospital (RSUTH). There were spikes of cases recorded in years 2015 (134) and 2019 (138).

TABLE 4: YEAR-BASED CASES OF GUNSHOT INJURIES IN PORT HARCOURT (RSUTH & UPTH)

| Both Teaching Hospital (RSUTH & UPTH) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S/N | CENTERS | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | TOTAL |
| 1 | RSUTH | 37 | 40 | 41 | 19 | 23 | 71 | 27 | 69 | 67 | 55 | 471 |
| 2 | UPTH | 75 | 82 | 75 | 70 | 73 | 63 | 86 | 38 | 44 | 83 | 667 |
| TOTAL | | 112 | 122 | 116 | 89 | 96 | 134 | 113 | 107 | 111 | 138 | 1138 |

## DISCUSSION

There were over a thousand cases of gunshot injuries recorded in the city from two tertiary healthcare centers, exclusive of private hospitals and primary health care centers. The sad reality of this finding is that we are gradually beginning to align with the experiences of some western countries where the leading cause of death among young people of African-American decent is gunshot injuries.[3] The number of males affected by gunshot injuries was more than six times the total number of females. Males have always been

reported to be more involved in gunshot injuries for obvious reasons.[16,17] The age group between 20 and 44 years dominated the record of affected cases. This finding is similar to previous report from other clime of gunshot injuries being more prevalent among the younger population.[3] It also aligns with the work of another researcher in Nigeria.[14] The pediatric population in this study of 6.9% (79 cases) is a source of concern as children injured in gun violence have been reported to experience negative short and long-term psychological effects, including anger, withdrawal, posttraumatic stress, and desensitization to violence.[20,21] Healthcare workers in low and middle-income countries are inadequately qualified to handle post-traumatic stress disorder in children and often do not anticipate or look out for it.[20,21] Children desensitized to violence also grow up to perpetuate violence thereby continuing the cycle of violence.

There were noticeable spikes of increased gunshot injuries during or around 2011/2012, 2015 (134), and 2019. These years apparently coincided with the period of conduct of democratic elections for presidential and governorship positions in Nigeria. It is possible that electioneering campaigns during these periods, with the associated violence can explain these spikes in the number of victims of gun violence and consequent morbidity and mortality among the citizens. There seems to be no other explanation. Election-related violence has been reported in Rivers State,[22,23,24] and other parts of Nigeria.[25,26,27]

The region of the body most commonly affected in this study was the abdomen, followed by the lower limb. This finding is at variance with the findings in Northern Nigeria, where the lower limb was reported to be the most commonly affected part of the body in gunshot injuries.[14,15] It is also different from an eastern Nigeria experience that also reported the lower limb as the commonest site.[17] Since spikes of case of gunshot injuries were noticed around election-related seasons, it may not be out of place to reason that the explanation for this difference could lie in the intent of the perpetrators of the gunshots that occasioned the injuries, in which in this setting, may be with the intent to eliminate the victims and not just to scare away. However, the findings share some similarity with the report from some conflict areas in Lebanon, where intentional abdominal gunshot injury was high.[28] The cases recorded at the University of Port Harcourt Teaching Hospital out-numbered those of the Rivers State University Teaching Hospital. This finding is expected, as the former is an older facility and has a higher bed capacity.

**Study Limitations:** The data collected in this study is limited to those found in the registers (and not patients' case notes/folders) of the two Teaching Hospitals in Port Harcourt, and hence does not provide information on treatment and outcome of the patients. Our study therefore opens up opportunity for further studies on the subject. Gunshot injury patients also patronize private hospitals, which were not represented in this study. Additionally, this is a retrospective study with data collected from the registers of the study centers, hence omissions from incomplete data may be an issue. The implication of these is that the figures of Gunshot injuries in this study, with reference to Port Harcourt City may be a tip of the iceberg.

## CONCLUSION

Gunshot injury is a significant contributor to morbidity and mortality among patients in Port Harcourt, with a total of 1138 cases seen within the ten-year study period. Most cases occurred during the election period and steps should be taken to reduce election-related violence in Port Harcourt during these periods. Males

were six times affected than females. The findings of this study bring to the fore the need to equip the accident and emergency departments of these reference hospitals for trauma care to ensure that more lives/victims are saved, and build the capacity of healthcare workers to provide mental health services especially for children injured in gun violence.

**Research Ethics Consideration:** The approval of the Research Ethics Committee of the Rivers State University Teaching Hospital and the University of Port Harcourt Teaching Hospital, were obtained before commencement of data collection.

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