Pilot Phase Analysis of the National Trauma Data Registry: Trends, Challenges, and Preliminary Findings

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ABSTRACT

Introduction: Trauma is a significant public health issue in Nigeria, with road traffic accidents (RTAs) being a leading cause of morbidity and mortality. Recognizing the urgent need to address this, the Federal Ministry of Health and Social Welfare of Nigeria initiated a pilot phase for the National Trauma Data Registry in June 2023. **Materials and Methods:** This study aimed to systematically collect and analyze acute trauma cases across the country. The report presents a comprehensive analysis of 4,895 patient records gathered from June to December 2023 from 24 Federal Tertiary Hospitals situated in three key geopolitical zones. **Results:** The findings are striking: RTAs were identified as the predominant cause of trauma, accounting for 58% of the cases, with a disproportionate impact on young males aged 21-30. The study also reveals significant gaps in pre-hospital care, such as delayed emergency response and inadequate medical interventions at the scene, which contribute to poor outcomes for trauma victims. **Conclusion:** Despite facing challenges, including incomplete patient records and the constraints of a limited data collection period, this analysis underscores the critical need for a comprehensive and fully operational national trauma data bank. This is not only essential for shaping effective policies but also for enhancing trauma prevention and care strategies, ultimately improving public health outcomes in Nigeria.

Keywords: Trauma Registry, Road Traffic Accidents (RTAs), Trauma Care, Epidemiological Trends

INTRODUCTION

Trauma, a leading cause of disability and mortality worldwide, exhibits an upward trend. Developing countries, despite lower vehicular volume, report higher rates of road traffic accidents (RTAs) [1]. Mortality alone does not adequately represent trauma's full impact, as most cases do not result in death [2]. Non-fatal outcomes significantly affect the quality of life. Previous projection for 2020 stipulated that, external causes of injury are projected to climb in disability-adjusted life-year rankings [3]. Recognizing trauma as a preventable public health issue necessitates strong surveillance systems, including trauma registries. Our preliminary observations indicated a persistent overcrowding of hospital emergency units due to trauma cases. The rise in incidents can be attributed to road traffic accidents (RTAs), insecurity, mass casualties, and communal conflicts. Developing countries face a disproportionate burden of trauma-related disability and mortality. In 2023, the Trauma Emergency and Disaster Response Division (Department of Hospital Services) of the Federal Ministry of Health and Social Welfare (FMOH & SW) initiated the collection of

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acute trauma cases from June 2023 to December 2023. This report presents the observations and findings from the pilot phase, with a focus on trends and challenges.

Trauma management is a multidisciplinary field, even the principles of Physics play a crucial role in both understanding and treating injuries. From the mechanics of injury at the accident scene to the sophisticated technologies used in hospital diagnostics and treatment, the application of physical principles is essential. At the accident scene, the initial assessment of trauma relies heavily on understanding the mechanics of injury. Newtonian mechanics, particularly Newton's first and second laws, are fundamental in explaining how forces cause injuries in high-impact events like car crashes. The sudden deceleration experienced by occupants results in forces that are directly proportional to their mass and the deceleration of the vehicle. This often leads to blunt force trauma, where rapid deceleration causes internal injuries as the body collides with parts of the vehicle or experiences sudden force changes [4]. Physics also plays a significant role in the stabilization and transport of trauma patients. Once first responders arrive, principles of biomechanics and material science are applied to stabilize the patient and minimize further injury during transport [5]. In most situations, the lack of understanding of the mechanics of injury and improper transportation of accident victims can be attributed in pre-hospital care deficiencies often experienced in RTA's. Even after the initial trauma care, application of Physics continues to influence the rehabilitation and recovery of trauma patients. The principles of biomechanics and the body's response to physical forces are essential in designing effective physical therapy programs towards speedy recovery of the victims.

MATERIALS AND METHODS

The trauma registry was set up after a consultative meeting with the core stakeholders. The WHO standard tool for trauma data collection was adopted and modified to fit the Nigerian context (the plot phase). The modified data collection tool was scripted for a Google Form (an electronic tablet), which was used for trauma data collection. These data were collected from selected Federal Tertiary Hospitals (FTHs), which have the capacity to manage trauma cases across the three of the geopolitical zones (North Central, North West, and South West). The remaining three zones (North East, South East, and South-South) will be assessed in the 2024 budget year to complete the pilot phase of the Trauma Registry.

Data collection was carried out by trained medical officers, nurses, and scientific officers, who were then deployed to the selected institutions. An electronic Google form was filled out for each patient that visited the accident and emergency unit with acute trauma from June 1 to December 31, 2023. The hospital's medical record department and IT unit retrieved patient folders and electronic health records from the specified time frame. These records were then used by data collection officers, trained by the FMOH & SW, to populate a modified WHO form on Google Forms. Inclusion Criteria: Patients of all ages presenting with acute trauma requiring admission. The information gathered includes demography, circumstances surrounding the trauma (major complaint), presenting conditions, aetiology, body region affected by the ER, vital signs, initial care, definitive care, complications, imaging reports, interventions, outcomes, etc.

RESULTS

A total of 4895 patient records were abstracted into the registry from 24 FTHs. Data entry was incomplete for some patients due to missing pages in some patients' folders, e.t.c. The patients were categorized into groups of 10 according to their ages as shown in Figure 1. The count of 4,892 individuals had their ages recorded, but 3 patients' ages were not documented in their folders. The average age of patients in this study was approximately 34 years, the youngest age group was 1-10 years (with mean of 4.5 years), and the oldest age group is 61–70 years (with mean of 65.5 years). The most common age group (Mode) was 21–30 years (with mean of 25.5 years). The ER disposition is shown in Figure 2. Most of the cases recorded were new cases (3695), followed by referred cases (1171). A small number were both new and referred (5). The most

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common causes of trauma were road traffic accidents (RTAs), particularly motor vehicle crashes in 1541 patients (31.55%), motor cycle crashes in 1292 patients (26.43%), falls in 748 patients (15.32%), gunshots in 260 patients (5.32%), and burns in 195 patients (3.99%). Table 3 shows details of the causes of trauma among patients while Figure 3 shows the details of the location of injuries. A total of 6,406 responses were recorded for different types of injuries, out of which different forms of fractures were accounted for in 1191 patients, combination injuries in 2130 patients, laceration in 1873 patients, abrasion in 418 patients, avulsion in 230 patients, burns, and other forms of injury accounted for in 564 patients. Figure 4 shows the results from types of injury. The highest number of cases came from the National Hospital Abuja (1089), followed by other hospitals with varying counts (Figure 5). Three thousand eight hundred and eighteen (78.02%) were males, while one thousand and seventy-seven (22.00%) were females.

One thousand, eight hundred and fifty-five (37.90%) were taken to the hospital with taxis, one thousand, three hundred and forty-seven (27.52%) were taken to the hospital with private cars, only (6.86%) were taken to the hospital with Ambulances (Table 1). The body part that was affected most was the head in 1960 patients, the upper limb in 1313 patients, the lower limb in 1625 patients, etc. Some patients had multiple injuries in different locations and were counted separately for each location. Most of the trauma victims (69.93%) did not actually receive any form of pre-hospital care before taking them over a distance to the hospital (Table 2). Two thousand and ninety patients (43%) suffered various complications and were admitted to the wards and 156 (3%) were admitted at the ICU, while 1671 patients (34%) were discharged to go home in satisfactory status, also 287 (6%) died, while 90 patients (2%) were referred for expert management in some centres or for proximity to the family, about 20 (1%) of the patients absconded from the hospitals, while 540 patients (11%) discharged themselves against the medical advice. The mechanism of trauma injury is shown in Table 3.

Challenges encountered

Challenges encountered in this study include difficulty in data collection due to unablity for the record officers to retrieve all patients' folders that were identified from the emergency record and issues of missing folders due to migration from hardcopy folders to electronic medical records. Some hospitals with high volume of patients and the number of days allocated for the data collectors to collect data from each centre was not sufficient and data collectors have to spend extra days to mop-up all the data. Furthermore, lack of proper documentations due to severe injury cases that may require immediate ICU admission or surgery, limiting the time for complot ete documentation.

DISCUSSION

The trauma registry data shows an average patient age of approximately 34 years, with the most common age group being 21–30 years. This is indicative of the high burden of trauma on young adults, especially males, who constituted 78.02% of the cases. The preponderance of young males in trauma cases is consistent with global trends, as this demographic is more likely to engage in high-risk activities, such as driving and participating in physical labour or sports [6]. This will greatly affect the productive-year age group affected by trauma incidence. In addition, data reveals that males between 15 and 35 years old (a demographic mainly represented in trauma cases) exhibit higher risk-taking behaviours, leading to severe traumatic brain injuries often associated with the Young Male Syndrome [7, 8]. The specific injury patterns and interventions noticed in adolescent trauma cases emphasise the need for tailored preventive measures and targeted interventions to address the specific risk factors prevalent in this demographic group [9, 10]. The data highlights the serious need for organized trauma systems, including efficient ambulance services and trained paramedics. Utilising the use of taxis and private vehicles as a major means of transporting trauma patients highlights a severe deficiency in emergency response capabilities. Organised Emergency Medical Services (EMS) systems can ensure timely and appropriate pre-hospital care, which is important for

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improving trauma outcomes [11]. Improper transportation of trauma patients can indeed have detrimental effects on their condition, as evidenced by a study in Nigeria highlighting the impact of inadequate immobilisation during transport on patients with spinal injuries, leading to a deterioration in their neurological status [12, 13]. The majority of patients (69.93%) did not receive any pre-hospital care, the vast absence of pre-hospital care is a significant issue for effective trauma management. Timely and appropriate pre-hospital interventions can significantly reduce mortality and morbidity. In many developed countries, established emergency medical services (EMS) provide critical care during transport, which improves outcomes [14]. Moreover, the ambulances are equipped with shock-absorbing stretchers and advanced suspension systems to reduce vibrations and jolts, which can exacerbate injuries. Understanding these forces is also very crucial in reducing the risk of further injuries during transport of accident victims to the hospitals [15].

Our findings highlight the significant impact of RTAs, particularly motor vehicle and motorcycle crashes, which together accounted for nearly 58% of all trauma cases. It is instructive that despite the rising cases of insecurity, the incidence of communal clashes, and civil violence in the country, road traffic accidents (RTAs) remain a significant public health concern in Nigeria, contributing substantially to trauma-related morbidity and mortality. This is consistent with the World Health Organisation's (WHO) report, which identifies RTAs as a major cause of injury and death globally, especially in low- and middle-income countries [16], it is imperative to develop strategies aimed at preventing road traffic collisions. The high prevalence of gunshot and stab injuries underscores the problems of insecurity and the widespread availability of small arms and light weapons, particularly in the aftermath of recent sectarian conflicts in the country. Although, some patients sustained multiple body injuries in various parts of their bodies, the head injury was the highest (1960 cases) with lower limb (1625 cases), and upper limb (1313 cases). Head injuries are of great concern due to their potential severity and long-term consequences, including cognitive and functional impairments. The high incidence of lower and upper limb injuries reflect the common occurrence of fractures and other musculoskeletal trauma resulting from road traffic accidents (RTAs) and falls [17]. From this study, it was revealed that a substantial proportion of patients (43%) required ward admissions, indicating the severity of their injuries. ICU admissions were relatively low (3%), which might reflect either a shortage of ICU beds or a triage system prioritising the most critically injured patients. The mortality rate was 6%, which does not underscore the serious nature of trauma cases seen in emergency departments; perhaps, most mortality case files were missing except in hospitals that are using EMR. The high rate of patients leaving against medical advice (11%) could be due to various factors, including financial constraints, dissatisfaction with care, or cultural beliefs about hospital treatment, mainly patients with fracture injuries who always opt for traditional bone setting once the laceration and other life-threatening injuries have been treated. [18 -21].

The data from the trauma registry highlights how urgently trauma care systems need to be improved, particularly in developing nations. Strengthening pre-hospital care, setting up well-organised ambulance services, and strengthening data administration and gathering, are important areas for improvement. By addressing these issues, trauma outcomes can be greatly enhanced, and the strain on healthcare systems can be decreased.

There are a lot of challenges encountered in the data collection processes, one is due to missing patient folders in some hospitals, and the transition from hardcopy to electronic records. Also, inadequate time allocated for data collectors who visited hospitals with high-volume of patients. Accordingly, efficient and accurate data collection is crucial for developing effective trauma care policies and interventions. The challenges faced in these areas highlighted the need for robust health information systems and adequate resources for data management.

The data collected so far has provided an objective basis for an epidemiological trend and burden of trauma

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in three geo political zones in Nigeria, but this have not really reviewed enough information on the prevalence of trauma in Nigeria, there is need to collect data on trauma incidence over a period of one year to be able to justify our reporting and to be published in a global status journal.

CONCLUSION

In conclusion, the establishment of a National Trauma Data Bank in Nigeria is an ambitious but essential endeavor that requires substantial government support and commitment. While the challenges associated with setting up a sophisticated trauma registry are significant, they are not insurmountable. A comprehensive trauma registry, complete with specialized equipment, a web-based application, and dedicated personnel, is critical for generating reliable data that can inform decision-making and drive research. By investing in the infrastructure, training, and resources needed to establish dedicated trauma registries in all Federal Teaching Hospitals, the government can ensure that these systems are robust and capable of providing the data necessary to improve trauma prevention and care. Furthermore, the deployment of state-of-the-art ambulances and the formation of specialized rapid response teams will enhance the effectiveness of pre-hospital care, ultimately saving lives. With the right support and resources, Nigeria can build a trauma care system that is not only responsive but also proactive in addressing the nation's trauma burden.

RECOMMENDATIONS

1. **Establish a National Trauma Data Bank (NTDB):** We strongly advocate for the creation of a National Trauma Data Bank with branches in all Federal Teaching Hospitals, State Government hospitals, Federal Medical Centers, and other State or Private University Teaching Hospitals. This initiative should be supported by the provision of essential infrastructure, specialized equipment, and ICT facilities. Additionally, comprehensive training should be provided to hospital staff, particularly those in Accident & Emergency (A&E) units, to enhance the management of trauma patients and ensure data accuracy and efficiency.
2. **Deploy Modern Ambulances and Strategic Emergency Response:** We recommend that the Federal Government of Nigeria equip all Federal Teaching Hospitals, Military and Police Hospitals, NEMA and the Federal Road Safety Corps (FRSC) with state-of-the-art ambulances. These ambulances should be fully equipped with modern life-saving technologies and stationed strategically along major highways across each state. Furthermore, there should be a robust public information system to ensure rapid emergency response, enabling timely interventions in critical situations.
3. **Strengthen Pre-Hospital Care with Specialized Rapid ResponseTeams:** We propose that the Federal Government should consider the recruitment of more medical and paramedical graduates, including Physicists, into the Military, Police, NEMA and FRSC. These recruits should undergo specialized training to form highly skilled rapid response teams, capable of delivering effective pre-hospital care to victims of road traffic accidents. This will significantly enhance the quality of emergency care and improve survival outcomes for trauma victims.

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FIGURES

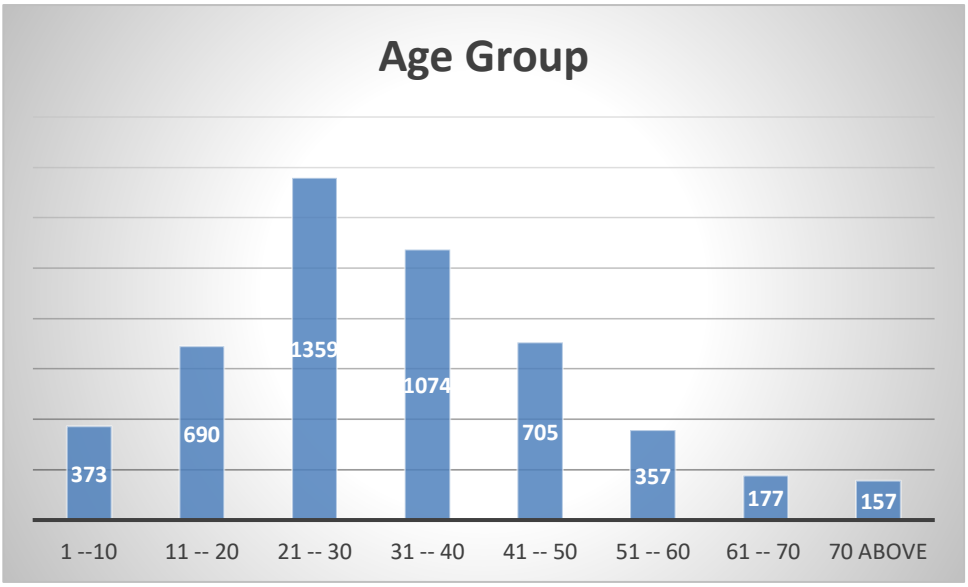

Fig. 1: Showing the Age distribution

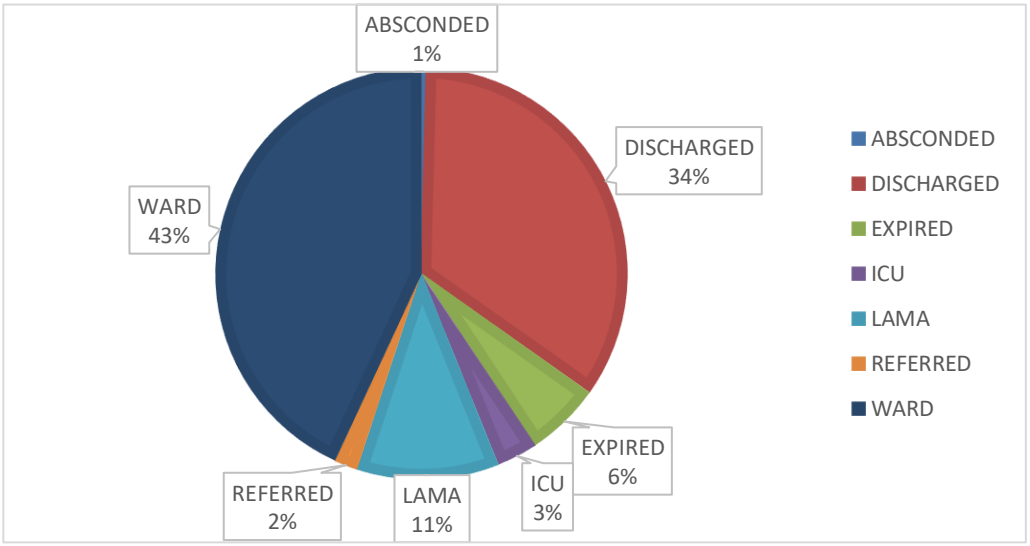

Fig. 2: ER Disposition

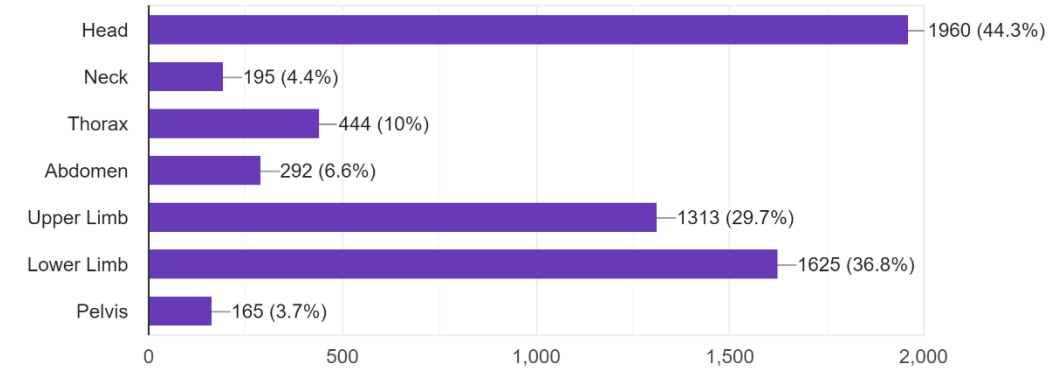

Fig 3: Location of Injury

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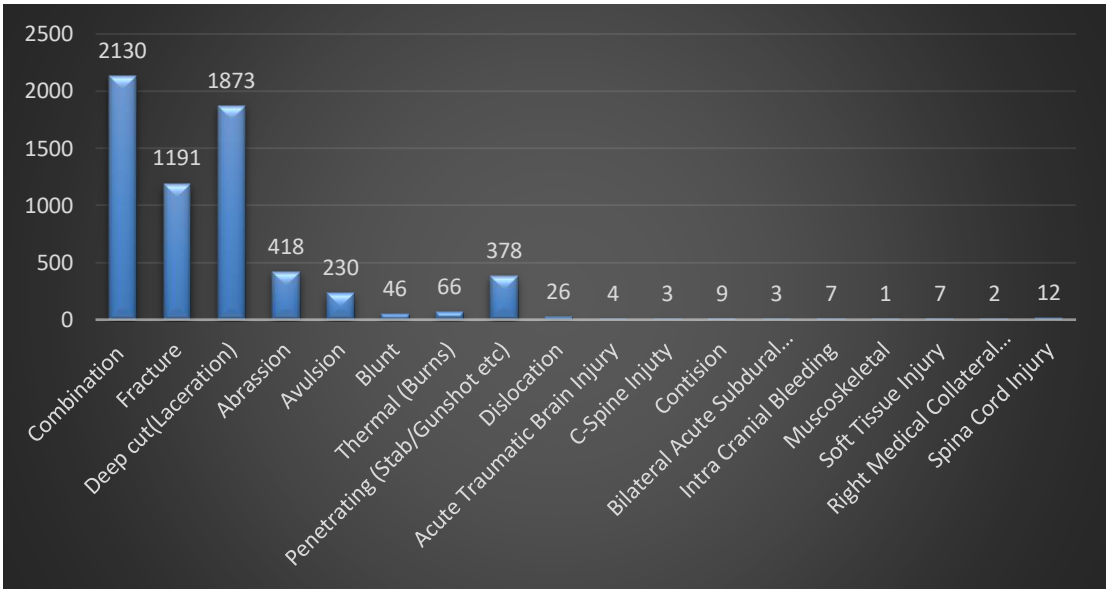

Fig 4: Type of Injury.

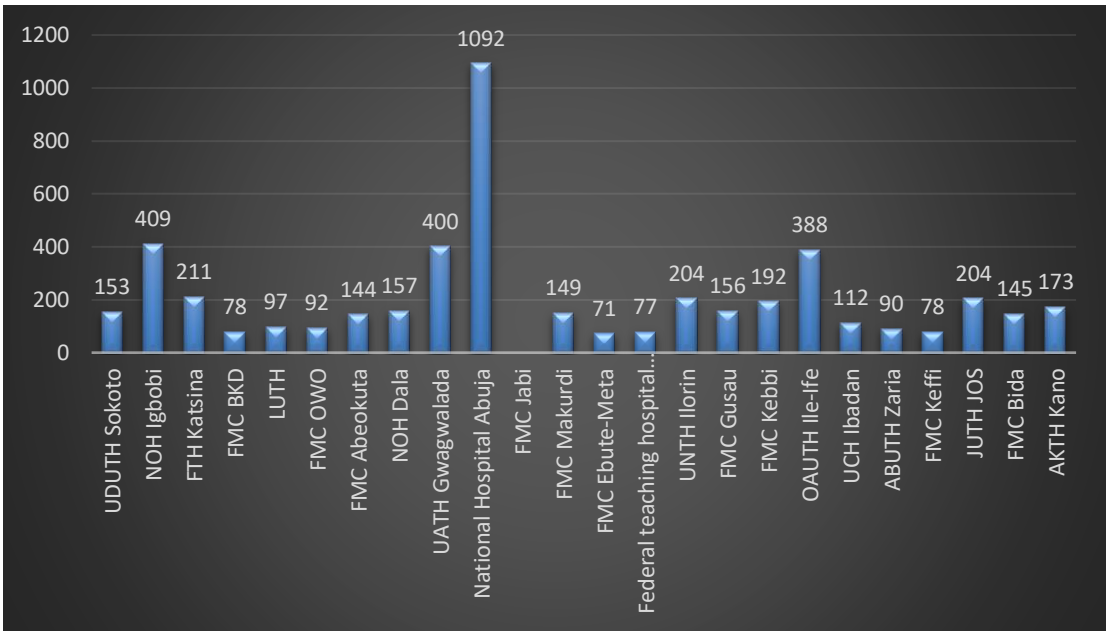

Fig. 5: List of Hospital Accessed

TABLES

Table. 1: Means of Transportation to Hospital

Means	Number	Percentage %
TAXI	1855	37.90
Private Car	1347	27.52
Public Transport Vehicle	1159	23.68
Ambulance (Private/Hospital/FRSC)	336	6.86
Walk-in	74	1.51
Tricycle	29	0.59
FRSC Van	30	0.61

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Police Van	28	0.57
Motor cycle	21	0.43
Military Van	16	0.33

Table 2: Pre – Hospital care

Pre- Hospital Care	**No.**	**%**
None	3424	69.93
Lay Person	910	18.58
Doctor	250	5.11
Emergency Responder (FRSC/NEMA)	206	4.21
CHEW	23	0.47
Traditional Bone Setter	34	0.69
PHC	44	0.9
Search Rescue	6	0.12

Table 3: Mechanism of Trauma Injury

Cause of Injury	*Freq.*	*%*
Motor Vehicular Crash	1541	31.58
Motor cycle crash	1292	26.45
Assault	385	7.88
Fall	748	15.31
Gunshot	260	5.32
Stab	106	2.17
Burns	195	3.99
Tricycle crash	105	2.15
Falling Object	97	1.99
Industrial/Occupational Accident	60	1.23
Domestic Accident	43	0.88
Animal harm (Dog/Snake)	27	0.55
Drowning	8	0.16
Sport Injury	8	0.16
Suicide Attempt	9	0.18