Original Article

Developing a Low-resource Approach to Trauma Patient Care - Findings from a Nigerian Trauma Registry

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Abstract

Background: Trauma is a worldwide problem that results in significant morbidity and mortality in developing countries. **Objective:** This study looks at the demography of trauma from data abstracted from a Nigerian trauma registry and considers the peculiarities of a low-resource setting from this perspective. **Methods:** Trauma registry data from January 2013 to June 2014 were analyzed. **Results:** A total of 542 patients were included in the study. The mean age of the patients was 33.43 ± 12.79 years; the median time from injury to arrival at the hospital was 3 h (interquartile range IQR 1 – 5.1 h); three-quarters of the patients sustained their injuries on the road-tricycles were rarely involved in road traffic injuries (RTIs) (6.9% of RTIs) but were used in transporting a third of the patients whose data on means of transportation were captured. There were 15 (2.7%) deaths in the first 24 h period postinjury covered by the study – 13 (86.7%) of these patients had head-and-neck injury. About half of the assault injury (50.5%) was from persons known to the victim. The shock indices suggested that a majority of the patients were not at a high risk of mortality. **Conclusion:** Most of the trauma patients at our hospital were in low- to middle-income categories. The median time to arrival of injured patients was 3 h (IQR 1 – 6 h). Most injuries occurred on the road because of RTIs. The involvement of tricycles in accidents was uncommon, but they were used fairly commonly by lay responders in transporting the injured victim to hospital. A high proportion of assailants were known to the victim. The use of trauma registries provides essential data for prioritizing limited resources and can guide a contextualized approach to reducing trauma and improving trauma patient care.

Keywords: *Assault, low resource, road traffic injury, trauma registry, tricycle*

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Introduction

Trauma is a worldwide problem which has a greater risk of morbidity and mortality in developing countries, because of inefficient systems to provide adequate care for the injured.[1] In Sub-Saharan Africa, there is a paucity of data on the epidemiology of trauma, which results in poor planning toward the prevention of and care for trauma victims.[2] There is no trauma system in Nigeria to provide rapid and safe transport for the injured to designated centers.[3] Those patients that do arrive early in the hospital have a reasonable chance of survival as it has been determined that 25% of deaths from injury in sub-Saharan Africa, can be averted by the provision of basic surgical care.[4]

Data from a trauma registry are key in providing essential information on the epidemiology of injury in the area covered by the registry and thus required for efficient deployment of resources.[3] Such registries are not established in LMICs (Low and Middle Income Countries), possibly due to the problem with using technology-based human resource-intensive systems in resource deficient settings.[5]

In Southern Nigeria, Uyo is the capital city of Akwa-Ibom State-the only tertiary hospital in the State

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is the University of Uyo Teaching Hospital. A simple sustainable model for a hospital-based trauma registry in Nigeria was developed in Uyo – the aim of this study was to highlight the contributions to knowledge of this trauma registry about the profile of the demography, etiology, clinical pattern of injury, treatment, and initial outcome of injured patients presenting to the University of Uyo teaching hospital.[6]

Methods

Study design

This study was a retrospective observational study which analyzed data from the Trauma Registry from the month of January 2013 to June 2014. Missing data noted in the Registry was obtained from hospital records where these were available. Residual missing data were handled as defined in the inclusion criteria.

Study setting

This study was carried out on data from the Trauma Registry at the University of Uyo Teaching Hospital. It is a 500-bed tertiary hospital in the capital city of Akwa-Ibom State in Southern Nigeria. Tertiary hospitals are the highest level of care in the three-tier public health system in Nigeria. This hospital serves an estimated population of 4.4 million people.

Study materials

This Trauma Registry was developed by carrying out a study to determine which trauma patient parameters are most likely to be obtained reliably without overloading a resource-constrained system.[6] Most of the items in the dataset were based on the Cape Town Trauma Registry, which was also developed based on the minimal dataset concept. The items were obtained from trauma patients over a period and those parameters which were collected equal to or >80% of the time were included in the Uyo Trauma Registry. The details of the development, staffing, equipment, and data processing have been published in an earlier paper.[6]

The initial collection of data was sustained over the years 2013 and 2014 but has since become less regular due to difficulties with staffing and funding.

The Registry captures data on demography, etiology, clinical pattern of injury, treatment, and initial outcome of injured patients presenting to the accident and emergency. Data were abstracted from the Registry for this study. The severity of the injury was graded with both the injury severity score and the Kampala Trauma Score, but due to difficulties with consistent use, this data were not included in the study. The shock indices were used as a means of ascertaining the risk of mortality.[7,8]

Data analytics

The data were analyzed using descriptive statistics.

Data management

Inclusion criteria

Adult patients from 15 years old and above.

Datasets with complete pulse and blood pressure data.

Patients arriving 24 h or less after the injury.

Datasets which had pulse and blood pressure data but where not complete in some other item, were included.

Exclusion criteria

People who were dead on arrival.

All nontrauma patients, as the index accident and emergency department, attends to all emergencies.

The compilation of the final dataset was carried out as follows:

675 patients were captured on the trauma registry over the period. The accident and emergency does not routinely attend to children; hence, the data for 34 patients below the age of 15 years were excluded. All data sets with incomplete pulse or blood pressure data were also excluded. Of the 591 residual data sets that met the inclusion criteria, those patients who took over 24 h to arrive and residual duplicate data were excluded. Thus, 542 patients' data sets were included in this study.

Ethical approval

Ethical approval for this study was obtained from the Institutional Health Research Ethics Committee.

Results

Demographic characteristics [Table 1]

Three-quarters (409) of the patients were male. The mean age was 33.43 ± 12.79 years (confidence interval [CI]: 32.4–34.5); the age range was 15–78 years – two-thirds of the patients (n = 354; 66.4%) were in the 20–39 years age range. Most injured patients were in low- to medium-income occupations (423–81.3%) – small business owners were in the majority (118–27.9%), followed by students (87–20.6%).

Movement of the patient to the hospital [Table 2]

The median time from injury to the arrival of the patient was 3 (interquartile range [IQR] 1–5.1) h. Three-quarters (400–76.2%) of the patients sustained their injuries on the road. Three quarters (47–75.8%) of the patients who sustained their injuries in a compound were assaulted. Nearly two-thirds (211–58.3%) of patients whose data on means of transportation were captured were brought in by a car or bus, while a third

Table 1: Demographic characteristics of patients on the trauma registry

Characteristic	*n*=542, *n* (%)
Sex	542 (100)
Male	409 (75)
Female	133 (25)
Male:female	3.2:1
Age (years)	529 (97.6)
15-19	38 (7.2)
20-29	215 (38.8)
30-39	139 (27.6)
40-49	73 (13.4)
50-59	30 (5.9)
60-69	31 (5.5)
70-78	8 (1.7)
Mean age	33.43±12.79
Age range	15-78
Income categories	520 (95.9)
Low to medium*	423 (81.3)
Others**	97 (18.7)

*Low to medium – small business owners (118-27.9%), students (87-20.6%), artisans (74-17.5%), driver (66-15.6%), unemployed (27-6.4%), labourer (25-5.9%), farmer (18-4.3%), miscellaneous (8-1.9%), **Others – health workers, administrators, civil servants, big business owners etc

Table 2: Transportation characteristics and referral pattern of patients on the trauma registry

Time to arrival	546 (99.8)
Median (IQR) (h)	3 (1-5.1)
Range	15 min - 24 h
Characteristic	***n* (%)**
Incident site, *n* (%)	525 (96.9)
Road	400 (76.2)
Compound	62 (11.8)
Work	34 (6.5)
Others	17 (5.5)
Means of transportation, *n* (%)	362 (66.8)
Car/bus	211 (58.3)
Tricycle	113 (31.2)
Ambulance	21 (5.8)
Uniformed officers	8 (2.3)
Others	6 (1.7)
Motorcycle	3 (0.8)
Mode of presentation, *n* (%)	524 (96.7)
No referral	414 (79.0)
Referred	110 (21.0)
From a private facility	43 (39.1)
From a Government facility	66 (60.0)
From a TBS	1 (0.9)

TBS: Traditional bone setter, IQR: Interquartile range

came in a tricycle (113–31.2%). Three-quarters (414–79%) of the patients who arrived at the teaching hospital, came without a referral.

Injury characteristics [Table 3]

Most (424–79.4%) injuries were of the blunt type and occurred due to a road traffic injury mechanism (333–62.1%). Further analysis of those who had a road traffic injury revealed that half (171–51.4%) of the injuries involved a four-wheel vehicle, while (23–6.9%) involved a tricycle. Most (62–87.3%) of the patients who sustained cut or stab wounds were assault victims. About half (56–50.5%) of the assault victims knew their assailants. There was a preponderance (8–88.9%) of home injury for females, in the acquaintance and family categories. Two out of the three intimate partner assault victims were females. There were two cases of rape.

A third (159–30%) of the injuries were minor, involving skin and or soft tissue, while a fifth (114–21.5%) were multiple injuries. The region-specific injuries had head-and-neck injuries as the most common (94–17.7%), whereas lower limb (80–15.1%) and upper limb (38–7.2%) followed in frequency. Isolated chest and abdominal injuries were uncommon.

Shock indices and outcome of patient care at the accident and emergency [Table 4]

Both the shock index (SI) and the modified SI (MSI) indicated that most patients had hemodynamic stability – 486 (89.8%) had an SI grade I or II; 427 (78.2%) had an MSI from 0.7 to 1.3. Most patients – 280 (64.8%) were either treated and discharged or admitted to the orthopedic ward for definitive care. Thirteen of the fifteen patients (86.7%) who died in the emergency room had head-and-neck injuries.

Discussion

Most of the trauma patients at our hospital were in low- to middle-income categories. The median time to arrival of injured patients was 3 h (IQR 1–5.1 h). Most injuries occurred on the road because of road traffic injuries. The involvement of tricycles in accidents was uncommon, but they were used fairly commonly by lay responders in transporting the injured victim to hospital. A high proportion of assailants were known to the victim. Most patients were not at a high risk of mortality.

Some limitations of this study relate to the skewed nature of hospital-based data. In addition, the patients brought to the hospital may not reflect the injury pattern in the community due to the lay responder effect, as there was no formal emergency response. Furthermore, formal injury severity scores were not used in this study.

The mean age of the participants in this study was 33.43 ± 12.79 years (CI: 32.4–34.5) [Table 1], which is higher than that found both by Thanni (mean age

Table 3: Injury characteristics of patients on the trauma registry

Characteristic	*n* (%)
Injury type	534 (98.5)
Blunt	424 (79.4)
Penetrating	101 (18.9)
Burns	9 (1.7)
Mechanism of injury	536 (98.9)
RTI*	333 (62.1)
Cut/stab	71 (13.2)
Blunt object	48 (9.0)
Fall	30 (5.6)
Gunshot	22 (4.1)
Burns	14 (2.6)
Unknown	13 (2.4)
Bite	5 (0.9)
Intent of injury	537 (99.1)
Assault	111 (20.7)
Stranger	55 of 111 (49.5)
Acquaintance	31 of 111 (27.9) (Male 27) (Female 4 - assaulted at home)
Family	21 of 111 (18.9) (Male 16) (Female 5 - 4 assaulted at home)
Intimate partner	3 of 111 (2.7)
Undetermined	174 (32.4)
Unintentional	252 (46.9)
Anatomical body site of injury	530 (97.8)
Skin/soft tissue	159 (30.0)
Multiple	114 (21.5)
Head/neck	94 (17.7)
Lower limb	80 (15.1)
Upper limb	38 (7.2)
Chest	25 (4.7)
Abdomen	11 (2.1)
Others	7 (1.3)
Rape	2 (0.4)

*RTI Four-wheel vehicle (171-51.4%), Tricycle (23-6.9%), Motorcycle (63-18.9%), bicycle (4-1.2%), pedestrian (64-19.2%), Unknown (8-2.4%). RTI: Road traffic injury

Table 4: Shock indices and outcome of patient care on the trauma registry

Shock index/outcome	*n* (%)
SI	541 (99.8)
I	117 (21.6)
II	369 (68.2)
III	49 (9.1)
IV	6 (1.1)
MSI	541 (99.8)
<0.7	59 (10.9)
>1.3	59 (10.9)
0.7-1.3	423 (78.2)
Outcome	445 (82.1)
Treated and released	190 (42.7)
Orthopedic ward	83 (18.7)
Left against medical advice	77 (17.3)
Burns and plastic ward	17 (3.8)
Died in accident and emergency	15 (3.4)
Further care in accident and emergency	14 (3.1)
Referred to other teaching hospitals	14 (3.1)
Surgery ward	12 (2.7)
Surgery out-patient	11 (2.5)
ICU	7 (1.6)
Others	5 (1.1)

SI - Group I <0.6; Group II ≥0.6 to <1.0; Group III ≥1.0 to <1.4; Group IV ≥1.4. SI: Shock index, MSI: Modified shock index, ICU: Intensive care unit

of 27 ± 13 years) in a systematic review of injuries in Nigeria and Ozoilo *et al*. (mean age of 29 ± 15 years) based on trauma registry data from a center in Northern Nigeria.[9,10] However, the two studies under reference included data from both children and adults, while our study was restricted to adults. This may account for the downward pull on the mean in the other studies.

Most of the patients were in the low- to middle-income categories [Table 1], which suggests that the high-income category patients may sustain injuries less frequently. The implication is that the less privileged in the society are more at risk of injury, particularly road traffic injury. This finding requires a public database to confirm, to envisage the scale of trauma patient demography and to put in place policies that protect the less privileged in the society. The concept of providing Governmental support for trauma patients could leverage on the finding that those with a less secure means of income seem disproportionately involved in injuries.

The median time to arrival was noted in a few studies from developing countries.[4] The time of 3 h, which we found [Table 2], is consistent with the findings from a systematic review of trauma registry data from LMIC (Low- and Medium-Income Countries).[4] The total time (in minutes) to move a patient from the scene of the injury to definitive hospital care in the US was 30.96, 30.97, and 43.17 for urban, suburban, and rural settings, respectively.[5] This highlights the long arrival time of patients in our setting. The absence of a structured trauma response system and national emergency health policy in Nigeria makes arrival within the "golden hour" a mirage.[3] However, South Africa, Ghana, and Kenya are leading the way for other LMIC countries to make these essential structures a reality despite resource constraints.[3]

In Lagos, Nigeria, where prehospital care is in its infancy, only 2.3% of road traffic crash victims received such care.[11] Our finding that 5.8% were brought by an ambulance [Table 2] is much less than that for Cassidy *et al*. (including Abuja – the capital state in Nigeria) – 18% but more consistent

with findings by Ozoilo *et al*. (Jos) – 9% and Ibrahim *et al*. (Lagos) – 2.3%.[10-12] The findings by Cassidy *et al*. may not be representative of the country because it included findings from Abuja, the Federal Capital Territory, which being the seat of Government, may enjoy more facilities than most other States or regions of the country. In general, ambulance transport for the injured is a Nigerian rarity that is undergoing some development.[13] Alternatives may also be sought – our data showed that a third of the victims were brought to the hospital in a tricycle. This can be leveraged, using the lay first responder framework based on motorcycle taxi riders, which has been utilized in Iganga, Eastern Uganda, with reasonable success.[14]

Our findings suggest that one-fifth (21%) of the patients arrive with a referral from either a private (60%) or a Government facility (39.1%) – [Table 2]. This indicates that most patients arrive at the tertiary hospital, as their first place of healthcare, despite the large distances some have to cover and that the majority who came without a referral from distant towns probably had no early postinjury care. This detail of patient referral has not been noted in other studies from LMICs. It highlights the difficulty in providing adequate trauma care in this Southern Nigerian State, which has a large population (4.4 million), but only one definitive trauma patient care facility.[15] In the developed world trauma systems are set up to maximize coverage of cities, such that primary transfer of a trauma victim to the nearest and most appropriate hospital can be reasonably ensured.[16]

The type of injury was penetrating in one-fifth (18.9%) of cases and blunt in four fifths (79.4%) – [Table 3]. This is consistent with studies in West Africa.[9,17] The findings from Northern Nigeria, however, revealed a higher proportion of penetrating injuries (one-third), which could be accounted for by the high spate of civil conflict in the region.[10] This draws attention to the low proportion of gunshot injuries in studies from non-conflict zones of Nigeria.[9] This may represent a low incidence of gunshot injuries in Nigeria as suggested by other studies – rigorous community-based research is required to clarify these findings.[18]

This study suggests that motor vehicle crashes made up two-thirds (62.1%) of the victims' injury mechanism [Table 3]. This is consistent with similar studies in West Africa.[9,10,12,19] The tricycle is the most common means of public transportation in Uyo, the capital city of Akwa-Ibom State.[20] Despite this background, only 6.9% of the motor vehicular crashes involved a tricycle, suggesting it may be a safer means of transportation [Table 3]. This may be because these vehicles have a curtailed maximum speed and low weight, hence low momentum – same consideration has been applied to small versus large motorcycles and their relative risks of severe injury.[21] This finding requires a rigorous community study to determine.

The high proportion of assault injuries from persons known to the victim (50.5%) requires further inquiry [Table 3]. This detail has not been noted in other studies from trauma registries/injury records in West Africa.[9,10,12,19] Nwashindi *et al*. in an injury study limited to facial injuries, noted a high proportion of assailants were known to the victim.[22] The assault cases noted in our study and that by Nwashindi (Southern Nigeria) was mostly in or around the victims dwelling, while it was noted to occur in or around farmland in North-Western Nigeria.[23] This may indicate a propensity for assault by familiar people in Southern Nigeria and possibly by strangers in the Northern parts of the country. We found all but one of the females involved in assault by known persons to have been injured at home, bringing up the question of the small number (2) assaulted by an intimate partner – could there be a cover-up to protect a partner? Consistent with this, only two cases of rape were noted – could there be women suffering assault who are unable or unwilling to obtain care due to the need to cover up or avoid being stigmatized? Contrary to our findings and those of Nwashindi *et al*., a study in The Gambia revealed that more adult females are victims of domestic violence and a study on wife beating in seven African countries also suggests the practice is still overlooked in most African cultures.[17,24]

In a third of the cases (30.02%), the skin/soft-tissue injury without underlying fracture or visceral injury, was the major injury sustained [Table 3]. In terms of anatomical site of major injury, the head and neck (17.7%) and the lower limbs (15.1%) were the commonly injured regions. These findings were consistent with others in the literature.[11,12] A similar study in Northern Nigeria, revealed a much higher incidence of head injury (59.9%).[10] This may be due to the high incidence of violence in those areas, as the assailants tend to attack the head with either gunshots or machete's.

More than three-quarters of the patients (78.2%) presented in the "safe" range of the MSI, i.e., <0.7 and >1.3. Studies have shown that the risk of mortality is not significant in this range of MSI [Table 4].[7,8] This suggests that most patients did not present in a state of severe derangement of blood pressure – either a hypodynamic or a hyperdynamic circulation. This may indicate why there were relatively few deaths in the emergency room (15 deaths–2.6%) – 13 of them

had head-and-neck injuries. While a much larger study is required to interrogate these findings, there is the suggestion that patients with head injury are at a much higher risk of dying from their injuries than those with other injuries. This concept is consistent with other studies.[25,26] Thus, priority could be placed on transporting those patients with isolated head injury to the nearest tertiary health center, while those with isolated limb injury could be resuscitated at a peripheral centre before moving them to the tertiary health-care center if necessary. This approach may help manage scarce resources, if it can be implemented safely.

The SI indicates the severity of shock more accurately than the blood pressure alone, and is an indicator of the patients haemodynamic stability.[7,8] However, it is a poor predictor of mortality.[7,8] Most patients in this data set (89.8%) presented with Grade I or II SI, suggesting they were fairly stable haemodynamically. Information on MSI and SI was not provided in similar studies from West Africa. However, the impression that most patients were not severely injured is consistent with findings from the West African subregion.[10,19] It is important to note the internal coherence of the data in this study, suggesting most patients were not at a high risk of mortality – a third of them had minor injuries, only 15 died within 24 h, the shock indices were mostly favorable and almost half (42.7%) of the patients were treated and released. It is also possible that due to the lack or absence of a national trauma patient care system and the dependence on passersby for transport to health facilities, many severely injured patients may have been left at the scene of the accident – further studies are required.

Conclusion

A trauma registry is a necessary tool in providing trauma patient data and can help guide priorities for further study and policy formulation in developing economies. Enforcing safe road use, scaling up prehospital care and improving the capacity to handle trauma in secondary health-care centers is a priority. The option of using the tricycle for formal transport of injured patients can be considered, in the context of limited resources. The high proportion of assailants known to the victim is a concern. Further studies are required into the severity of trauma for patients with either isolated head injuries or those with isolated limb injuries. Institutional support for trauma registries is recommended in all secondary and tertiary hospitals in Nigeria and other developing economies, as a means of guiding the management of scarce resources for the care of the trauma victim.

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Conflicts of interest

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References

1. Gosselin RA, Spiegel DA, Coughlin R, Zirkle LG. Injuries: The neglected burden in developing countries. Bull World Health Organ 2009;87:246-6a.
2. Reynolds TA, Stewart B, Drewett I, Salerno S, Sawe HR, Toroyan T, *et al*. The impact of trauma care systems in low- and middle-income countries. Annu Rev Public Health 2017;38:507-32.
3. Adeloye D. Prehospital trauma care systems: Potential role toward reducing morbidities and mortalities from road traffic injuries in Nigeria. Prehosp Disaster Med 2012;27:536-42.
4. Boughton O, Jones GG, Lavy CB, Grimes CE. Young, male, road traffic victims: A systematic review of the published trauma registry literature from low and middle income countries. SICOT J 2015;1:10.
5. Carr BG, Caplan JM, Pryor JP, Branas CC. A meta-analysis of prehospital care times for trauma. Prehosp Emerg Care 2006;10:198-206.
6. Nottidge TE, Dim M, Udoinyang CI, Udoh IA. The Uyo Trauma Registry-developed for sustainable audit of trauma care and cause in Nigeria. Trop Doct 2014;44:14-8.
7. Singh A, Ali S, Agarwal A, Srivastava RN. Correlation of shock index and modified shock index with the outcome of adult trauma patients: A prospective study of 9860 patients. N Am J Med Sci 2014;6:450-2.
8. Liu YC, Liu JH, Fang ZA, Shan GL, Xu J, Qi ZW, *et al*. Modified shock index and mortality rate of emergency patients. World J Emerg Med 2012;3:114-7.
9. Thanni LO. Epidemiology of injuries in Nigeria-a systematic review of mortality and etiology. Prehosp Disaster Med 2011;26:293-8.
10. Ozoilo KN, Ali M, Peter S, Chirdan L, Mock C. Trauma Registry Development for Jos University Teaching Hospital: Report of the First Year Experience. Indian J Surg 2015;77:297-300.
11. Ibrahim NA, Ajani AW, Mustafa IA, Balogun RA, Oludara MA, Idowu OE, *et al*. Road traffic injury in Lagos, Nigeria: Assessing prehospital care. Prehosp Disaster Med 2017;32:424-30.
12. Cassidy LD, Olaomi O, Ertl A, Ameh EA. Collaborative development and results of a nigerian trauma registry. J Registry Manag 2016;43:23-8.
13. Nwauwa N. Improving care & response in Nigeria. Emerg Med Serv 2017;42. Available from: https://www.jems.com/articles/print/volume-42/issue-6/features/improveng-care-response-in-nigeria.html. [Last accessed on 2019 Apr 22].
14. Delaney PG, Bamuleke R, Lee YJ. Lay first responder training in Eastern Uganda: Leveraging transportation infrastructure to build an effective prehospital emergency care training program. World J Surg 2018;42:2293-302.
15. Kale Y. Annual Abstract of Statisitcs, 2011; 2011.

16. Davies G, Chesters A. Transport of the trauma patient. Br J Anaesth 2015;115:33-7.
17. Sanyang E, Peek-Asa C, Bass P, Young TL, Jagne A, Njie B. Injury factors associated with discharge status from emergency room at two major trauma hospitals in The Gambia, Africa. Injury 2017;48:1451-8.
18. Nottidge TE, Ekpe EE, Dim ME, Nottidge BA. Audit of gunshot injuries in a southern Nigerian tertiary hospital. Ibom Med J 2019;12:23-8.
19. Chichom-Mefire A, Nwanna-Nzewunwa OC, Siysi VV, Feldhaus I, Dicker R, Juillard C. Key findings from a prospective trauma registry at a regional hospital in Southwest Cameroon. PLoS One 2017;12:e0180784.
20. Ikot AS, Akpan U. Motorcycle ban and its economic implications on Uyo metropolis of Akwa Ibom state, Nigeria. Int J Econom Dev Res Investment 2011;2:32-9.
21. Nottidge TE, Ekanem US, Ogunlade SO, Ngim NE, Mkpouto-Obong E. Motorcycle road traffic injuries in Southern Nigeria: The small motorcycle as a prevention strategy. East Central Afr J Surg 2010;15:24-7.
22. Nwashindi A, Dim EM, Osunde OD, Nwashindi NM, Uduma F. An analysis of cutlass injuries to the face from assault in southern Nigeria. Niger J Exp Clin Biosci 2014;2:115-9.
23. Eni UE, Na'aya HU, Musa AM, Lawan MA, Chinda JY. An audit of non-fatal assault injuries treated in Federal Medical Center (FMC), Nguru, North East Nigeria. Niger J Med 2009;18:168-71.
24. Rani M, Bonu S, Diop-Sidibe N. An empirical investigation of attitudes towards wife-beating among men and women in seven sub-Saharan African countries. Afr J Reprod Health 2004;8:116-36.
25. Kobusingye OC, Lett RR. Hospital-based trauma registries in Uganda. J Trauma 2000;48:498-502.
26. Ozoilo K, Nwadiaro C. The influence of craniotrauma on the outcome of polytrauma. J Med Trop 2010;12:69-71.