

Aetiology and presentation pattern of mandibular fractures at the State Dental Hospital in Maiduguri, Borno State, Nigeria.

*Mathew Ekhaleafo OGBEZODE, **Emmanuel Akinwumi OROMAKINDE, ***Faith Nonyelum NGENE, ****Ibrahim Kayode SULEIMAN, ****Kabiru IDRIS

[*Oral medicine unit, **Orthodontics Unit, ***Periodontology Unit, ****Oral And Maxillofacial Surgery Unit, Department of Dental Surgery, University of Maiduguri Teaching Hospital, Maiduguri, Borno State]

Correspondence

Mathew Ekhaleafo OGBEZODE

Oral medicine unit, University of Maiduguri Teaching Hospital, Maiduguri, Borno State

Email: ogbezodental@gmail.com

ABSTRACT

Background: The mandible is the biggest and the main bone occupying the lower third of the face, and it is prone to fracture because of its prominence. Fracture of the mandible is more common in some major parts such as, the angle, the canine region, and the condylar neck due to its weakness in those regions.

Objective: To analyse the aetiology and presentation pattern of mandibular fractures at the State Dental Hospital in Maiduguri

Methods: This was a retrospective-prospective descriptive study approved by the Ethical Review Board of Borno State Ministry of Health. A total number of 956 facial fracture cases, which included both old cases retrieved from the record book and new cases seen during the period under review, was recorded. Out of this total, 252 mandibular fracture cases were seen during the seven-year period at the State Dental Hospital in Maiduguri. The patients seen were examined clinically and radiographically by a team of three independent dental surgeons after calibration was done by a consultant oral and maxillofacial surgeon. All patients and cases included in the study were properly briefed and informed consent taken prior to carrying out the study.

Results: A total of 956 facial fractures were recorded: 252 cases were mandibular fractures, accounting for a prevalence 26.4%. Males accounted for 76.2% and females 23.8% with a male to female ratio of 3.2:1. Age range was 11-60yrs with a mean age of 27.7yrs. Those aged 21-30yrs showed the highest level of distribution in the sampled cases, and most of the fractures occurred on weekends, especially Friday which accounted for 34.4% of cases. The major aetiology of most fracture is road traffic accident in 122(48.8%) cases and the body (44.8%) of the mandible was noted as the most commonly affected site.

Conclusion: Although road traffic accident appeared to be the major aetiology of mandibular fracture in this study, a substantial part of assault related causes are due to blast related injuries to the mandible. The age distribution, sex, location and treatment modalities still remain the same.

Keywords: Mandible, Mandibular fracture, Road traffic accident, Assault, Blast injury

Mathew E. Ogbezode: <https://orcid.org/>

Emmanuel A. Oromakinde: <https://orcid.org/>

Faith N. Ngene: <https://orcid.org/>

Ibrahim K. Suleiman: <https://orcid.org/>

Received: 17 Aug, 2021

Revision: 7 Dec, 2021

Accepted: 11 Dec, 2021

Citation: Ogbezode ME, Oromakinde EA, Ngene FN, Suleiman IK, Idris K. Aetiology and presentation pattern of mandibular fractures at the State Dental Hospital in Maiduguri, Borno State, Nigeria. *Nig J Dent Res* 2022; 7(1):53-59
<https://dx.doi.org/10.4314/njdr.v7i1.7>

INTRODUCTION

The mandible is the biggest and the main bone occupying the lower third of the face.^{1,2} Structurally, the mandible consists of several parts: the symphysis, parasymphysis, body, angle, ramus, coronoid process, condyle and the alveolus.³ The mandible, a V-shaped bone, articulates with the temporal bone at a point known as the temporomandibular joint. Through this joint, the mandible plays a huge role in mastication, digestion, speech, and aesthetics of the face, occlusion, and facial expression as well as contributing to the facial height and width. Some parts of the mandible are specifically prone to fracture because of weakness in those areas. The angle, due to the presence of impacted lower third molar; the region of the canine due to the increased length of the root of lower canine and the deficient amount of bone coverage in that region of the mandible; the condylar neck due to its thinness³

Although diverse, the implicated aetiological factors of mandibular fracture includes assault, road traffic accident, gunshot wound, sport, fall and work related injuries or industrial accidents.^{1,2,4-15} In our environment, mandibular fracture with some of its associated morbidity is common.

Anecdotally, like in other regions of the world facing insurgencies,¹⁶⁻²⁰ blast injury is responsible for a substantial part of the cause of mandibular fracture in our environment. This region currently experiencing insurgencies but the level of contribution to prevalence hasn't been sufficiently or previously documented based on our literature search.

The pattern of mandibular fracture has been shown to change from time to time, from culture to culture, age, gender, demography of the country, socio economic and environmental conditions. Improved legislations in most developed countries and some developing countries such as the use of seat belt, monitoring of blood alcohol and reduction in blood alcohol level permissible during driving, crashed helmet use by citizens of these countries have been shown to cause a drastic reduction in the prevalence of mandibular fracture.^{1,2,10,21-23} In the developed world, interpersonal violence appears to be the major cause of mandibular fracture^{1,2,14} while road accidents account for the bulk of maxillofacial

trauma in most developing countries.^{1,14,22} However, the worldwide prevalence of mandibular fracture seems to have road traffic accident as its major aetiology.²¹ Fractures of the mandible are more common in males compared to females and in the middle age group than the children and the elderly^{1,3}. The reason may be attributed to the fact that middle age individuals tend to be very active and are frequently involved in risky behaviours such as, excessive intake of alcohol, drug abuse, and risky driving attitude without recourse to safety. In addition, they tend to travel more when compared with the elderly and children.^{2,22}

In Nigeria, road traffic accidents account for a substantial cause of mandibular fractures.^{8,11,14,24-28} However, a previous study in the North East region of the country indicated that assaults were the most common cause of mandibular fractures (48%), closely followed by road traffic accidents.² In some series from Nigeria, road traffic accidents accounted for between 74-86%.^{24,25,29} Most series on mandibular fractures, irrespective of region and sex indicate that the age group 21-30yrs has the highest level of distribution of mandibular fractures in Nigeria, including studies from the North East.^{2,8,11,14,21,22,24,25,28,30} Besides, based on the literature from Nigeria, irrespective of age, the male sex is more commonly affected compared with the female folks.^{2,8-10,13,14,24,25,27,28,30} In addition, previous findings by most authors in Nigeria showed that the most commonly fractured site is the body of the mandible.^{2,8,9,14,21,22,27,30}

The objectives of this study were to classify mandibular fractures based on clinical and anatomical location in patients seen at the State Dental Hospitals in Maiduguri; to analyse the aetiology and pattern of mandibular fractures seen in the state Dental Hospital in Maiduguri; to evaluate the contribution of blast injuries in region plagued by insurgencies.

METHODOLOGY

This study was approved by the Ethical Review Board of the Borno Ministry of Health and was a 7-year combined prospective-retrospective from January 2011 to December 2017. The study was carried out at the State Dental Hospital Maiduguri which is a major referral centre for patients from the 28 general hospitals located within Borno state and neighbouring communities from Yobe, Adamawa,

Taraba, Bauchi and Gombe State. The State Dental Hospital in Maiduguri as well as the maxillofacial unit of the University of Maiduguri Teaching Hospital serve as referral centers and are estimated to serve a population of close to 30 Million people.²

A total number of 956 facial fractures were seen, which included both old cases from the record book and new cases seen during the period under review. Out of this total, 252 cases were mandibular fractures. It comprised all mandibular fracture cases seen during the period under review and patients with complete data from the medical record department of the State Dental Hospital. Excluded were those with missing or incomplete data.

The new cases/patients were examined clinically and radiographically by a team of three independent dental surgeons after calibration was done by a consultant Oral and Maxillofacial surgeon. All

patients included in the study were properly briefed and informed consent taken prior to carrying out the study. And each case was included after the four researchers reached an agreement.

Simple manner of classification of mandibular fracture based on the anatomical location of the fracture on the mandible was adopted as described by Dingman and Natvig,³¹⁻³³ into symphyseal, parasymphyseal, body, angle, condylar and coronoid fractures.

All procedures were performed and conducted in accordance with the ethical standard given in 1964 declaration of Helsinki as revised in 2013.³⁴ (Figure 1&2)

The data obtained was analyzed with statistical package for social sciences software (SPSS) version 20 and presented in form of statements and frequency tables.



Figure 1

(Case of mandibular fracture due to blast injury at initial presentation and same patient after immediate Postop wound debridement, Inter Maxillary Fixation and proper tissues apposition in layers). Photo Credit; Dr Kephass Mbaya, Consultant Plastic and Reconstructive Surgeon, University of Maiduguri Teaching Hospital, Maiduguri.



Figure 2

RESULT

A total of 956 facial fractures were recorded: 252 cases were mandibular fracture, accounting for a prevalence 26.4%.

The age range of the study participants was 11-60 years with a mean age of 27.7yrs \pm 9.7yrs. Majority were 21-30 years, 126(50%) and the least 8(3.2%) were aged 51-60 years. There were 192(76.2%) males

and 60 females (23.8%) with a male to female ratio of 3.2:1. (Table 1)

Assault was the cause of fractures in 80 patients (36.8%), with a further breakdown of assault related causes of mandibular fractures indicating that domestic assault/fight accounted for 38cases (15.1%), blast injuries, 39cases (15.5%), and gunshot/armed robbery (1.2%). All forms of road

traffic accidents accounted for 122 cases (48.4%), sport injuries 33cases (13.1%), falls 17cases (6.7%).

A major finding was that there were only three patients presented with gunshot injuries despite the fact that blast injuries accounted for a substantial amount of assault related injuries with 39 cases (15.5%) of all the 252 cases seen during the period of the study.

Thirty-one cases of blast injuries were in males while females accounted for 8 cases; hence, the ratio of male to female presenting with blast injuries is 3.9. (Table 2)

The distribution of the various fractures on various sites and locations on the mandible showed that the body of the mandible had the highest number of fractures with 113(44.8%) cases, condyle 22(8.7%) cases, symphysis 6(2.4%) cases, parasymphysis

41(16.3%) cases, coronoid 7(2.8%), angle 63(25.0%). (Table 3)

In cases of mandibular fracture associated with fractures in other parts of the body, 150 cases (59.5%) did not present to the clinic with fractures in any other bone in the body while 102 cases representing 40.5% presented with fracture in other bones of the body, most of the fracture were located in the middle third of the facial region. (Table 4)

A look at the days of the week in which mandibular fracture occurred showed that Monday was the least day 12(4.8%) and Friday was the most day of fracture occurrence 80(31.7%), In male, fracture is more common on Friday 66(34.4%) while in female, mandibular fracture is more common on Saturday 16(23.3%). (Table 5)

Table 1. Socio demographics of the participants

Age Group	Frequency	Percentage
11-20	58	23.0
21-30	126	50
31-40	45	17.9
41-50	15	6.0
51-60	8	3.2
Total	252	100
Sex		
Female	60	23.8
Male	192	76.2
Total	252	100

Table 2: Causes of mandibular fracture

CAUSE	Frequency	Percent
Domestic assault	38	15.1
Blast	39	15.5
Fall	17	6.7
Gunshot	3	1.2
Sport	33	13.1
RTA	122	48.4
Total	252	100.0

Table 3: Type/site of fracture

Type/site of fracture	Frequency	Percent
Symphyseal	6	2.4
Parasymphyseal	41	16.3
Body	113	44.8
Angle	63	25.0
Condyle	22	8.7
Coronoid	7	2.8
Total	252	100.0

Table 4. Multiple sites of fractures in the body

Multiple Sites Of Fractures	Frequency	Percent
No	150	59.5
Yes	102	40.5
Total	252	100.0

Table 5: Day of week and sex involved in mandibular fracture

Day of week	Freq.	%	Sex	
			Male N(%)	Female N(%)
Monday	12	4.8	6(3.1)	6(10.0)
Tuesday	19	7.5	11(5.7)	8(13.3)
Wednesday	24	9.5	21(10.9)	3(5.0)
Thursday	29	11.5	28(14.6)	1(1.7)
Friday	80	31.7	66(34.4)	14(23.3)
Saturday	57	22.6	41(21.4)	16(26.7)
Sunday	31	12.3	19(9.9)	12(20.0)
Total	252	100.0	192(100)	60(100.0)

DISCUSSION

Mandibular fracture has reduced mortality rate but has its own fair share of attendant morbidity such as, occlusal derangement, loss of masticatory efficiency, speech affectation, poor aesthetics (which may be due to facial width and height distortion), bone infection, temporomandibular joint disorders and in severe cases, respiratory embarrassment, malunion/nonunion/delayed union, neurological deficit or nerve damage may follow mandibular injury.^{5,6,20} Our finding in this study was consistent with other similar studies from Nigeria by Olasoji³, Ajagbe¹⁹ and Adekeye¹⁸ which showed that age group 21-30yrs accounted for the bulk of study subjects with mandibular fracture. The reason attributed to the increased mandibular fracture in people in this age group as opined by Brown and Cowpe,³⁵ was due to the fact that, people around this particular age group irrespective of the social economic, cultural and environmental conditions tend to wreak havoc on one another either with object or motorcycle. Most people around this age group tend to be very active, freely mobile, engage themselves in risky behaviours such as drugs, alcohol, fight and interpersonal violence^{2,35}.

Recorded in this study was a very low incidence of mandibular fracture during the period of the study because, at the peak of insurgency, the state government placed a ban on commercial motorcycle popularly known in our environment as *Okada*. Another possible reason may be due to the long distance most of our patients had to travel to assess treatment from various referral centers and the risk involved in travelling for a very long distance due to the prevailing security situation in the state during the people of the study.²

Majority of the fractures occurred in males in all age groups, the ratio of male to female is 3.2 which is higher than that reported by Olasoji et al,² in 2002 in Maiduguri. Many reasons such as, road traffic accidents, assault, gunshot injuries ,falls, industrial and domestic accidents, animal attacks^{14,27,28} have all been linked to the cause of mandibular fracture in the literature Olasoji et al,² Ajagbe et al,¹³ Adekeye et al,²⁴ Owusu et al,³⁶ Ogundare et al.¹⁰ Our findings in this study, revealed road traffic accident as the major aetiology of mandibular fracture. This finding is similar to previous studies by Oji C et al,²⁹ in Enugu and Adekeye et al,²⁴ from Northern part of Nigeria.

The relative reduction in road traffic accidents as a cause of mandibular fracture when compared with some earlier studies in the late 70s and 80s conducted by Ajagbe et al,¹³ and Adekeye et al,²⁴ may be related to the banning of motor cycle by the state government. Many studies from Europe and America,³⁷⁻⁴⁰ and some earlier studies from Nigeria have implicated assault related injuries as the major cause of mandibular fracture^{2,22,27,41} Although, assault is second only to road traffic accident as the number one cause of mandibular fracture in our study, the relative high level of assault related injuries in our study can be attributed to the insurgency within the state during the period of the study, high level of unemployment, reduction in per capita income, reduction of man hours at work as a result of prevailing insecurity condition within the state and neighboring state in the North East region of the Country.^{2,22,42}

Blast injuries to the mandible accounted for a substantial amount of assault related cases. This can be attributed to the still ongoing insurgency in the state. This is similar to findings from other parts of the World facing insurgencies,^{16,18-20} causing a change in pattern of the cause of mandibular fracture as seen in our study. As far as we know, this is the first time the contribution of blast injuries to the aetiology mandibular fracture in our environment is being documented. Hence, further research is required in that regard. Domestic violence and fight accounted for the highest amount of cases of assault injury, this can also be attributed to the high rate of unemployment, majority of the farmers could no longer engage in the farming activities which may lead to rage and frustration, leading to relatively high level of assault witnessed. Our study accounted for low number of cases of armed robbery attacks/gunshots compared with earlier study by Olasoji et al,² from Maiduguri which accounted for higher cases of armed robbery and firearm injury.

Body of the mandible accounted for the majority of the cases of mandibular fractures seen. This result is consistent with other studies from Nigeria by Abiose et al,⁷ Ajagbe et al,¹³ Adekeye et al,²⁴ Olasoji et al,² and a study by Khalil and Shaladi^{5,6} in Libya. In contrast studies from Europe and America¹³ indicates that condyle is the commonest site mandibular fracture. Iram et al,⁴ from Pakistan discovered parasymphseal region of the mandible as the

commonest fractured site. Condylar fracture could have been missed in this study because plain radiograph was used as the only available means of investigation during the period. There was relatively higher number of cases of angle fracture in our study in relation to previous earlier similar studies from northern part of the country^{8,11,24,26,30} and other studies from other parts of the country.^{15,21,25,43} Ogundare et al,¹⁰ and Owusu et al,³⁶ documented a higher number of angle fracture cases from separate studies in adults and children. This could be attributed to the improved method of investigation of facial fractures at the period.

Most cases of mandibular fractures seen occurred majorly on Friday, Saturday and Sunday with peak incidence on Friday. The reasons for the peak incidence may be attributed to the fact that many people tend to engage in religious activities, attend social events and likely to travel during those days of the week. Most of our patients had close reduction with the use of wire and arch bar while complex cases were referred to the University of Maiduguri Teaching for open reduction and internal fixation with screw and bone plate.

CONCLUSION

Although road traffic accident appeared to be the major aetiology of mandibular fracture in this study, a substantial part of assault related causes are due to blast related injuries to the mandible. The age distribution, sex, location and treatment modalities still remain the same.

SOURCE OF SUPPORT

Nil

CONFLICT OF INTEREST

None declared

REFERENCES

1. Hwang K, You SH. Analysis of facial bone fractures: An 11-year study of 2,094 patients. *Analysis of facial bone fractures: An 11-year study of 2, 094 patients.* Indian J Plast Surg. 2010; 43: 42-48.
2. Olasoji HO, Tahir A, Arotiba GT. Changing picture of facial fractures in northern Nigeria. 2002; 40; 140-143.
3. Dergin G, Emes Y, Aybar B. Evaluation and management of mandibular fracture. *Trauma Dent [Working Title].* 2019; 1-23.
4. Abbas I, Ali K, Mirza YB. Spectrum of mandibular

fractures at a tertiary care dental hospital in Lahore. *J Ayub Med Coll Abbottabad.* 2003; 15:12-4.

5. Shaladi OJ, Khalil AF. Fractures of the facial bones in the Eastern region of Libya. *Br J Oral Surg.* 1981; 19; 300-304.
6. Khalil AF. Civilian gunshot injuries to the face and jaws. *Br J Surg.* 1980; 18:205-209.
7. Abiose BO. Maxillofacial skeleton injuries in the Western states of Nigeria. *Br J Oral Maxillofac Surg.* 1986; 24; 31-39.
8. Adebayo E.T, Ajike OS, Adekeye EO. Analysis of the pattern of maxillofacial fractures in Kaduna, Nigeria. *Br J Oral Maxillofac Surg.* 2003; 41: 396-400.
9. Olasoji HO, Tahir A, Bukar A. Jaw fractures in Nigerian children: an analysis of 102 cases. *Cent Afr J Med.* 2002; 48: 1-7.
10. Ogundare BO. Pattern of mandibular fractures in an urban major trauma center. *J Oral Maxillofac Surg.* 2003; 61: 713-718.
11. Ugboko VI, Olasoji HO, Ajike SO, Amole AOD, Ogundipe OT. Facial injuries caused by animals in Northern Nigeria. *Br J Oral Maxillofac Surg.* 2002; 40:433-7.
12. Adeyemo WL, Iwegbu IO, Bello SA, et al. Management of mandibular fractures in a developing country: A review of 314 cases from two urban centers in Nigeria. *World Journal of Surgery.* 2008; 32:2631-2635.
13. Ajagbe HA, Daramola JO, Oluwasanmi JO. Civilian type facial injuries – a retrospective study of cases seen at the University college hospital, Ibadan. *Niger Med J.* 1977; 4: 432-437.
14. Adeyemo WL, Ladeinde AL, Ogunlewe MO, James O. Trends and characteristics of oral and maxillofacial injuries in Nigeria: a review of the literature. *Head Face Med.* 2005; 11: 1:1-9.
15. Obimakinde OS, Okoje VN, Fasola AO. Pattern of assault-induced oral and maxillofacial injuries in Ado-Ekiti, Nigeria. *Nigerian journal of surgery: official publication of the Nig Surg Res S.* 2012. 18, P. 88-91.
16. Scolozzi P, Richter M. Treatment of severe mandibular fractures using AO reconstruction plates. *J Oral Maxillofac Surg.* 2003; 61; 458-461.
17. Elgehani RA, Orafi MI. Incidence of mandibular fractures in Eastern part of Libya. *Med Oral Patol Oral Cir Bucal.* 2009; 14:529-532.
18. Abdel-Galil K, Loukota R. Fractures of the mandibular condyle: Evidence base and current

- concepts of management. *Br J Oral Maxillofac Surg.* 2010; 48: 520-526.
19. Schultz BD, Sosin M, Nam A, et al. Classification of mandible defects and algorithm for microvascular reconstruction. In: *plastic and reconstructive Surgery.* 2015; 135: 743e-745e.
 20. Kummoona R. Management of missiles injuries of the facial skeleton: primary, intermediate, and secondary phases. *J Craniofac Surg.* 21:976-981.
 21. Wasiu L.A, Innocent OI, Olanrewaju AT. Management of mandibular fractures in a developing country: A review of 314 cases from two urban centers in Nigeria. *World J Surg.* 2008; 32: 2631-2635.
 22. Olasoji HO, Maxillofacial Injuries Due to Assault in Maiduguri, Nigeria. *Trop Doct.* 1999; 29; 106-108.
 23. Bernard EK, Akama MK, Odhiambo WA, Chindia ML, Mua B. Maxillofacial Soft Tissue Injuries in Nairobi, Kenya. *East Afr Med J.* 2012; 89:306-311.
 24. Adekeye EO. The pattern of fractures of the facial skeleton in Kaduna, Nigeria. *Oral Surg Oral Med Oral Pathol.* 1980; 49:491-459.
 25. Oji C. O. Jaw fractures in Enugu, Nigeria, 1985-1995. *Br J Oral Maxillofac Surg.* 1999; 37; 106-109.
 26. Olasoji HO, Tahir A, Bukar A. Jaw fractures in Nigerian children: an analysis of 102 cases. *Cent Afr J Med.* 2002; 48; 9/10; 109-112.
 27. Ugboko VI, Odusanya SA, Fagade OO. Maxillofacial fractures in a semi-urban Nigerian teaching hospital. A review of 442 cases. *Int J oral maxillofac surg.* 1998; 27; 286-289.
 28. Olojede A, Gbotolorun OM, Ogundana OM, Emeka IC, Emmanuel MM, Oluseye S, et al. Pattern of assault-related maxillofacial injuries treated at the General Hospital, Lagos, Nigeria. *J West Afr Coll Surg.* 2016; 6: 68-82.
 29. Oji C. Fractures of the facial skeleton in children: A survey of patients under the age of 11 years. *J Cranio-Maxillo-Facial Surg.* 1998; 26; 322-325.
 30. Ajagbe HA, Daramola JO. Civilian type facial injuries – a retrospective study of cases seen at the University college hospital, Ibadan. *Niger Med J.* 1977; 4:432-437.
 31. Dingman RO, Natvig P. *Surgery of Facial Fractures.* Saunders, Philadelphia, PA Page Views: 1,170. *Surg Facial Fract Saunders, Philadelphia, PA.* 1964: Pp: 1,170.
 32. Mihailova H. Classifications of mandibular fractures - Review. *J IMAB.* 2006; 12:3-5.
 33. Passi D, Malkunje L, Atri M, Chahal D, Kumar Singh T. Newer proposed classification of mandibular Fractures: A Critical Review with Recent Updates. *Ann Med Heal Sci Res.* 2017; 7:314–8.
 34. Nwhator S, Opeodu O, Ayanbadejo P, Umeizudike K, Olamijulo J, Alade G, et al. Could periodontitis affect time to conception? *Ann Med Health Sci Res.* 2014; 4:817.
 35. Brown RD, Cowpe CJ. Patterns of maxillofacial trauma in two different cultures. *J R Coll Surg Edinb.* 1985; 30:299–302.
 36. Owusu JA. Patterns of Paediatric Fractures in the United State. *JAMA of Facial. Plast. Surgery;* 2016; 18(1); 37-41
 37. Pogrel MA KL. *Mandibular fractures.* Habel Arian BC Facial Fract Toronto, Philadelphia Decker Inc. 1989; 183–229.
 38. Cornelius CP, Audigé L, Kunz C, Rudderman R, Buitrago-Téllez CH, Frodel J, et al. The comprehensive AOCMF classification system: Mandible fractures – level 2 tutorial. *Cranio-maxillofacial Trauma Reconstr.* 2014; 7; S15-S30.
 39. Kabakov B., Malishev V. *Fract jaws. M: Med.* 1981; 176.
 40. Exhibit E, Hameeduddin A, Makalanda L, Stuart S, Malhotra A, Chan O, et al. Procedure details Conclusions Personal Information References. 2019; 1-7.
 41. Benjamin A, Olushola A, Sara K. Analysis of complication of mandibular fracture. *Afr J Trauma.* 2014; 3:24-29.
 42. UNDP. Accelerating Development Investments in Famine Response and Prevention NORTH-EAST NIGERIA. 2017; Available from: https://www.undp.org/content/dam/undp/library/crisis_prevention/UNDP_FamineStudy_Nigeria.PDF
 43. Obimakinde OS, Ogundipe KO, Rabiu TB, Okoje VN. Maxillofacial fractures in a budding teaching hospital: A study of pattern of presentation and care. *Pan Afr Med J.* 2017; 26:1-9.