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# Psychosocial and Health-Related Quality of Life (HRQoL) Aspect of Oral and Maxillofacial Trauma

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## Abstract

Psychosocial and health-related quality of life following oral and maxillofacial injuries is an often neglected aspect of patients' management. It has been noted that patients with maxillofacial trauma were more likely to be depressed, anxious with low self-esteem and poor health-related quality of life and possibility of post-traumatic stress disorder (PTSD). Depression and anxiety associated with facial trauma are often coupled with worries regarding recovery. Following trauma, there may be physical dysfunction especially facial disfigurement which may adversely affect the patients' ability to undertake daily activities and lower their mood and self-esteem leading to overall poor health-related quality of life. Focusing on these psychosocial factors, this chapter also elaborated on the immediate and long term effects of these factors if not incorporated into patient's care. In a study of 80 maxillofacial injured patients' in Sub-Saharan Africa using hospital anxiety and depression scale (HADS) questionnaire, the HADS detected 42 (52.5%) cases of depression and 56 (70.0%) cases of anxiety at baseline. Rosenberg's self-esteem questionnaire detected 33 (41.3%) patients with low self-esteem at baseline. WHO HRQoL-Bref questionnaire showed poor Quality of life in all the domains of the instrument with lowest in the physical and psychological domains. Similarly, the trauma screening questionnaire (TSQ) for PTSD detected 19 patients had symptoms of PTSD at Time 1 with a prevalence rate of 25%.

**Keywords:** anxiety, depression, injury, maxillofacial, self-esteem, quality of life, post-traumatic stress disorder

## 1. Introduction

Following maxillofacial trauma, the psychosomatic requirements of patients are distinctive and very important. Studies have shown that individuals with maxillofacial trauma often presents with signs of depression/sadness, worry/anxiety and aggression/hostility over 1 year period after such traumatic conditions as compared to equaled control group [1]. Similarly, several authors have documented that 10–70% of maxillofacial trauma patients showed signs of sadness and worry [1]. Often, these patients have other psychosocial troubles such as joblessness, illiteracy and poor societal support [2]. Many times these symptoms are sub-threshold and might not meet the diagnostic benchmarks for a psychiatric

condition. Subsequently, these subthreshold symptoms often lead to problem-solving dilemmas, deprived management of the condition and poor interventions. Other symptoms that may complicate the dilemma include normative reactions to sadness, anguish over the losses in such trauma, complications from medications and exhaustion from treatment.

Depression puts the individual at more danger of suicidal tendencies, reduced treatment compliance, and poor convalescence aftermath. In such cases, quality of life and recovery from the maxillofacial trauma are often compromised [3, 4].

### **1.1 Psychosocial morbidity of patients with facial trauma**

Although maxillofacial fractures are one of the more common types of injuries, studies frequently publish epidemiology of maxillofacial injuries and management protocol. Such studies only from surgical management tend to disregard salient symptoms that can impact health aftermaths.

Throughout the preceding decade, the efforts of some investigators [5–7] have increasingly sensitized the surgical community to the hidden social and psychological factors that adversely influence treatment response and increase the risk of re-injury. Through the efforts of these investigators, maxillofacial injuries are now seen and managed both surgically and psychologically [8]. Although, efficient surgical repair is a critical aspect of recuperation, meeting the psycho-social needs that may put them at specific risk for poor psychological adjustment is equally important after the traumatic incident.

When these emotional and behavioral disorders, including depression and antisocial behavior remains untreated, it leads to deprived social performance, job-related fiasco, drug and substance abuse that upsurges the peril of violence and re-injury [5]. Based on these facts, the current mode of management should be a multidisciplinary approach wherein surgeons and other specialists (psychologists, psychotherapists and psychiatrists) will formulate a treatment plan that would address the surgical and psychosocial needs following maxillofacial trauma [5, 9].

#### *1.1.1 Depression and anxiety*

Depression and anxiety related with maxillofacial injuries are often linked with concerns regarding recovery and stretch of the treatment course [10]. Disfigurement often associated with maxillofacial trauma also affects the social image of the individual with such injuries [11]. Social withdrawal and isolation is major sequelae that may ensue following the facial disfigurement with feeling inferior and social stigmatization [12, 13]. Many times recovery from maxillofacial injuries is often protracted with multiple surgeries and complex postoperative management to restore function. This protracted course may add to patient's frustration [14].

Injuries to vital regions of the face such as the eyes, ears, and dental hard tissue injuries often increase exposure to stress and hinder recovery [15]. Substantial difficulties in returning to premorbid levels of work-related functioning have also been noted in these cases [16]. Maxillofacial trauma patients also report higher rates of somatoform symptoms, drug abuse, PTSD symptoms, body aura issues, stigmatization, lesser quality of life, and lower overall contentment with life [17]. Also, maxillofacial trauma patients report snags in marital, work-related, and social functioning [18, 19].

#### *1.1.2 Self-esteem*

In psychology, self-esteem is a term used to echo a person's overall emotional evaluation of his or her own worth. Self-esteem is the level, to which one

respects, values, accepts, admires, and likes oneself [20]. During the mid-1960s, Rosenberg, a social learning theorist, defined self-esteem as a personal worth or worthiness [20].

The significance of self-esteem lies in the fact that it concerns one's self, the way we are and the sense of our personal worth. Thus, self-esteem affects the way we are, the way we act in the world, and the way we relate with everyone else [21]. Furthermore, the way individuals reflect, feels, decides, and act is swayed by self-esteem. Low self-esteem is having a generally damaging overall outlook of oneself, judging or evaluating oneself negatively, and placing a general deleterious value on oneself as a person [21]. Low self-esteem can also have an impact on many aspects of a person's life. It can affect a person's functioning at work or at school. People with low self-esteem might not participate in many relaxation or entertaining activities, as they might believe that they do not justify any pleasure or fun [21]. Individual self-care could also be affected and might drink alcohol heavily and also abuse drugs and substances [21].

### *1.1.3 Health-related quality of life (HRQoL)*

In everyday life, facial appearance plays an important function and roles. The appearance and "attractiveness" of an individual to one another is partially contributed by the person's face [22]. Following maxillofacial trauma, the individual may suffer facial defacement, chronic facial pain, anosmia, dysosmia, speech, dental, and ocular infirmities. Often times, concern is dedicated on the apparent physical aspect of maxillofacial trauma while the impact on the patient's psychological makeup and quality of life (QoL) is relegated to the background or even ignored. Most of the studies on psychological consequences and QoL in patients following maxillofacial injuries have been conducted in Western countries. Such studies in Sub-Saharan Africa and Middle East are rare [23].

### *1.1.4 Post-traumatic stress disorder*

Other interesting and possible sequelae of trauma are post-traumatic stress disorder (PTSD). This disorder starts with an initial event of the trauma, which causes the person to feel intense fear, helplessness, and horror. The event is re-experienced either during the daytime in the form of distressing flashbacks or at night as terrifying dreams. This again causes fear, dread and a heightened state of psychological arousal in which patient tends to restrict activities and constrict thoughts and emotions in an effort to avoid re-experiencing the trauma. This disorder significantly distresses the individual and is highly associated with marital, occupational, financial and health problems [24–27]. Several investigators have reported PTSD rates of between 27 and 41% after maxillofacial injuries majorly caused by assault and interpersonal violence [1, 28], however, a preliminary Nigerian study reported a rate of 17.4% after maxillofacial trauma majorly caused by motorcycle accidents [23].

## **1.2 Psychological philosophies for the maxillofacial surgeon**

When managing patients with maxillofacial injuries, the psychosocial aspect of the management must follow some general principles and must be kept in mind during reconstructive surgeries [29]. All efforts must be geared toward creating some realistic expectations for both patients and their families regarding surgical upshot. The duration to complete reconstruction, possible total number of surgeries, and degree of life disruptions and pain that may likely occur should be clearly

explained to both patients and relatives [29]. One of the most significant roles that the handling surgeon can make is to take time to thoroughly listen to the victims and relatives' unique worries concerning the surgery, its sequel, and their capability living with defacement [30].

While many surgical team will satisfactorily respond to the psychological wants of their patients, many will require little additional psychosocial care like creating extra time, devotion and encouragement [31]. However, if the surgical team felt the patient and family may be assisted further by interrelating with psychiatrist or psychologists, such consultation should be expedited immediately by the surgical team.

Over the years, there has been some advancement made in focusing on the specific psychosocial worries of persons with maxillofacial disfigurement, including addressing the need for social skills improvement. Application of cognitive-behavioral forms which have been proven to very valuable will assist patients to cope with persistent negative social response following disfigurement from trauma. Furthermore, developing and spreading effective psycho-educational materials will also address specific concerns for those living with facial disfigurement [32].

## **2. Investigation of psychosocial and health-related quality of life after maxillofacial trauma**

The authors carried out a research to investigate the psychological and health-related quality of life among maxillofacial injured patients in Sub-Saharan Africa (Nigeria). This was a prospective repeated measure designed to evaluate psychological characteristics and health-related quality of life in subjects with maxillofacial trauma who presented at the Oral/Maxillofacial Surgery Unit or Accident & Emergency Unit, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria.

### **2.1 Methodology**

The study population was consecutive subjects with maxillofacial injuries attending the Accident and Emergency Unit or Oral/Maxillofacial Surgery Unit of the Obafemi Awolowo University Teaching Hospital Complex Ile-Ife Nigeria. Participants were recruited over a period of 12 months after approval from the hospital's Ethics and Research Committee. Adult subjects above 18 years irrespective of sex, race and type of injury were recruited after informed consent for the study was given. Additionally, they satisfied all the specified inclusion criteria. Head injured patients were excluded. Baseline interview was conducted within 1 week of arrival in the hospital (Time 1). Follow-up interviews were conducted at intervals of 4–8 weeks after initial contact (Time 2) and 10–12 weeks thereafter (Time 3).

### **2.2 Instruments for data collection**

#### *2.2.1 Demographics and clinical data collection*

Data such as age, sex, level of education, occupation, and marital status was stored with questionnaire specially designed for such. The clinical data retrieved included cause of injury, location of injury, category of injury, and whether treatment was open reduction with internal fixation or closed reduction. Information about use of alcohol, drugs and other psychoactive substances were also obtained and recorded.

### 2.2.2 Hospital anxiety and depression scale (HADS)

This is a 14-item self-reporting tool with anxiety and depression subscales [33]. Each detail is rated on a four-point gradation, with each subscale having a range of 0–21. The HADS data collection instrument has been authorized in Nigerian hospitals and community samples [34]. The endorsed cut-off mark of seven for this region was adopted for this study [34].

### 2.2.3 Rosenbergs self-esteem questionnaire

This is a screening instrument for self-esteem [20]. The scale is a 10 item statement. Retrieved scores were calculated as follows:

- For questions 1, 2, 4, 6 and 7: They are rated as follows: strongly agree = 3, agree = 2, disagree = 1, strongly disagree = 0.
- For items 3, 5, 8, 9 and 10 (which are upturned in valence): They are rated as follows: strongly agree = 0, agree = 1, disagree = 2, strongly disagree = 3.

The scale ranged from 0 to 30. Marks between 15 and 25 are within normal range while marks below 15 insinuate low self-esteem. The Rosenberg self-esteem scale has been used in earlier research in Nigeria [35].

### 2.2.4 Quality of life (QoL)

World Health Organization QoL assessment instrument 26-item (WHO QoL-Bref) was used in assessing the QoL of individuals with maxillofacial injuries. This brief version QoL is a generic measure designed for use within a broad range of psychological and physical disorders [36]. It is a multidimensional tool, and was established for cross-cultural use; it assesses personal QoL. It comprises 26 queries and uses a five-point interval Likert response scale. For our study, the four domain model was applied. The four domains are those of physical health, psychological health, social relationships, and environment. Scores for domains were transformed on a scale of 4–20, with 20 being the highest and four being the lowest (see **Table 1** for steps in checking, cleaning data and computing domain scores for WHO QoL-Bref and also manual for converting raw scores to transformed scores). Scores were scaled in a positive direction. Higher scores denote high QoL and low scores shows low QoL. The WHO QoL-Bref has been widely used in Nigeria [37].

### 2.2.5 Post-traumatic stress disorder (PTSD)

The Trauma Screening Questionnaire [38] (TSQ) is a brief 10-item self-report measure devised to screen for posttraumatic stress disorder (PTSD). Each item is copied from the DSM-IV [25] criteria and describes either a re-experiencing symptom of PTSD (items 1–5) or a provocation symptom of PTSD (items 6–10). Evading and numbing symptoms, though also listed in the DSM-IV criteria, were not included in the TSQ in keeping with the authors' goal of creating a useful screening tool that was "short and contained the least amount of items essential for precise case identification" [38]. The TSQ has been able to predict excellent levels of PTSD following preliminary psychometric data [38] from two samples (rail crash survivors and crime victims). The principal author states that "what the TSQ gains in simplicity and clarity more than compensates for the absence of symptoms that may be difficult to understand and judgments that may be difficult to make" [39]. The authors have

DOMAIN 1			DOMAIN 2			DOMAIN 3			DOMAIN 4		
Raw Score	Trasnformed scores		Raw score	Trasnformed scores		Raw score	Transformed scores		Raw score	Transformed scores	
	4-20	0-100		4-20	0-100		4-20	0-100		4-20	0-100
7	4	0	6	4	0	3	4	0	8	4	0
8	5	6	7	5	6	4	5	6	9	5	6
9	5	6	8	5	6	5	7	19	10	5	6
10	6	13	9	6	13	6	8	25	11	6	13
11	6	13	10	7	19	7	9	31	12	6	13
12	7	19	11	7	19	8	11	44	13	7	19
13	7	19	12	8	25	9	12	50	14	7	19
14	8	25	13	9	31	10	13	56	15	8	25
15	9	31	14	9	31	11	15	69	16	8	25
16	9	31	15	10	38	12	16	75	17	9	31
17	10	38	16	11	44	13	17	81	18	9	31
18	10	38	17	11	44	14	19	94	19	10	38
19	11	44	18	12	50	15	20	100	20	10	38
20	11	44	19	13	56				21	11	44
21	12	50	20	13	56				22	11	44
22	13	56	21	14	63				23	12	50
23	13	56	22	15	69				24	12	50
24	14	63	23	15	69				25	13	56
25	14	63	24	16	75				26	13	56
26	15	69	25	17	81				27	14	63
27	15	69	26	17	81				28	14	63
28	16	75	27	18	88				29	15	69
29	17	81	28	19	94				30	15	69
30	17	81	29	19	94				31	16	75
31	18	88	30	20	100				32	16	75
32	18	88							33	17	81
33	19	94							34	17	81
34	19	94							35	18	88
35	20	100							36	18	88
									37	19	94
									38	19	94
									39	20	100
									40	20	100

**Table 1.**  
Manual for converting raw scores to transformed scores.

suggested administering the TSQ at least 3 weeks after the traumatic event “to allow for natural recovery processes.” An ideal cut-off point was found to be a YES response to *at least* six re-experiencing or arousal symptom items, in any combination.

### 2.2.6 Statistical analysis

Data was analyzed with SPSS version 16 (SPSS 16 Inc., Chicago, IL, USA). Results were calculated as frequencies (%), means and standard deviations (SD) for normally distributed variables.

### 3. Results presentation

#### 3.1 Socio-demographics

The study population consisted of 80 participants. There were 64 (80.0%) males and 16 (20.0%) females. The mean age of the sample was  $33.2 \pm 12.5$ , range 18–70 years. Road traffic accidents were responsible for a sizeable proportion of injuries in the facial injured (68 (85%)). The socio-demographic characteristics of the study population are shown in **Tables 2** and **3**. Only 21 patients were admitted and most of them were discharged home within 1 week of hospital stay (16 (76.2%)) as shown in **Table 4**.

	Facial injury (%)
<b>Sex</b>	
Male	64 (80.0)
Female	16 (20.0)
<b>Age</b>	
Young adult (18–35)	60 (75.0)
Middle age (36–44)	10 (12.5)
Elderly (45–70)	10 (12.5)
<b>Marital status</b>	
Married	47 (58.8)
Single	33 (41.2)
Divorced	0 (0.0)
<b>Education</b>	
No education	2 (2.5)
Primary	13 (16.2)
Secondary	41 (51.3)
Tertiary	24 (30)
<b>Occupation</b>	
Unemployed	21 (26.3)
Unskilled	30 (37.5)
Skilled	14 (17.5)
Professional	12 (15.0)
#Others	3 (3.7)
<b>Type of house</b>	
Personal	15 (18.8)
Rented	64 (80.0)
No house	1 (1.2)
<b>Admission</b>	
Yes	21 (26.3)
No	59 (73.7)
#Voluntary workers.	

**Table 2.**  
 Socio-demographic characteristics.

	Facial injury (%)
<b>Complex PTSD</b>	
Assault	6 (7.5)
Road traffic accident	68 (85.0)
Others (fall and occupational injury)	6 (7.5)
<b>Type of RTA</b>	
Motorcycle	52 (76.6)
Car	9 (13.2)
Truck	1 (1.4)
Bus	6 (8.8)
Combined	0 (0.0)
<b>Road location</b>	
Intercity	26 (37.7)
Intracity	43 (62.3)
<b>Status of patient</b>	
Driver	43 (64.2)
Passenger	24 (35.8)
Pedestrian	0 (0.0)
<b>Vehicle factor</b>	
Burst tyre	9 (25.0)
Failed brakes	0 (0.0)
Unknown	27 (75.0)
<b>Driver factor</b>	
Over speeding	30 (68.2)
Drunk	2 (4.5)
Slept off	0 (0.0)
Unknown	12 (27.3)

**Table 3.**  
*Sociodemographic characteristics (continued).*

Duration of hospital stay (week)	Facial injury (n = 21) (%)
<1	16 (76.2)
4–8	5 (23.8)
10–12	—
>12	—
Total	21 (100)

**Table 4.**  
*Distribution of duration of hospital stay and injury.*

Mandibular fracture was the most frequently fractured facial bone ( $n = 46$ ) followed by mandible + maxillary fracture ( $n = 14$ ). The distribution of these is shown in **Table 5** and **Figure 1**. Fifty-two (65%) of the facial injured patients had soft tissue injuries in addition to their facial bone fractures.

Sixty-seven subjects (83.8%) were managed with closed reduction of the fractured bone, 13 (16.2%) were treated with open reduction and rigid internal fixation (**Table 6**).

### 3.2 Anxiety and depression

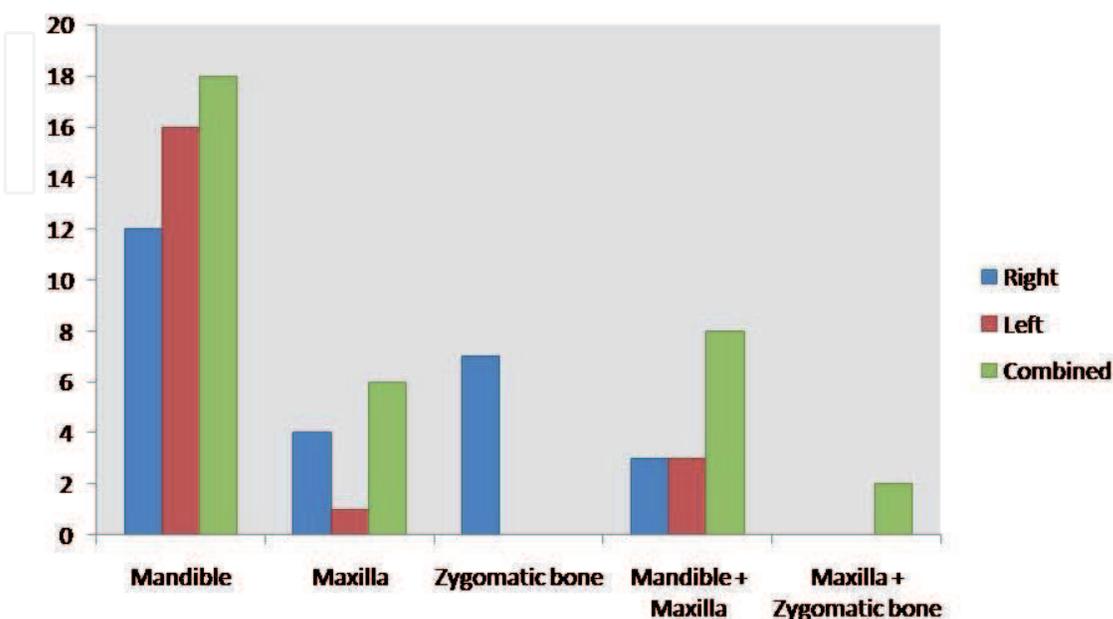
#### 3.2.1 Anxiety

The Hospital anxiety and Depression scale (HADS) detected 56 (70.0%) had anxiety at baseline, 32 (42.1%) at Time 2 and only 9 (11.8%) had anxiety at Time 3. There was reduction in anxiety levels with time with only 9 (11.8%) having anxiety after 10–12 weeks post trauma (**Table 7**).

Type	Right (%)	Left (%)	#Combined (%)	Total (%)
Mandible	12 (26.1)	16 (34.8)	18 (39.1)	46 (100)
Maxilla	4 (36.4)	1 (9.1)	6 (54.5)	11 (100)
Zygomatic bone	7 (100)	0	0	7 (100)
Mandible + maxilla	3 (21.4)	3 (21.4)	8 (57.2)	14 (100)
Maxilla + zygomatic	0	0	2 (100)	2 (100)
Total				80 (100)

#Combined (both right and left).

**Table 5.**  
 Distribution of facial bone fracture.



**Figure 1.**  
 Bar chart showing distribution of maxillofacial bone fractures.

Type of treatment	Facial injury (%)
Closed reduction	67 (83.8)
Open reduction	13 (16.2)
Total	80 (100)

**Table 6.**  
Distribution of types of treatment received by the facial fracture.

Time	Facial injury
Time 1 (within 1 week of injury)	(n = 80)
	10.8 (3.3)
	56 (70.0%) <sup>#</sup>
Time 2 (4–8 weeks)	(n = 76)
	6.5 (3.2)
	32 (42.1%) <sup>#</sup>
Time 3 (10–12 weeks)	(n = 76)
	3.9 (3.1)
	9 (11.8%) <sup>#</sup>

<sup>#</sup>Proportion of subjects with high anxiety scores.

**Table 7.**  
Change in mean HADS anxiety scores ( $M \pm SD$ ) with time.

### 3.2.2 Depression

The Hospital anxiety and Depression scale (HADS) detected 42 (52.5%) cases of depression at baseline, 36 (47.4%) cases at Time 2 and 14 (18.4%) cases at Time 3 (These are subjects that scored above the cut-off point of 7 on the Depression scale of the HADS). There was reduction in depression levels with time (**Table 8**).

### 3.3 Self-esteem

Thirty-three (41.3%) participants in the facial injured subjects scored between 0 and 14 at Time 1. At Time 2, 39 (51.3%) subjects scored between 0 and 14, while at Time 3, 7 (9.2%) scored between 0 and 14. Subjects with facial injuries consistently had lower self-esteem (**Table 9**).

### 3.4 Health-related quality of life (HRQoL)

Throughout the review periods, the psychological domains of the WHO QoL-Bref were constantly lower than other domains. This was followed closely by the social relationship domain at Time 1 review period (**Table 10**).

### 3.5 Post-traumatic stress disorder (PTSD)

The PTSD was evaluated only at Times 2 and 3 consistent with the commencement of evaluation after 3 weeks of injury. Seventy-six patients were screened out of the 80 participants at Times 1 and 2. Nineteen patients had symptoms of PTSD at Time 1 and 20 patients at Time 2 with a prevalence rates of 25.0 and 26.3% respectively (**Figure 2**).

Time	Facial injury
Time 1 (within 1 week of injury)	(n = 80)
	8.4 (3.4)
	42 (52.5%) <sup>#</sup>
Time 2 (4–8 weeks)	(n = 76)
	7.4 (2.5)
	36 (47.4%) <sup>#</sup>
Time 3 (10–12 weeks)	(n = 76)
	6.4 (1.7)
	14 (18.4%) <sup>#</sup>

<sup>#</sup>Proportion of subjects with high depression score.

**Table 8.**  
 Change in mean HADS depression scores ( $M \pm SD$ ) with time.

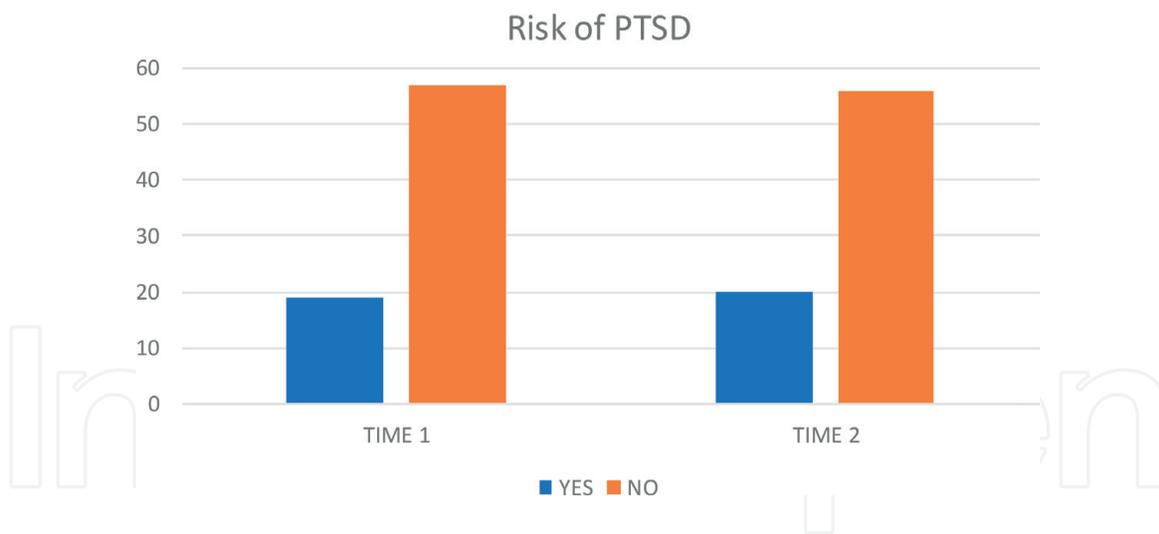
Time	Facial injury
Time 1 (within 1 week of injury)	(n = 80)
<sup>#</sup> Score 0–14	33 (41.3%)
<sup>¶</sup> Score 15–30	47 (58.7%)
Time 2 (4–8 weeks)	(n = 76)
<sup>#</sup> Score 0–14	39 (51.3%)
<sup>¶</sup> Score 15–30	37 (48.7%)
Time 3 (10–12 weeks)	(n = 76)
<sup>#</sup> Score 0–14	7 (9.2%)
<sup>¶</sup> Score 15–30	69 (90.8%)

<sup>#</sup>Low self-esteem.  
<sup>¶</sup>Normal self-esteem.

**Table 9.**  
 Changes in proportion of subjects with low and normal self-esteem with time.

Domains at Times 1, 2, and 3	Facial injury
<b>Time 1 (1 week or less)</b>	
Physical health	11.0 ( $\pm 1.8$ )
Psychological health	9.3 ( $\pm 1.8$ )
Social relationship	10.5 ( $\pm 2.6$ )
Environment	11.4 ( $\pm 2.3$ )
<b>At Time 2 (4–8 weeks)</b>	
Physical health	12.5 ( $\pm 1.5$ )
Psychological health	11.4 ( $\pm 1.8$ )
Social relationship	13.1 ( $\pm 2.5$ )
Environment	12.9 ( $\pm 1.6$ )
<b>At Time 3 (10–12 weeks)</b>	
Physical health	13.5 ( $\pm 1.3$ )
Psychological health	12.9 ( $\pm 1.8$ )
Social relationship	15.8 ( $\pm 6.7$ )
Environment	14.3 ( $\pm 2.5$ )

**Table 10.**  
 Change in mean WHO (HRQoL-Bref) score according to domains at Times 1, 2, and 3.



**Figure 2.**

Bar chart showing distribution of number of maxillofacial injured having potential for post-traumatic stress disorder (PTSD) at Times 1 and 2.

## 4. Discussion

### 4.1 Socio-demographics

The management of maxillofacial is largely driven by the obvious clinical manifestations of the physical injury, while the less evident psychosocial sequelae are rarely considered [40]. Documented possible symptoms of these psychological sequelae following facial trauma include increase in levels of depression, anxiety, phobic anxiety, and obsessive compulsive tendencies [40]. The appearance and “attractiveness” of a person to other people is partly contributed by the person’s face. As a result of maxillofacial trauma, the patient may suffer facial disfigurement.

Previous reports [23, 41–43] have supported these new findings where 84% of injuries resulted from road traffic accidents. Road traffic accident continue to account for the most common reason of maxillofacial injury because of insufficient vehicular maintenance, lack of traffic laws enforcement, and poor levels of educational status of drivers [44]. In United Kingdom, United States of America and other parts of the world, the mandatory uses of seat belts, crash helmets, traffic law enforcement, and increase in use of vehicles with airbags have reduced the incidence of maxillofacial injuries due to road traffic accident [45, 46].

Majority of the road traffic accident were motorcycle related, 76.6% in facial injured subjects. This is because motorcycle is still a major means of transportation in Sub-Saharan Africa and riders do not often wear protective helmets making them more prone to head and facial injuries. Frequent traffic congestion because of poor road maintenance/network has made this mode of transportation attractive in most communities because motorcycles can navigate through narrow ways [44]. Whereas motorcycle-related facial trauma has been on the increase in Nigeria, a study in Europe however showed a decline in the incidence of such injuries in motorcycle-related accident [47]. Enforcement and use of appropriate crash helmets, increasing vehicle ownership due to increase in wealth were the reasons given for this decrease.

Assault-related maxillofacial injuries remain the main cause of maxillofacial trauma in industrialized nations [28, 48, 49]. This was not observed in this study as assault accounted for only 6 (7.5%) cases of facial trauma.

The present study recorded male preponderance. The reason for this observation is that motorcycle operators were predominantly males [34]. This pattern is in agreement with previous findings where male preponderance was reported [42, 43, 48].

The overall mean age for the study population was 33.2 (SD ± 12.5) years. This finding is also in agreement with previous studies where young adults are frequently involved in road traffic accidents [43, 50]. This age group is the period of high activity and individuals in this age group are more likely to take part in dangerous and risky exercises and sports, drive motor vehicle and motorcycles carelessly and are likely to be involved in violence [51]. More than half of the subjects who sustained injuries were either unemployed or involved in unskilled jobs. These findings echoed previous findings that patients with maxillofacial injuries have psychosocial problems like anxiety and depression, low self-esteem, unemployment, lower educational level and poor social support [2].

#### **4.2 Anxiety and depression**

The maxillofacial injured subjects were anxious from this study. This is comparable to previous reports of high rate of psychosocial complication following maxillofacial trauma [1, 28]. This present findings contrast those of previous study in south west Nigeria [23] where researchers stated that 11.8% of individuals sustaining maxillofacial injuries faced extreme anxiety levels immediately after injury, 3.0% during 4–8 weeks and 13.0% at 10–12 weeks follow-up times. While both studies were carried out in a comparable setting, the reason for the disparity could not be described; however, the authors opined that higher attrition rate in the earlier study might be responsible.

This study has shown high levels of depression in maxillofacial injured subjects. The findings are similar to those of previous researches investigating psychosocial complications of traumatic injury [1, 23, 28, 52]. A comparable finding in an erstwhile Nigerian study stated that 41.2% of patients had depression at Time 1 (within 10 days of injury), 47.1% at Time 2 (6–8 weeks after injury), and 21.7% at Time 3 (10–12 weeks after injury) [23]. This similarity was because both studies were carried out in similar study population and environment. The etiology of injury was also similar. Higher proportion of maxillofacial facial injured patients were depressed at Times 2 and 3 (47.4 and 18.4%, respectively) from previous study. This pattern is possibly as 52 (65%) patients of the maxillofacial injured sustained concomitant maxillofacial soft tissue wounds with the additional enduring scarring that could not be masked. This long-lasting scarring may alter their form and personality leading to social retraction and loss of self-esteem [16]. In addition, disfiguring might be the etiology of constant depression and be a continuous reminder of the mishap or act of violence where the injury occurred [53]. Though, the anxiety and depression levels were decreasing over the review times, it did not totally cease. Lento et al. [40] have described comparable outcomes whereby notwithstanding the decline in signs of psychological grief over time, additional psychological snags were still reported in injured group than the comparison cohort.

Other reports [40, 54] have opined that post-traumatic symptomatology may be an extension of earlier psychosocial problems and these individuals may be inadequately equipped psychologically to endure the pressures of the injury and recovery. Prior psychological status of persons in the third world nations is not a usual practice, therefore background psychological position of our patients were unavailable.

Extensive literature search yielded only two published data on risks of anxiety and depression following maxillofacial trauma from Sub-Saharan Africa [23, 55]. Additionally, our outcomes reverberated the need for reconstructive surgeons and other healthcare professionals to identify these psychosocial agonies together with the physical injuries sustained by these patients. Also, trauma care givers must be informed and trained in offering brief psychologic evaluations.

### **4.3 Self-esteem**

The human face is the central point of identity of a person, and the existence of scar may alter a person's identity, which could lead to seclusion and loss of self-esteem. Additionally, when such injuries affect functions like speech and feeding, a maxillofacial injured subject may develop psychosocial problems [15, 56, 57]. Studies has also acknowledged the fact that nice-looking persons are more likely to have better self-esteem, accomplish higher levels of educational and job-related satisfaction, have more satisfying sexual encounters, and will generally have a better quality of life [58]. Consequently, it is rational to resolve that living with a maxillofacial defacement puts the person at an increased peril of undergoing a drastically reduced low quality of life and low self-esteem [2].

Psychological interventions are needed in the near aftermath of trauma in maxillofacial injured, as esteem needs of victims are frequently compromised. In this study, patients who screened positive for low self-esteem were referred to the psychiatry unit of the hospital for further follow-up. The strongest deficits in self-esteem were seen in the 1st week after injury and again from 6 to 8 weeks during recovery. This showed that maxillofacial injured consistently had low self-esteem throughout the review periods [59].

### **4.4 Health-related quality of life**

Lower HRQoL after physical trauma has been reported in other studies [60]. In addition, it is probable that the physical dysfunction caused by these injuries may adversely affect the patients' ability to undertake their daily activities like tooth brushing, eating which will lower their mood and sense of self-esteem [60]. From the study, it will be observed that throughout the review periods, the psychological domains of the WHO QoL-Bref were constantly lower than other domains. This shows that maxillofacial injured are psychologically affected apart from the physical injuries they sustained. Similarly, the social relationship domain at Time 1 review period was also lower than other domains. Social relationships after maxillofacial injuries was also affected whereby patient may abstain from social interactions due to presence of scars on the face or inability to speak especially following inter-maxillary fixation [61].

### **4.5 Post-traumatic stress disorder (PTSD)**

Maxillofacial trauma may occur in life-threatening situations and as a result of accidents or industrial mishaps [62]. This may often herald the onset of PTSD. The principal symptoms of PTSD comprise (i) re-experiencing of the incidence (e.g., having unpleasant and upsetting thoughts and/or distressing images and dreams); (ii) evasion of thoughts, emotions or situations linked to the incidence; and (iii) autonomic nervous system hyperarousal, including struggles with sleeping, having an exaggerated disconcert response and undergoing increased irritability and nervousness [63].

From the current study, 19 patients had symptoms of PTSD at Time 1 and 20 patients at Time 2 with a prevalence rates of 25.0% and 26.3% respectively. This shows that in African population, there is high risk of patients with maxillofacial injuries to developing PTSD. A previous preliminary Nigerian study have reported a rate of 17.4% after maxillofacial trauma majorly caused by motorcycle accidents [23]. The current study showed a higher prevalence rate probably due to lower attrition rate as compared to previous study which reported a high attrition rate.

Studies have shown that there is the proof of PTSD signs and symptoms in adult acquired maxillofacial trauma patients [1, 28]. Similarly, it is likely that a significant lot of patients might experience sub-clinical forms of PTSD (i.e., not meeting the full diagnostic benchmarks) that can greatly affect quality of life [64]. Patients with maxillofacial injuries who recounted PTSD symptoms were more likely to also report pre-injury psychological troubles, amplified levels of stress and deprived social support [65].

Furthermore, such patients are also likely to be elder female that experience more injury-related pain [66]. Identification of PTSD signs and symptoms can lead to additional exploration and uncovering of earlier unrecognized psychological symptoms like depression and anxiety disorders [67].

## **5. Clinical implications of psychological disorders in the injured patient**

Injured patients are typically unemployed, socially disadvantaged, mostly males from their mid-twenties to their mid-thirties [48]. They had likely been exposed to prior traumatic events, though they typically did not currently have PTSD from these events at the time of the orofacial injury [48].

With the astronomical rates of unidentified and untreated psychosocial problems in patients suffering from maxillofacial trauma, using the emergency care as a chance to screen for psychosocial troubles will likely increase the discovery of more patients with behavioral disorders that might have precipitated the injury and interfere with a complete recovery. Evidence has shown that psychological assessment of trauma patients followed by referral to mental health services for those identified may result in better aftermath.

Since the acute trauma is frequently the only contact the patients who are healthy young adults have with the hospital, this hospital visit, may offer chances to ascertain psychosocial hitches such as alcohol, drug and substance abuse that may lead to subsequent re-injury and poor treatment outcome. While a substantial subgroup of maxillofacial injuries are associated with alcohol and substance abuse [68], there is potential for integrating brief screening and behavioral interventions into the care of these folks.

Physical scarring and psychological wounds may develop over time, and even become chronic [63]. It is likely that these negative sequelae are going to be even more prevalent in persons who already are experiencing difficulties with substance use, anxiety, depression, hostility, small social networks, limited social support and financial resources, and unmet social service need when they are injured. While surgical treatment may repair the broken bones, many of these patients remain to be at danger for re-injury or deprived psychological outcomes because they may lack the social and personal resources required to make the sustained positive behavior changes. A standard of widespread participation created on the ethics of collective care, wherein medical practitioners from multiple disciplines work together to develop and implement an integrated treatment plan to address the concurrent social and psychologic needs of maxillofacial injury patients is very essential and long overdue [69].

## **6. Conclusion**

Road traffic accident remained the main cause of injury of subject and majorities were males. Most of the patients were young adults. There were significant differences in depression and anxiety level in the maxillofacial injured subjects at baseline

(Time 1), Time 2 (4–8 weeks) and Time 3 (10–12 weeks) with the recording of higher levels of depression and anxiety. Similarly, lower self-esteem was observed subjects at Time 1 (within 1 week), Time 2 (4–8 weeks) and Time 3 (10–12) weeks post injury. The psychological domains of the WHO QoL-Bref was constantly lower than other domains. This shows that maxillofacial injured are psychologically affected apart from the physical injuries they sustained.

## **7. Recommendations**

1. In addition to providing surgical care, the team must be able to address social needs (homelessness, joblessness) and psychological needs (PTSD, depression, anxiety, and substance use).
2. Innovative cost-effective programs which can integrate medical and psychological care are especially necessary in hospitals taking care of trauma patients.
3. Interventions like motivational interviewing which is a brief form of counseling created to assist patients gather personal resources to promote positive behavior change. This can be presented to patients within days of maxillofacial injury and principally important in refining long-term outcomes.
4. Educating surgeons on behavioral issues and offering easily assessable guides for swift screening of psychosocial problems is essential.
5. Developing collaborative bonds with mental health professionals and social health workers are critical first steps regarding incorporating mental health assistances into the full care of maxillofacial injured patients.
6. Studies on psychological aspect of maxillofacial trauma in other continents like Middle East, Asia and African nations should be encouraged for data comparison.

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## **Conflict of interest**

The authors declare no conflict of interest.

## **Notes**

I want to dedicate this work to the following:

To Almighty God, the Beneficent and most Merciful.

To my wife, Engr. (Dr) Mrs. Maryam Niyilola Braimah for her unflinching support and encouragement at all times and my children, Aishah, Aliyah, and Amilah.

And finally to my parents, in-laws, and siblings.

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