

Assessment of Health-Related Quality of Life and Socio-Demographic Determinants Associated with Orthopaedic Trauma Patients

Daifallah Alharbi^{1*}

1 Department of Orthopedics, College of Medicine, Majmaah University, Al Majmaah 11952, Saudi Arabia;

*Correspondence: Dr Daifallah Alharbi, Assistant Professor, Department of Orthopedics, College of Medicine, Majmaah University, Al Majmaah 11952, Saudi Arabia;

d.alharbi@mu.edu.sa

ABSTRACT:

Background: In Kingdom of Saudi Arabia, preventable injuries are the second leading cause of death, accounting for about a fifth of all reported fatalities in the country. During the last decade, the importance of health-related quality of life (HRQOL) has been recognized as a principal outcome of these traumatic injuries. Hence this study is being carried out to assess the outcome and to determine the factors associated with it. **Methodology:** All the Patients attending orthopaedic department of King Khalid General hospital, Al Majmaah with history of trauma in the past 2 years were included in the study. After obtaining Verbal consent from the study subjects data was collected by an orthopaedic surgeon. SF-36 questionnaire was used to collect information on Health Related Quality of Life. Qualitative variables are expressed as frequency and percentages and Quantitative variables are expressed as median and range. For comparison between groups Chi-Square test was applied. Significance level is fixed as 5% ($p < 0.05$). **Results:** Total 152 study subjects participated in this study, 135 (88.8%) among them were from Saudi, 93 (61.2%) were, most of them 36 (23.6%) belonged to 11-20 years age group. The median HRQOL score in this study was 59.25(25), it was highest for the domain "pain" [67.5(34)] and "GH" [67.5(65)] when compared to other domains. HRQOL scores were more among those from non-Saudi [54.22(34.17)], for females [56.85(31.87)], for those in the age group between 1-10 years [72.54(26.22)], for those with sprains [61.06(29.65)], for those with sport injuries [63.75(35.14)] and for those in whom duration since injury was 21-24 months [61.67(23)]. **Conclusion:** In this study, SF- 36 served as a simple and an easy tool to assess the health-related quality of life of post orthopaedic trauma patients. All the socio-demographic variables were found to be significantly associated with HRQOL scores.

Keywords: Orthopaedics patients, Trauma, Health related quality of life, Socio-demography.

INTRODUCTION:

Traumatic injuries are a significant threat to public health worldwide.¹ Kingdom of Saudi Arabia (KSA) is among many developing countries that have suffered a major burden of morbidity and mortality due to injuries.² Preventable injuries are the second leading cause of death, accounting for about a fifth of all reported fatalities in the country.³ Because KSA is a relatively young country (40% of the population is 19 years old and younger), injuries can have significant implications on the country's health and prosperity.⁴

During the last decade, the importance of health-related quality of life (HRQOL) has been recognized as a principal outcome of traumatic injuries.⁵ "Quality of life" is subjective and

multidimensional, encompassing positive and negative features of life. WHO defines Quality of Life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concern. It is a broad-ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships, and relationship to salient features of their environment.⁶

Health-Related Quality of Life (HRQOL) represents a biophysical-social orientation toward the concept of health.⁶ Information on HRQOL is usually obtained by generic measures, which can provide operational definitions of several concepts summarized by index value or in a profile of interrelated scores. HRQOL is a broad term covering five categories: duration of life, impairments, functional status, perceptions, and social opportunities.⁷ These are health related to the extent that they are influenced by disease, injury, treatment, or policy.⁸

The concept of health-related quality of life (HRQOL) and its determinants have evolved since the 1980s to encompass those aspects of overall quality of life that can be clearly shown to affect health either physical or mental.⁹

On the individual level, HRQOL includes physical and mental health perceptions (e.g., energy level, mood) and their correlates including health risks and conditions, functional status, social support, and socioeconomic status. At the community level, HRQOL includes community-level resources, conditions, policies, and practices that influence a population's health perceptions and functional status.

On the basis of a synthesis of the scientific literature and advice from its public health partners, Centre for Disease Control has defined HRQOL as "an individual's or group's perceived physical and mental health over time."⁹

Health Related Quality of Life (HRQOL) is now recognized as being an inclusive term that assesses both self-reported mental and physical functioning of an individual. HRQOL is defined as the "physical, psychological and social domains of health, seen as distinct areas that are influenced by a person's experiences, beliefs, expectations and perceptions". An important feature of this construct is that it acknowledges that an individual's personal views, judgments and preferences influence the perception of quality of life. The appraisal or interpretation of having to experience a chronic illness and to live with it impacts the overall adjustment to the illness. The appraisal of illness management and self-care plays an important role in both the actual self-care and quality of life. However, this aspect is often ignored in the overall assessment of health outcome and hence this study is being carried out to assess the outcome and to determine the factors associated with it.¹⁰

OBJECTIVES:

1. To assess the Health-Related Quality of Life among post Orthopaedic trauma patients attending orthopaedic department of a secondary care centre.
2. To assess the socio-demographic determinants of trauma associated with HR-QOL of post Orthopaedic trauma patients.

METHODOLOGY:

SOURCE OF DATA: All the Patients attending orthopaedic department of King Khalid General hospital, Al Majmaah.

- **STUDY DESIGN:** Observational cross-sectional study

- **STUDY DURATION:** 12 months (Feb 2021 to Jan 2022)
- **STUDY AREA:** Al Majmaah province.
- **ESTIMATION OF SAMPLE SIZE:** 250, assuming a moderate of 20% (calculated by $1.96 \times 1.96 \times 4p(1-p)/(d \times d)$)

INCLUSION CRITERIA • Consenting individuals with history of trauma in past 2 years.

EXCLUSION CRITERIA • Non consenting individuals, patients with history of trauma prior to 1 year.

METHOD OF COLLECTION OF DATA: All the Patients attending orthopaedic department of King Khalid General hospital, Al Majmaah with history of trauma in the past 2 years were included in the study. Verbal consent was taken from the study subjects. Immediately after OPD visit, a pre-tested, semi-structured questionnaire was used by the orthopaedic surgeon to collect information on socio-demographic variables and SF-36 questionnaire¹¹ was used to collect information on Health Related Quality of Life. SF 36 questionnaire was translated to Arabic language and was standardized. Patients were given instructions before filling the questionnaire form. Samples were selected by Purposive Sampling technique.

Among 250 patients, 98 patients were excluded because of incomplete data (incomplete filling of SF 36 form) and only 152 Subjects were included in the study further.

Ethical issues: Ethical approval was obtained from central institutional review board ministry of health kingdom of Saudi Arabia, Central IRB log No: 20-100E.

Short Form-36¹¹

The SF-36 is a widely used generic measure of HRQOL. Patients provide Likert-style answers to questions, and a score ranging from 0 to 100 is given for each of the 8 subscales: physical functioning (PF), role limitations due to physical health problems (RP), bodily pain (BP), general health perceptions (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health (MH).

STATISTICAL ANALYSIS:

The data was collected and compiled in Micro Soft Excel. Descriptive statistics has been used to present the data. Qualitative variables are expressed as frequency and percentages and Quantitative variables are expressed as median and range. To analyse the data SPSS (IBM SPSS Statistics for Windows, Version 26.0, Armonk, NY: IBM Corp. Released 2019) is used. For comparison between groups Chi-Square test was applied. Significance level is fixed as 5% ($p < 0.05$).

RESULTS:

Table-1: Distribution of Socio-Demographic profile among the Study subjects (N=152)

Nationality	Frequency	Percentage
Non-Saudi	17	11.2
Saudi	135	88.8
Total	152	100.0
Gender	Frequency	Percentage
Male	59	38.8
Female	93	61.2
Total	152	100.0
Age	Frequency	Percentage

1-10	2	1.4
11-20	36	23.6
21-30	36	23.6
31-40	44	29
41-50	22	14.4
51-60	9	5.9
61-70	3	2.1
Total	152	100.0
Education	Frequency	Percentage
Graduation	63	41.4
High school	43	28.3
Middle school	15	9.9
Post-Graduation	4	2.6
Primary school	27	17.8
Total	152	100.0

Total 152 study subjects participated in this research. Among 152, majority 135 (88.8%) were Saudi, females 93 (61.2%), belonging to age group of 11-20, 21-30 years were 36 (23.6%) each respectively and were graduated 63 (41.4%). Mean age in this study was 32.05±12.803.

Table2: Distribution of Injury among the Study subjects (N=152)

Site of injury	Frequency	Percentage
Lower limb bone	53	34.9
Spine injury	24	15.8
Sprain	33	21.7
Upper limb bone	42	27.6
Total	152	100.0
Mechanism of injury	Frequency	Percentage
Fall down	90	59.2
Road traffic accident	19	12.5
Sports injury	43	28.3
Total	152	100.0
Number of months since injury	Frequency	Percentage
1-4	90	59.2
5-8	20	13.17
9-12	32	21.05
13-16	4	2.63
17-20	3	1.97
21-24	3	1.97
Total	152	100.0

Majority 53 (34.9%) had lower limb injury, for most of the study subjects, 90 (59.2%) mechanism of injury was due to fall down for most of the study subjects, 90 (59.2%) number of months since injury were 1-4.

Table-3: Distribution of median HQOL scores with respect to the Domain

	PF	RL.PH	RL.EP	ENERGY	E.W.B	SF	PAIN	GH
Median	50.0	25.0	66.0	50.0	56.0	62.5	67.5	67.5
Inter Quartile Range	55.0	75.0	100.0	25.0	20.0	35.0	55.0	38.3

HRQOL Score was highest for the domain “pain” and “GH” when compared to other domains and was lowest for RL.PH.

Table-4: Association of HRQOL scores with respect to Socio-Demographic profile of study participants

Variable	PF M(IQR)	P VALUE	RL.PH M(IQR)	P VALUE	RL.EP M(IQR)	P VALUE	ENERGY M(IQR)	P VALUE	E.W.B M(IQR)	P VALUE	SF M(IQR)	P VALUE	PAIN M(IQR)	P VALUE	GH M(IQR)	P VALUE
Nationality																
Non-Saudi	25.0 (100)	0.364	0.0 (100)	0.019*	33.3 (100)	0.492	50.0 (70)	0.737	52.0 (60)	0.513	62.5 (87.5)	0.652	67.5 (77.5)	0.547	60.0 (65)	0.309
Saudi	50.0 (100)		25.0 (100)		66.6 (100)		50.0 (100)		60.0 (88)		62.5 (100)		67.5 (100)		55.0 (100)	
Gender																
Female	50.0 (100)	0.742	25 (100)	0.013*	33.3 (100)	0.005*	50.0 (90)	0.235	52.0 (76)	0.396	62.5 (87.5)	0.744	67.5 (100)	0.355	55.0 (80)	0.335
Male	50.0 (100)		50.0 (100)		100 (100)		55.0 (100.5)		64.0 (88)		62.5 (100)		67.5 (100)		60.0 (100)	
Age																
1-10	75 (50)	0.727	100 (0)	0.034*	66.6 (66.6)	0.022*	62.5 (25)	0.828	64 (32)	0.947	75 (50)	0.250	578.7 (22.5)	0.000	70 (50)	0.862
11-20	50 (100)		25 (100)		100 (100)		55.0 (100)		56 (88)		62.5 (87.5)		60 (100)		60 (95)	
21-30	50 (100)		25 (100)		83. (100)		55.0 (80)		55 (84)		62.5 (100)		60 (100)		60 (65)	
31-40	50 (100)		25 (100)		33.3 (100)		50.0 (75)		55 (84)		62.5 (87.5)		55 (87.5)		55 (85)	
41-50	50 (100)		25 (100)		0.0 (100)		47.5 (65)		52 (56)		50.0 (87.5)		67.5 (80)		50 (80)	
51-60	25 (75)		25 (50)		33.3 (100)		50 (60)		68 (52)		62.5 (87.5)		45 (90)		50 (40)	
61-70	75 (75)		75 (50)		100 (66.6)		70 (40)		52 (36)		100 (50)		70 (45)		60 (10)	
Occupation																
Government	50 (100)	0.078	50 (100)	0.120	33.3 (100)	0.018*	50 (80)	0.553	64 (68)	0.408	62.5 (87.5)	0.242	67.5 (87.5)	0.000*	55 (85)	0.681
Private	25 (100)		25 (100)		50 (100)		50 (80)		56 (80)		62.5 (100)		67.5 (100)		60 (65)	
Retired	100 (0)		100 (0)		100 (0)		75 (0)		48 (0)		100 (0)		70 (0)		60 (0)	
Student	50 (100)		25 (100)		100 (100)		55 (100)		56 (88)		62.5 (87.5)		67.5 (100)		60 (95)	
Unemployed	50 (100)		12.5 (100)		0 (100)		45 (85)		54 (88)		50 (87.5)		45 (100)		50 (80)	
University	25		0.0		83.3		75		88		88		67.5		60	

	(0)		(0)		(33.3)		(20)		(16)		(0)		(20)		(0)	
Education																
Primary School	50.0 (100)	0.228	25.0 (100)	0.705	33.3 (100)	0.159	50.0 (70)	0.832	52.0 (52)	0.696	62.5 (87.5)	0.151	67.5 (100)	0.885	50.0 (65)	0.916
Middle School	50.0 (100)		25.0 (100)		33.3 (100)		45.0 (80)		52.0 (76)		62.5 (62.5)		67.5 (70)		55.0 (40)	
High School	50.0 (100)		25.0 (100)		66.6 (100)		50.0 (95)		60.0 (88)		50.0 (100)		52.5 (100)		50.0 (100)	
Graduation	50.0 (100)		25.0 (100)		66.6 (100)		55.0 (90)		64.0 (75)		62.5 (75)		67.5 (87.5)		60.0 (85)	
Post Graduation	25.0 (100)		0.0 (100)		0.0 (33.3)		50.0 (45)		50.0 (28)		56.2 (87.5)		72.5 (67.5)		52.5 (45)	
Site of Injury																
Lower limb	50.0 (0)	0.539	25.0 (0)	0.146	33.3 (0)	0.001*	50.0 (0)	0.022*	60.0 (0)	0.351	50.0 (0)	0.007*	55.0 (100)	0.012*	50.0 (80)	0.012*
Spine	50.0 (100)		25.0 (75)		16.6 (100)		50.0 (65)		52.0 (68)		56.2 (87.5)		66.25 (100)		52.5 (60)	
Sprain	50.0 (100)		50.0 (100)		100 (100)		55.0 (80)		56.0 (52)		62.5 (87.5)		67.5 (90)		60.0 (85)	
Upper limb	50.0 (100)		25.0 (100)		50.0 (100)		55.0 (90)		60.0 (88)		62.5 (87.5)		67.5 (100)		60.0 (95)	
Mode of Injury																
Fall down	50.0 (100)	0.754	25.0 (100)	0.001*	33.3 (100)	0.033*	50.0 (90)	0.102	52.0 (84)	0.073	62.5 (87.5)	0.044*	67.5 (100)	0.000*	50.0 (80)	0.000*
Road traffic accident	25.0 (100)		0.0 (100)		0.0 (100)		50.0 (90)		56.0 (88)		50.0 (87.5)		67.5 (77.5)		50.0 (80)	
Sports Injury	50.0 (100)		75.0 (100)		100 (100)		55.0 (85)		64.0 (88)		62.5 (100)		65.0 (100)		60.0 (85)	
Number of months since Injury																
1-4	50.0 (100)	0.099	25.0 (100)	0.022*	66.6 (100)	0.051	50.0 (95)	0.837	56.0 (88)	0.991	62.5 (100)	0.133	62.5 (100)	0.949	55.0 (90)	0.970
5-8	50.0 (100)		25.0 (100)		33.3 (100)		50.0 (95)		52.0 (88)		50.0 (87.5)		67.5 (77.5)		50.0 (90)	
9-12	25.0 (100)		0.0 (100)		66.6 (100)		55.0 (70)		66.0 (68)		62.5 (87.5)		72.5 (100)		60.0 (60)	
13-16	75.0 (0)		50.0 (50)		33.3 (33.3)		50.0 (15)		64.0 (12)		62.5 (12.5)		55.0 (32.5)		60.0 (10)	
17-20	50.0 (0)		0 (0)		50.0 (100)		47.5 (5)		56.0 (40)		43.75 (12.5)		22.5 (0)		50.0 (30)	
21-24	62.5 (25)		75.0 (50)		66.6 (66.6)		57.5 (5)		64.0 (8)		68.7 (37.5)		73.5 (32.5)		70.0 (0)	

Median HRQOL scores were more for the subjects from non-Saudi than those from Saudi in the domains PF, RLPH, RLEP, EWB and were similar for the domains Energy, SF and Pain. Overall score for non-Saudi v/s Saudi was 54.22 (34.17) v/s 51.79 (25.89). Overall median HRQOL score was more in males compared to females [56.85(31.87) v/s 44.8(27.33)].

Highest scores were found among graduates [57.12 (38.00)]. High school and middle school students showed similar scores [52.06 (25.93), 51.16 (30.31)]. Scores were lower for primary school and post graduate students [46.9(22.77), 38.59(33.76)] and the same was observed across all the domains.

Subjects with sprain showed highest score [61.06(29.65)], followed by those with upper limb injuries [56.22(28.31)]. Subjects with lower limb and spine injuries showed almost similar scores [45.31(30.21), 46.66(23.22)] and were at the lower side. HRQOL scores were more for

lower limb injuries across all the domains except for pain and GH. HRQOL scores were lowest for spine injuries across all the domains.

Highest score was found in subjects with sport injuries [63.75(35.14)] followed by those with history of fall down [51.47(22.73)] and it was least in subjects with road traffic accidents [43.75(36.12)] and same was observed across all the domains.

HRQOL score was more in subjects whose duration of months since injury was 21-24 months [61.67(23)] than those whose duration was 1-4 months it was [55.5(63)]. Same was observed across the domains.

Median HRQOL scores showed significant difference between subjects from Saudi and non-Saudi for the domain RLPH; between males and females for the domain RLPH and RLEP; between different age groups for the domain RLPH, RLEP and PAIN; within the occupation for the domain RLEP and PAIN; for different site of injuries for the domains RLEP, EWB, PAIN and GH; for different mode of injuries for the domains RLPH, RLEP, PAIN and GH; within the number of months since injury for the domain RLEP ($P < 0.05$)

Discussion:

Traumatic injuries are a significant threat to the whole world, among these, orthopaedic injuries due to accidents are the most common.¹ Saudi Arabia being a developing country has suffered a major burden due to these traumatic injuries. Forty percent of Saudi Arabia's population constitutes of 19 years and younger generation, which is the peak age group for most of the accidents.⁴ This will significantly implicate the country's health and prosperity. Hence assessing the health related quality of those people with history of injuries will help in taking necessary measures to improve health outcome. HRQOL in this study was measured using 8 domains of SF36 questionnaire. SF 36 is a validated, simple and easily administered tool. It relies on patient self-reporting and now used widely to measure health outcome among adults.¹¹

In this study, different sites of injuries reported were upper limb, lower limb, spine injuries and sprain and among these the most common site involved was lower limb followed by upper limb and spine injuries seen in 53 (34.9%), 42(27.6%) and 24 (15.8%) subjects respectively. In a study done by MC.Leod TCV et.al,¹² lower extremity injuries constituted to 65.5% followed by upper limb injuries among 29.1% which was similar to this study and Spine injuries reported among 5.5% subjects which was more compared to the study.

Mechanism of injury reported in this study was due to road traffic accidents, sports and due to fall down and majority 90 (59.2%) subjects reported injuries due to fall down. In a study done by David S¹³, the most common injury reported was road traffic accidents in 50% subjects, which was more compared to this study which was seen among 19 (12.5%) subjects. In the present study, among 152, 90(59.2%) of them had injury in the past 1 to 4 months.

HRQOL Scores:

The median HRQOL score in this study was 59.25 (25). HRQOL Score was highest for the domain "pain" [67.5 (55)] and "GH" [67.5(38.3)] when compared to other domains, whereas in a study conducted by Mc. Leod TCV et.al.,¹² HRQOL scores among the injured was highest for the domain "PF" [55.1(6.1)] and "RLPH" [49.5(11.9)]. In a study done by Huffman et.al.¹⁴ athletes with a self-reported history of injury scored lower on all SF-36 subscales except Energy, whereas in this study scores were lower for the domains RLPH, PF and Energy.

Overall median HRQOL score was more in males compared to females [56.85(31.87) v/s 44.8(27.33)]; same was observed in all the domains except PF and SF. In a study done by Alexandridis G¹⁵ and Fu XY et al.¹⁶, HRQOL scores were less for females which was similar to this study.

In this study, 1-10 years age group showed highest score [72.54 (26.22)] across all the domains. Similar observations were seen in a study done by Leduc B.E¹⁷ where HRQOL scores were highest for the younger age group. In the current study, 51-60 years showed the lowest 47.51 (33.72) scores across all the domains and the same was observed in a study conducted by Fu XY et al., where the scores were lowest for the subjects above 40 years.

In this study, Subjects from university had highest score [62.35 (28.33)] followed by students [60.05 (21.98)], subjects from private organizations [54.50 (32.97)] and government organizations [51.08 (28.26)]. Unemployed subjects had the lowest score [43.50 (21.11)] and the same was observed across all the domains. Similar observations were seen in a study done by Leduc B.E¹⁶ where HRQOL scores were highest for the employed people.

In this study, HRQOL score was more in subjects whose duration of months since injury was 21-24 months [61.67(23)] than those whose duration was 1-4 months [55.5(63)], this shows that HRQOL scores improved with time.

Conclusion:

This study was conducted to assess the health related quality of life of post orthopaedic trauma patients and to assess the socio-economic determinants associated with HRQOL. It was noted in the study that, HRQOL scores were low for the elderly, for males, for the unemployed, for those with history of spine injuries and road traffic accidents and with recent history of trauma (21-24 months). All the socio-demographic variables included in the study were found to be significantly associated with HRQOL scores. Hence, we conclude that in this study, SF- 36 served as a simple, easy and an effective tool to assess the health-related quality of life of post orthopaedic trauma patients which helped in taking early measures, interventions and regular, frequent follow up of those patients with lower HRQOL scores.

Recommendations:

Further studies are warranted for regular assessment of the health related quality of life of these patients. Future research is necessary to determine whether orthopaedic trauma patients would benefit from early screening and interventions.

Acknowledgements:

We thank the Deanship of scientific research Majmaah university Al Majmaah KSA for their cooperation and supporting this research with project number-XXXXX.

References:

1. Haider AH, Hashmi ZG, Zafar SN, Castello R, Haut ER, Schneider EB et al. Developing best practices to study trauma outcomes in large databases: An evidence-based approach to determine the best mortality risk adjustment model. *J Trauma Acute Care Surg.* 2014;76(4):1061–9. doi: 10.1097/TA.000000000000182.
2. Al-Naami MY, Arafah MA, Al-Ibrahim FS. Trauma care systems in Saudi Arabia: an agenda for action. *Ann Saudi Med.* 30(1):50–8. doi: 10.4103/0256-4947.59374.

3. Alrabea A. Annual Health Statistics. Riyadh: 2012. p. 93. Available at: <http://www.moh.gov.sa/en/Ministry/Statistics/book/Documents/1433.pdf>. [Accessed on 12.5.2022]
4. Alghnam S, Alkelya M, Al-Bedah K, Al-Enazi S. Burden of traumatic injuries in Saudi Arabia: lessons from a major trauma registry in Riyadh, Saudi Arabia. *Ann Saudi Med*. 2014;34(4):291-6. doi: 10.5144/0256-4947.2014.291.
5. Heng-Chia Chiu, Lih-Wen Mau, Yu-Ching Hsu, and Je-Ken Chang. Postoperative 6-Month and 1-Year evaluation of Health-Related Quality of Life in Total Hip Replacement patients. *J Formos Med Assoc* 2001;100:461–5(7):461-5.
6. The WHOQOL Group. The World Health Organization Quality of Life Assessment (WHOQOL). Development and psychometric properties. *Soc Sci Med* 1998;46:1569-1585.
7. Patrick DL, Deyo RA: Generic and disease-specific measures in assessing health status and quality of life. *Med Care* 1992;27(Suppl 3):217–232.
8. Patrick DL, Erickson P: Assessing health-related quality of life for clinical decision making. In: Walker SR, Rosser RM, eds. *Quality of Life: Assessment and Application*. Lancaster, UK: MTP Press, 1988:9.
9. Centers for Disease Control and Prevention. Measuring healthy days: Population assessment of health-related quality of life. *Centers for Disease Control and Prevention*, Atlanta, Georgia 2000.
10. Testa MA, Simonson DC. Assessment of quality-of-life outcomes. *N Engl J Med*. 1996;334:835–40.
11. Ware JE, Snow KK, Kosinski M, et al: SF-36 Health Survey: Manual and Interpretation Guide. Boston, MA: Nimrod Press, 1993
12. McLeod TC, Bay RC, Parsons JT, Sauers EL, Synder AR. Recent Injury and Health-Related Quality of Life in Adolescent Athletes. *Journal of Athletic Training* 2009;44(6):603–610.
13. Siddarth David, Nobhojit Roy, Cecilia Stålsby Lundborg, Martin Gerdin Wärnberg & Harris Solomon (2022) 'Coming home does not mean that the injury has gone'—exploring the lived experience of socioeconomic and quality of life outcomes in post-discharge trauma patients in urban India, *Global Public Health*, DOI: 10.1080/17441692.2022.2036217.
14. Huffman, Park G.R.J, Roser-Jones.C, Sennett B.J, Yagnik.G, Webner.D. Normative SF-36 values in competing NCAA intercollegiate athletes differ from values in the general population. *J Bone Joint Surg Am* 2008. 90(3):471–476.
15. Alexandridis G, Gunning AC, Leenen LP. Health-related quality of life in trauma patients who sustained a calcaneal fracture. *Injury*. 2016;47(7):1586-1591. doi:10.1016/j.injury.2016.04.008
16. Fu XY, Chen M, Yu T, Liu XK. Health-related quality of life of trauma patients after intensive care: a 2-year follow-up study. *Eur J Trauma Emerg Surg*. 2011;37(6):629-633. doi:10.1007/s00068-011-0084-7

17. Leduc. B.E, Lepage Y. Health-related quality of life after spinal cord injury, Disability and Rehabilitation. 2002.;24(4):196-202, DOI: 10.1080/09638280110067603