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Traumatic brain injuries at Vryheid Hospital during 2009

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TRAUMATIC BRAIN INJURIES AT VRYHEID HOSPITAL DURING 2009

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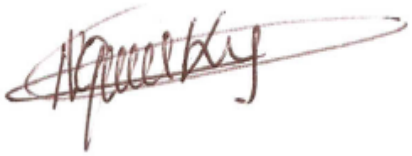
THIS THESIS IS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN EMERGENCY MEDICINE (MSc Med EM), DIVISION OF EMERGENCY MEDICINE.

UNIVERSITY OF THE WITWATERSRAND, FACULTY OF HEALTH SCIENCES, SCHOOL OF CLINICAL MEDICINE, DEPARTMENT OF FAMILY MEDICINE.

APRIL 2012

DECLARATION

I, the undersigned, hereby declare that the work contained in this thesis is my own, original work and that I have not previously submitted it – entirely or in part- to any university for a degree.

Signature  Date: 14 April 2012

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SYMBOLS AND ABBREVIATIONS

AD = Admission

Alc Intox = Alcohol Intoxication

Ass = Assault

B = bad prognosis

= black population

= blunt type of TBI

CI = confidence interval

D = discharged

DE = death

DOH = Department of Health

F = female (gender)

G = good

HREC = Human Research Ethics Committee

KZN = Kwazulu- Natal

M = Male (gender)

MI = Mild TBI

MO = Moderate TBI

MV = Motor vehicle accidents

N = number

Occupa inj = Occupational injuries

OP = Out-patient

p= p value

P = penetrating TBI

SE = Severe TBI

ST = Stab injuries

TBI = Traumatic brain injury

TR = Transfer

W = white (race)

<: lesser than

>: greater than

=: equal

ABSTRACT

1. BACKGROUND AND SETTING

The study was conducted at Vryheid district hospital in the Kwazulu- Natal province.

The increasing number of traumatic brain injuries seen at the hospital has prompted me to describe traumatic brain injuries in the community.

Data was collected from the records of casualty department and the hospital wards.

2. AIM

This thesis describes traumatic brain injuries at Vryheid district hospital during 2009.

3. METHODS

It is a retrospective cohort study with a total sample size of 596 participants; retrieved from patients' registers at the hospital's casualty department and hospital wards.

4. RESULTS

- The peak age of occurrence of traumatic brain injuries (TBI) at Vryheid is between 20 and 30 years with 75% of injuries happening in younger than 35 years and a mean age of 29 years.

- 78% of traumatic brain injuries occurred in female patients but it is important to note that females are in greater number than males at Abaqulusi municipality.

- Blacks are the most affected by the traumatic brain injuries at Vryheid: 97% versus 2.4% in white and 0.3 in Asians.

- Blunt traumatic brain injuries are the most common type of TBI at Vryheid: 97%.

- Assault injuries constitute the major cause of traumatic brain injuries (57 %) followed by motor vehicle accidents (40%)

- Mild traumatic brain injuries represent 75% of traumatic brain injuries presenting at Vryheid during 2009.

- The majority of TBI patients at Vryheid were discharged either from casualty department or from the wards and only as small number of patients died or was transferred out. Moreover, 60% of patients were treated as ambulatory patients.

- 94% of TBI at Vryheid hospital had a good prognosis and only a small percentage was associated with bad prognosis.

- The mean hospital length stay at Vryheid was 2.2 days with a minimum of less than a day (62%) and a maximum of 129 days.

5. CONCLUSION

In 2009, traumatic brain injuries were found to be common at Vryheid hospital in the black population and were mainly due to assault injuries and motor vehicle accidents. Moreover, motor vehicle accidents were associated with high mortality.

Although, the majority of traumatic brain injuries at Vryheid hospital were mild, 10% were severe. Thus, TBI at Vryheid constitutes a public health concern that needs to be addressed by the SA government in consultation and collaboration with various stakeholders.

1. INTRODUCTION AND BACKGROUND

Traumatic brain injury (TBI) continues to be an enormous public health problem, even in the era of modern medicine in the 21st century. Most patients with TBI (75- 80 %) have mild head injuries whereas 10 percent (10 %) are moderate injuries and 10 % severe TBI. Head injuries are associated with both economic and emotional impact on the society. Studies have also shown that almost 100% of patients with severe head injuries and two thirds (2/3) of those with moderate TBI will be permanently disabled to some extent and will not return to their pre-injury level of function [(1).] The management of in-patients with head injuries is very costly and the impact even greater mostly because of the occurrence of severe head injuries in adolescents and young adults. Therefore any approach aimed at identifying and addressing the risk factors for head injuries may result in the reduction of its incidence [(1)(2)(3)(6)].

The increasing number of patients with head injuries seen and/or admitted at Vryheid hospital has prompted me to look for predisposing factors for head injuries at Vryheid.

1.1. SOCIO- DEMOGRAPHICS OF VRYHEID

Vryheid is a small town in the AbaquIusi municipality and belongs to Zululand district municipality. It lies southward along the R33 in the valley at the foot of the Zungwini Mountain and is the centre of coal mining and cattle farming in the district. Vryheid is Zululand's main commercial, industrial and business centre, with a reasonably well-developed physical, social and institutional infrastructure. It is well located at the intersection of the major transport routes, which traverse the region and has a population of 34.058 , representing 15 % of Abaqulusi municipality's total population (Zululand District Water Services Development Plan: WSDP – 2005 population) [(18).]

However, it is also characterized by lack of transport in deep rural areas surrounding the town.

The 2001 census has revealed a mild gender profile imbalance with women representing approximately 52.35% of the total population and males accounting for only 47.64%.

The decrease in the number of males may be attributed to their migration to urban centres in search of employment opportunities and the decline in employment opportunities in the region over the last two decades due to the closure of coals mines. It is also characterized by a poverty level of 32.8 % with more than 1/3 (one third) of the population living below poverty line and an unemployment rate of 59.4%, with only 15.59 % in the working class. [18].

Moreover, the largest age group in the locality is between the ages 5 – 19 years constituting 27% of the entire population. This is followed by 30 – 49 age group constituting 17% of the total population (2001 Census). [18]

Vryheid hospital is a district hospital located at Vryheid and the only hospital operating at Abaqulusi municipality. It has a capacity of 338 beds and is situated 120 km from Madadeni hospital, referral hospital equipped with CT scan facility and other specialized units; 320 km away from Inkosi Albert Luthuli Central Hospital in Durban (tertiary institution with neuro-surgical capacity).

1.2. BACKGROUND LITERATURE ANALYSIS AND CRITIQUE

Traumatic brain injury (TBI) is simply defined as trauma to the head resulting in a range of possible insults to the brain, with an equally diverse range of clinical findings. The definition of TBI has not been consistent and tends to vary according to specialties and circumstances. Often, the term brain injury is used synonymously with head injury, which may not be associated with neurologic deficits. The definition also has been problematic with variations in inclusion criteria**.** [(2)]

The insult may be focal if only confined to one area of the brain or diffuse if more than one area of the brain is involved. TBI may be due to a closed (blunt) or penetrating head injury.

The annual incidence of TBI in the USA has been estimated to be 180 – 220 cases per 100 000 populations per year. About 10 % of injuries are fatal, resulting in almost 550 000 patients being admitted annually with head injuries. The incidence of TBI in has been estimated to be higher in South Africa and Europe [(4).] The findings of a twenty three European countries report have suggested that the incidence of TBI in Europe is about 235 per 100 000 population with an average mortality rate of about 15 per 100 000 and a case fatality rate of about 11 per 100 000 [(9).]

Recent Studies have shown that black -American children with TBI had a significant higher mortality rate despite similar findings on initial head CT scans with worse clinical and functional outcomes at discharge when compared with their counter-part white children. Furthermore, black –American children have been reported to have significantly increased premorbidities, penetrating trauma, and violent intent [(10) (14).]

Other studies have suggested sex, adverse life events and parental style as major risk factors for TBI in children. Thus, 2 categories have been described: the highest risk category characterized by male, multiple life events (4 or more) per annum and high maternal punitiveness and the lowest risk group made of female, white children. However, there has been evidence suggesting a modest rise in the rate of TBI for those in the highest category. Overall characteristics of both the family and child are an important tool in predicting a TBI event. Thus, a deeper understanding of risks associated with TBI in childhood will provide an avenue to design appropriate and specific interventions targeting risk- families and aimed at preventing these injuries [13][15][17]

Mild traumatic brain injury has been found to be more common in males with male- to-female ratio (for TBI) of nearly 2: 1 and much more common in persons younger than 35 years [4][5][6]. However female gender is independently associated with reduced mortality and decreased complications after TBI as male and female nervous systems have shown to respond differently to traumatic brain injury [11][12].

The most common causes of TBI are summarized follows:

1- Accidental causes comprise the following:

- Motor Vehicles accidents (collision between vehicles, pedestrians struck by motor vehicles, bicycles): transportation accidents involving automobiles, motorcycles, bicycles and pedestrians accounts for half of all TBIs and constitute the major causes of TBI in people under 75 years of age.

- Sports- related injuries represent 3% of TBI and adult females have been found to be at increasing risk for post- concussion syndrome after sport- related mild traumatic brain injury than male patients [10].

- Falls are the leading and an important cause of TBI in patients aged 75 or older. Race and sex group differences mandate enhanced focus on environmental safety and risk-taking behaviours. Multiple logistic regressions demonstrated a significant influence of age, race, and sex on the likelihood that a fall results in TBI [11].

2- Non- accidental causes (Interpersonal Violence)**:**

- Assaults including penetrating head injuries and stab injuries
- Shaking syndrome: TBI may occur in infants and small children who are victim of violent shaking.

It is important to note that the cause of TBI plays a vital role in predicting the outcome. Thus, any intervention on the risk or predisposing factors for TBI will considerably impact on the incidence of TBI. If primary prevention is to be undertaken, there is a need for a deeper understanding of the epidemiology of the condition. The primary causes of TBI vary by age, socio-economic factors and geographic regions and any planned interventions must be tailored accordingly [3]

Therefore the overall aim of this study is to identify factors responsible for the incidence of TBI at Vryheid.

2.STUDY OBJECTIVES

Following objectives were considered in the study:

- To document all TBI seen and/ or admitted at Vryheid hospital
- To describe the demographic characteristics of TBI patients at Vryheid
- To determine the main causes and severity of TBI.
- To establish the prognosis and outcomes of TBI patients at Vryheid.
- To assess risk factors associated TBI

3.STUDY METHODOLOGY

3.1. STUDY DESIGN

It is a retrospective cross- sectional study: a retrospective review of all TBI patients seen and / or admitted between January and December 2009.

3.2. STUDY SETTING

The study was conducted at Vryheid district hospital at Vryheid in the Kwazulu– Natal province.

3.3. STUDY POPULATION

All patients with TBI who were seen and/ or admitted at the hospital during 2009 were included in the study regardless of age, sex, severity, types and mechanisms of TBI.

3.4. SAMPLING AND SELECTION

It is an observational assignment of patients and 596 participants were included in the study.

4. ETHICS AND COLLECTION OF DATA

4.1. ETHICS

Following important matters were addressed before embarking on collection of data and analysis:

- Informed consent: informed consent was not obtained from participants as it is a retrospective study
- Confidentiality and privacy: participants were allocated codes in order to preserve their confidentiality and only few authorized persons had access to the information.
- Approval from the human research ethics committee (HREC) of the Witwatersrand University was sought and obtained (Clearance Certificate no M10924).
- Permission from KZN Health Department to conduct research at Vryheid was granted (Certificate Ref HRKM 136/10).

4.2. DATA COLLECTION

The study was conducted at Vryheid district hospital at Vryheid in the province of KwaZulu-Natal.

Data **was** retrieved from casualty and the wards records at Vryheid hospital.

A data extraction sheet was designed and included the following parameters:

- Demographics of patients: age, sex, race and codes of patients

- Types of TBI: Blunt and penetrating trauma

- Causes (mechanisms): accidental injuries such as transportation, sports and fall injuries and non-accidental injuries such as assaults, shaking syndrome.

- Severity of TBI: 3 categories have been described according to the initial post-resuscitation Glasgow coma scale (GCS): mild (GCS 13-15), moderate (GCS 9-12) and severity (GCS<8). It is also important to note that no other GCS reading is valid for the purpose of this classification

- Duration of hospital stay if admitted

- Prognosis: bad , moderate or good

- Outcomes of head injuries (discharged, admitted, referred, dead, outpatient etc.).The Glasgow outcome score (GOS) which is a more appropriate scale for outcomes measurements could not be used in this study because of lack of correct information on TBI recovery assessment in the wards.

However, it is important to know that the GOS is a 5 level scale that provides the following information:

Glasgow Outcome Score

Score	Rating	Definition
5	Good Recovery	Resumption of normal life despite minor deficits
4	Moderate Disability	Disabled but independent. Can work in sheltered setting
3	Severe Disability	Conscious but disabled. Dependent for daily support
2	Persistent vegetative	Minimal responsiveness
1	Death	Non survival

5. DATA ANALYSIS

Following statistical approaches were used in this study:

- Continuous variables such as age were analyzed using mean age, standard deviation and range, and the findings were presented in a frequency table.

- frequencies and proportions were determined for categorical variables such as race, gender, types of TBI and prognosis and were presented in bar graphs, pie- charts and frequency tables.

- The contingency table also known as CROSS-TABULATION, a test of choice for the comparison of nominal variable to another nominal variable was also used. The test of independence of the 2 variables was performed using an appropriate CHI-SQUARE test such as Pearson’s chi-square.

- The comparison of continuous variables was done using" regression and correlation analysis".

6. RESULTS

This study was conducted at Vryheid hospital and data collected from Vryheid hospital wards (female and male surgical, general, paediatric) and casualty records.

The total number of traumatic brain injuries (TBI) seen and/or admitted at Vryheid hospital during 2009 amounted to 596 and an intention-to-treat analysis has been used in this study.

6.1. DEMOGRAPHICS CHARACTERISTICS

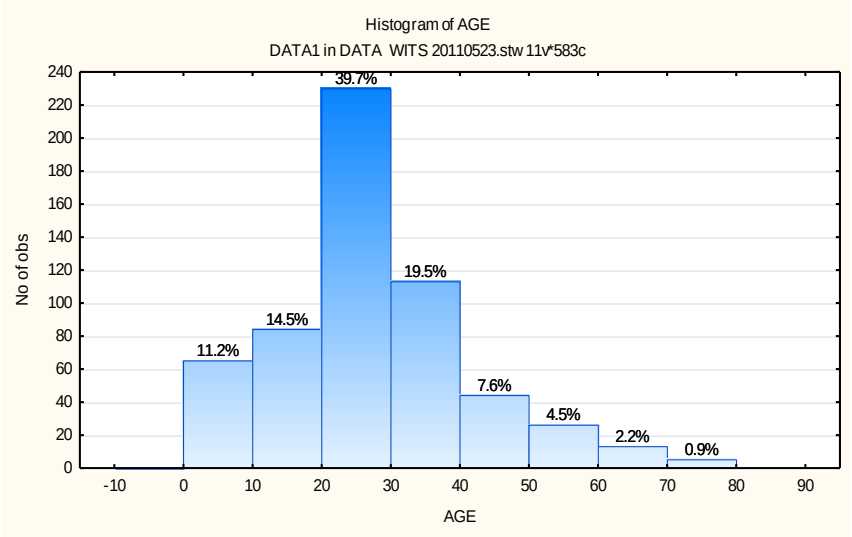
The following demographics parameters were studied:

- Age
- Gender
- Race

6.1.1. AGE DISTRIBUTION

Mean, standard deviation and range have been calculated to describe the age distribution in this study and results are presented in histograms, pie-charts and frequency tables.

Table 1. 2D Histograms: Histogram of age distribution



This histogram shows the occurrence of TBI in different age groups. Traumatic brain injuries have a peak between 20 and 30 years of age, followed by the age group of **30-40 years**. The picture is less common beyond 70.

The age group is further divided in 2 groups:

- Young (below 35 years) and
- Older (above 35 years).

This new categorization is presented in the following graphs:

Table 2. 2D Histograms: Histogram of Age group

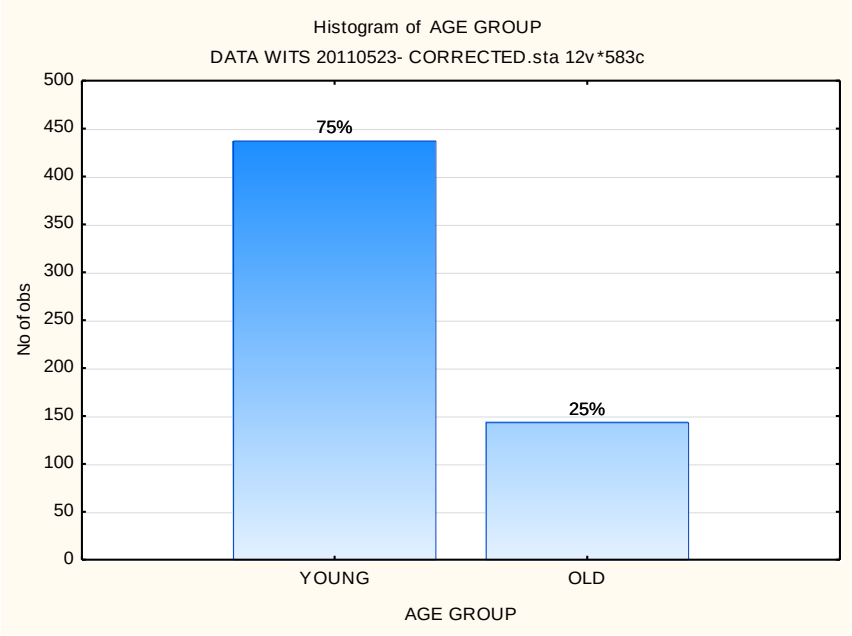


Table 3.Frequency table of age distribution

	Frequency table: AGE GROUP (DATA WITS 2			
Category	Count	Cumulative Count	Percent	Cumulative Percent
YOUNG	437	437	75.3448	75.344
OLD	143	580	24.6551	100.000

75% of TBI at Vryheid happened in the younger group (below 35 years) and only 25 % in the older group.

Table 4.Standard Deviation

	Descriptive Statistics (DATA1 in DATA WITS 20110523.stw)									
Variable	Valid N	Mean	Median	Min	Max	Lower Quartile	Upper Quartile	Range	Quartile Range	Std.Dev.
AGE	580	27.87	26.00	0.10	80.00	20.00	35.00	79.90	15.00	14.38
HOSPITAL DURATION	528	2.20	0.00	0.00	129.00	0.00	3.00	129.00	3.00	7.13

The mean age of TBI in this study is 29 years with a minimum age of 0.1 year and a maximum of 80 years

6.1.2. GENDER DISTRIBUTION

Histogram, Pie-charts and table frequency below have shown that 78 % of Traumatic brain injuries at Vryheid were male and **22% females**.

Thus, TBI is most common in male than female at Vryheid.

Table 5.Histogram of gender

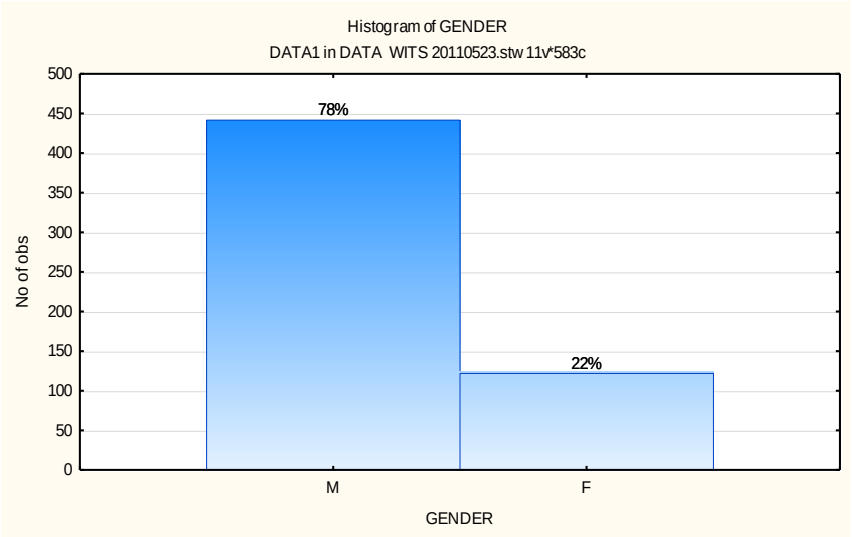
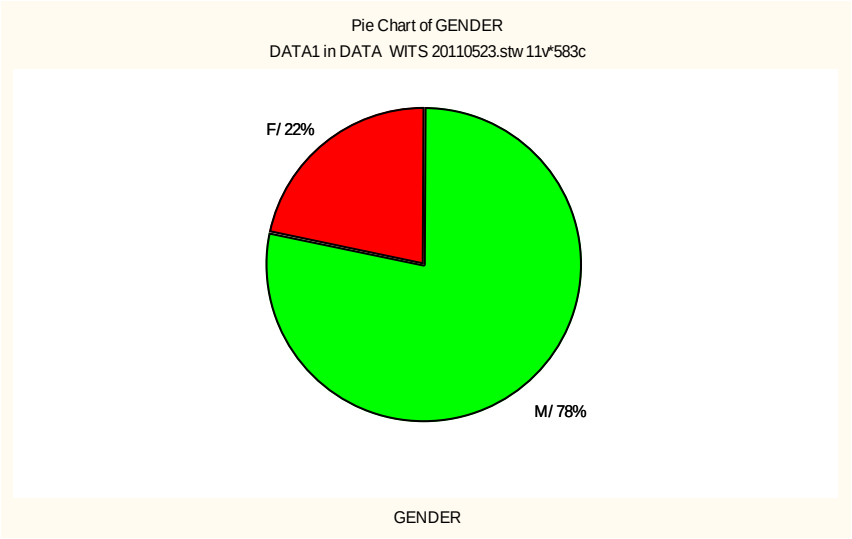


Table 6.Frequency table of gender

	Frequency table: GENDER (DATA1 in DATA W			
Category	Count	Cumulative Count	Percent	Cumulative Percent
M	442	442	78.3687	78.368
F	122	564	21.6312	100.000

Table 7. Pie-chart of gender



6.1.3. RACE

The overwhelming majority of injuries at Vryheid occurred mainly in black group (97.2%) with only 2.4% in white population and 0.3% in Asians.

Table 8. Histogram of race

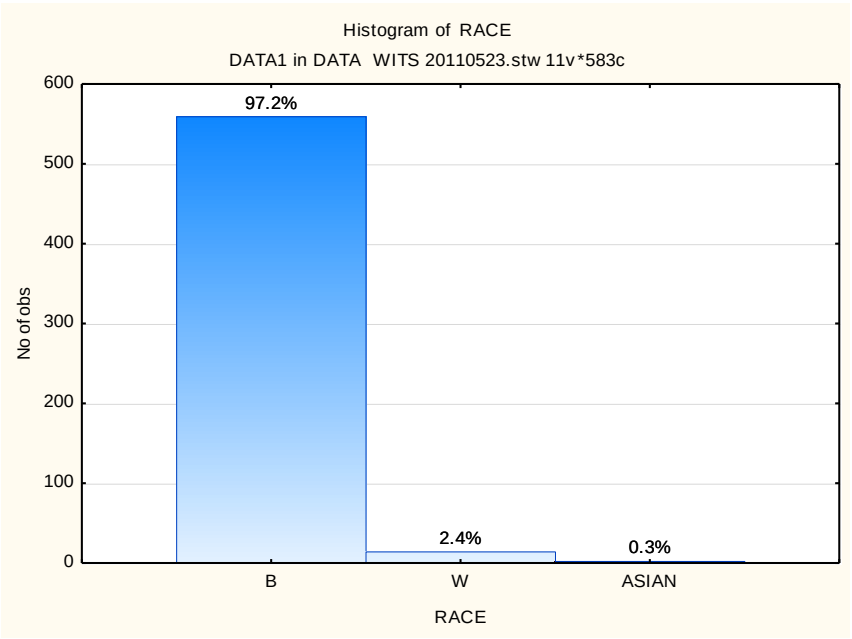


Table 9.Pie - Chart of race

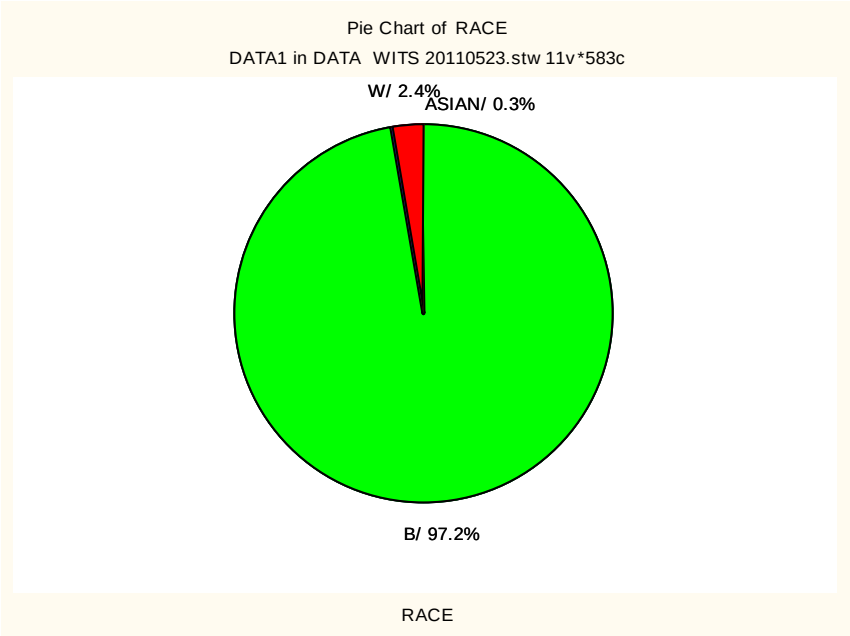


Table 10.Frequency table of race

	Frequency table: RACE (DATA1 in DATA WIT			
Category	Count	Cumulative Count	Percent	Cumulative Percent
B	559	559	97.2173	97.217
W	14	573	2.4347	99.652
ASIAN	2	575	0.3478	100.000

6.2. TBI TYPES

Blunt trauma represents the majority of traumatic brain injuries in Vryheid: 96% (blunt) versus 4% (penetrating).

Table 11.Frequency Table: TBI types

	Frequency table: TBI TYPES (DATA WITS 20			
Category	Count	Cumulative Count	Percent	Cumulative Percent
P	8	8	3.6036	3.603
B	214	222	96.3964	100.000

Table 12.Pie- Chart of TBI types

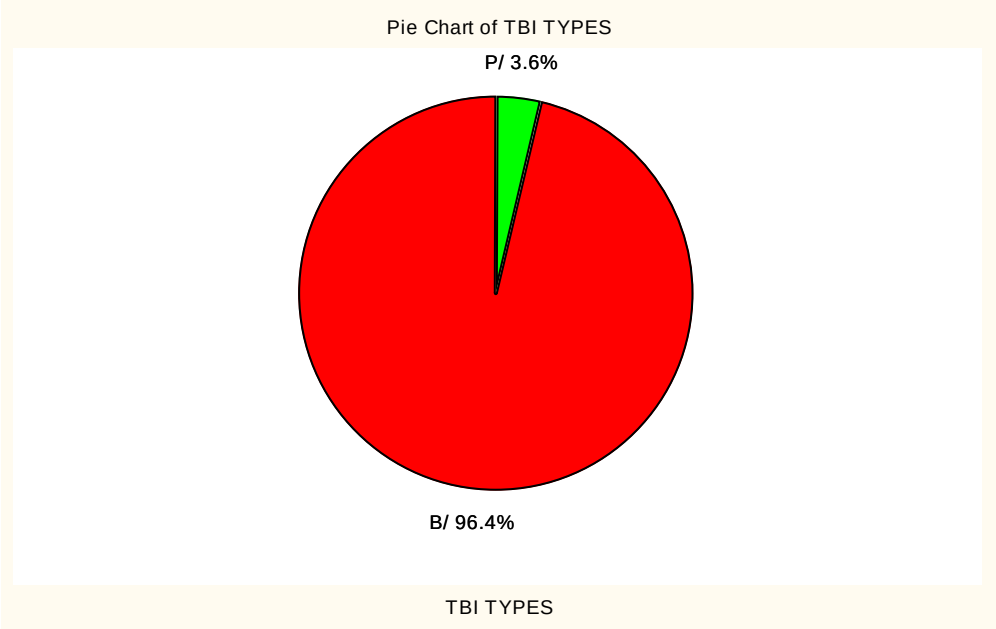
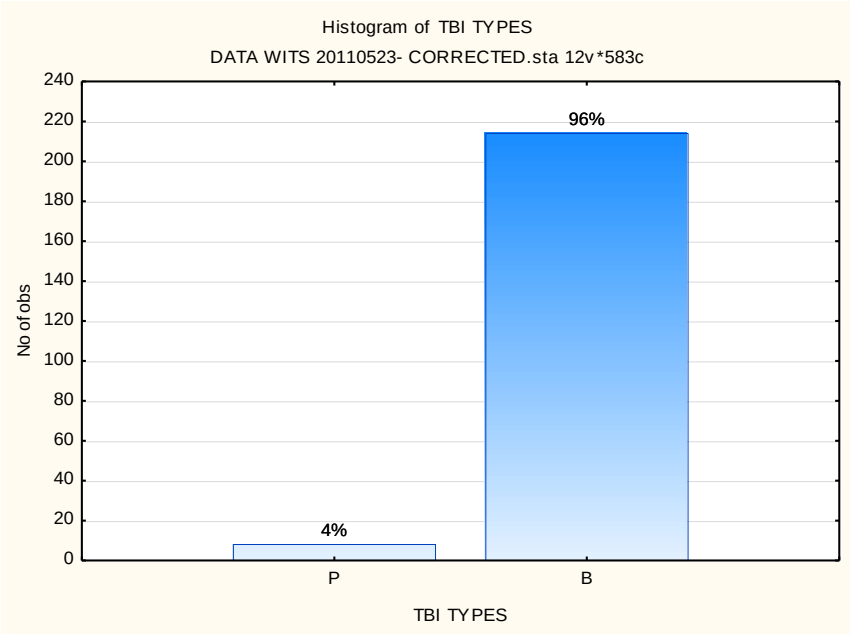


Table 13.Histogram of TBI types



6.3. TBI CAUSES

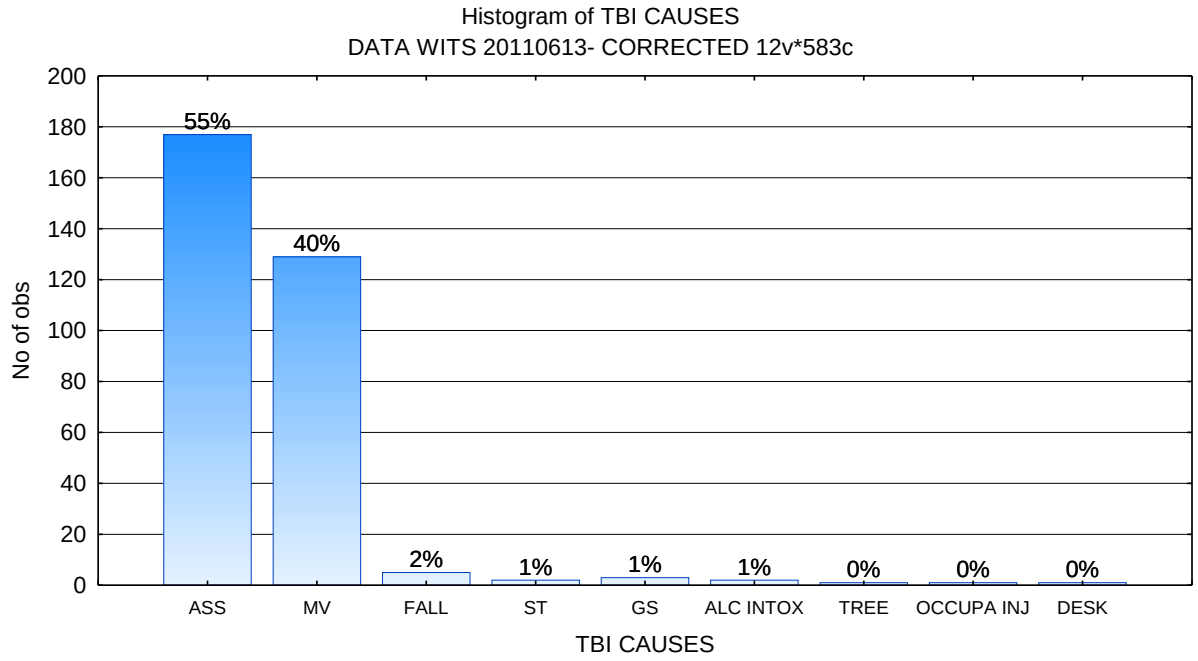
Assault injuries constitute the major cause of TBI at Vryheid (57%) followed by motor-vehicle accidents (40 %.).

Gunshot and stab related- injuries only account for 2% of the total of assault injuries. Alcohol intoxication is not really considered as a cause but rather a risk-factor.

Table 14.Frequency table: TBI causes

	Frequency table: TBI CAUSES (DATA WITS 2(			
Category	Count	Cumulative Count	Percent	Cumulative Percent
ASS	177	177	55.1401	55.140
MV	129	306	40.1869	95.327
FALL	5	311	1.5576	96.884
ST	2	313	0.6230	97.507
GS	3	316	0.9345	98.442
ALC INTOX	2	318	0.6230	99.065
TREE	1	319	0.3115	99.376
OCCUPA INJ	1	320	0.3115	99.688
DESK	1	321	0.3115	100.000

Table 15.2D Histograms: Histogram of TBI causes



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6.4. TBI SEVERITY

Mild traumatic brain Injuries represent 72% of injuries presenting at Vryheid hospital whereas **18%** of injuries are moderate and 10% severe.

This picture is clearly displayed in the following pie-chart, frequency- table and histogram

Table 16.Frequency Table of TBI severity

	Frequency table: TBI SEVERITY (DATA1 in D			
Category	Count	Cumulative Count	Percent	Cumulative Percent
MI	388	388	71.9851(	71.985
MO	98	486	18.1818	90.167(
SE	53	539	9.8330	100.000(

Table 17.Histogram of TBI severity

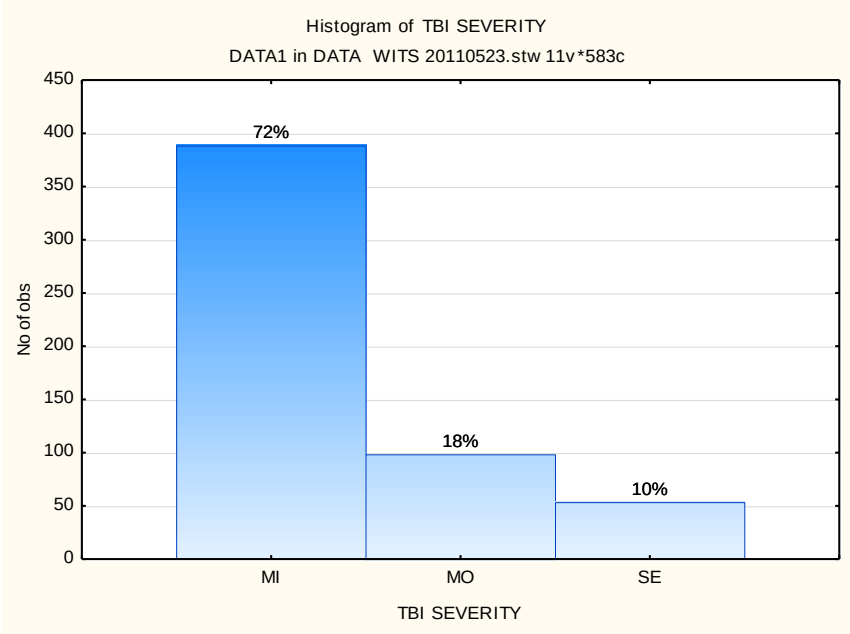
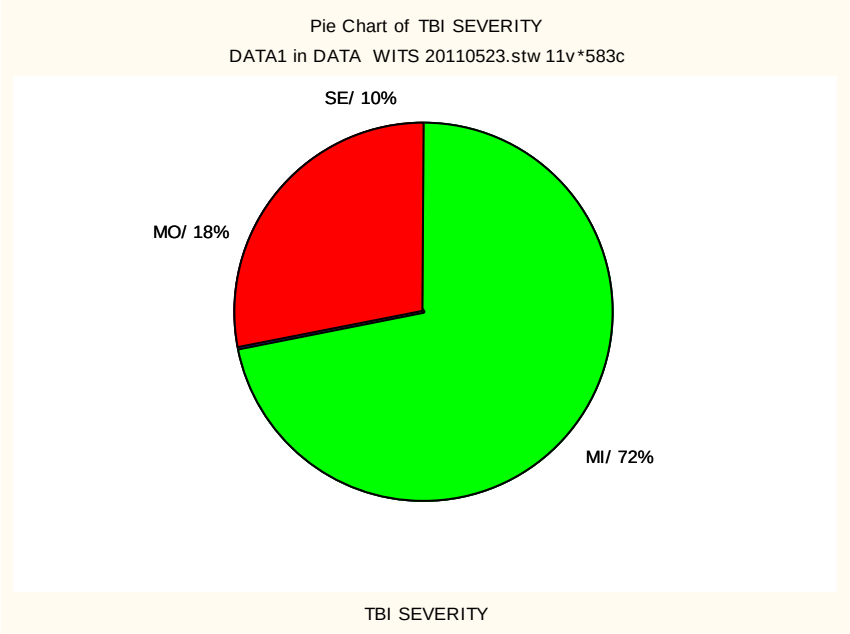


Table 18.Pie- Chart of TBI severity



6.5. TBI OUTCOMES

The majority (94.7%) of patients with TBI in this study are discharged either from **c**asualty department or after being admitted in the wards.

Only a small number of patients either died (3.8%) or were transferred to specialized centres (1.5%).

N.B. It was not possible to use the Glasgow outcome score during data collection (retrospective study) due to lack of appropriate information concerning proper TBI recovery assessment.

Table 19.Frequency table: OUTCOMES

	Frequency table: OUTCOMES (DATA1 in DAT			
Category	Count	Cumulative Count	Percent	Cumulative Percent
D	501	501	94.7069	94.707(
DE	20	521	3.7807:	98.487
TR	8	529	1.5122	100.000(

Table 20.Pie- Chart of outcomes

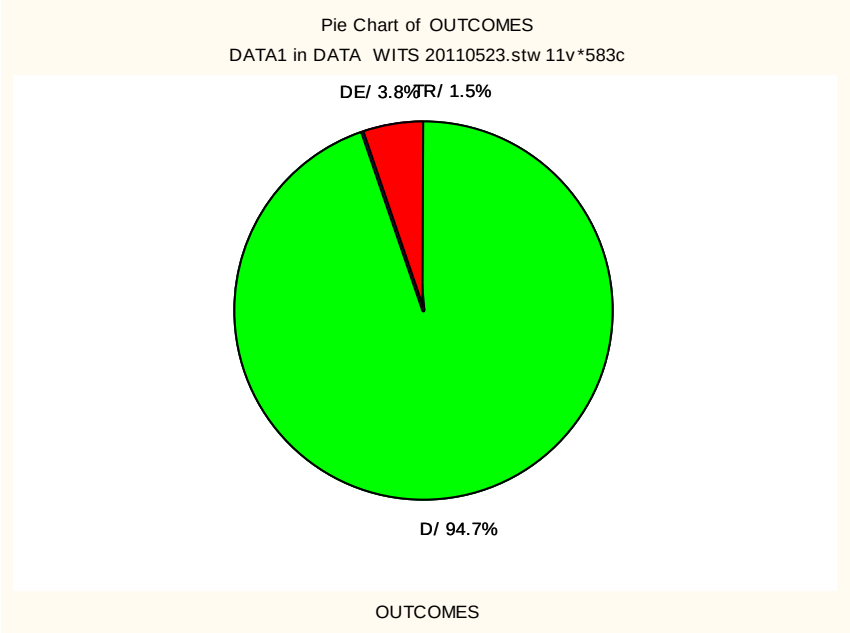
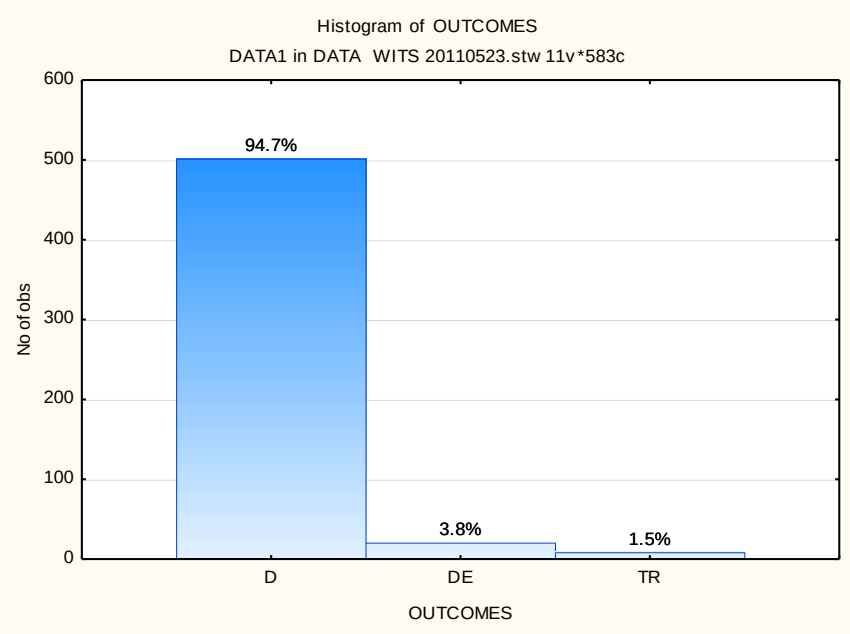


Table 21.Histogram of outcomes



6.6. TBI PROGNOSIS

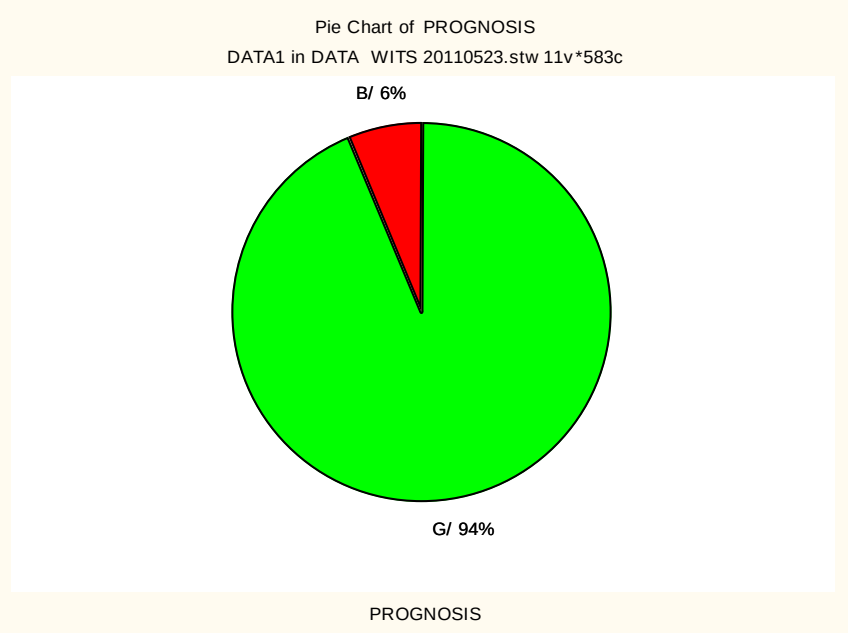
93.7% of TBI patients had a good prognosis .Nonetheless; a small percentage of patients (6.3%) had a bad prognosis.

Table 22.Frequency table: Prognosis

	Frequency table: PROGNOSIS (DATA1 in DAT			
Category	Count	Cumulative Count	Percent	Cumulative Percent
G	503	503	93.6685	93.668
B	34	537	6.3314	100.000

‘

Table 23.Pie chart of Prognosis



6.7. TBI MANAGEMENT PLAN

More than half of TBI patients seen at Vryheid hospital were treated as ambulatory patients, only 40% of TBI required admission in the wards.

Table 24.Frequency table: management

	Frequency table: MANAGEMENT (DATA1 in D			
Category	Count	Cumulative Count	Percent	Cumulative Percent
AD	214	214	39.8510:	39.851(
OP	323	537	60.1489:	100.000(

Table 25. Pie Chart of management

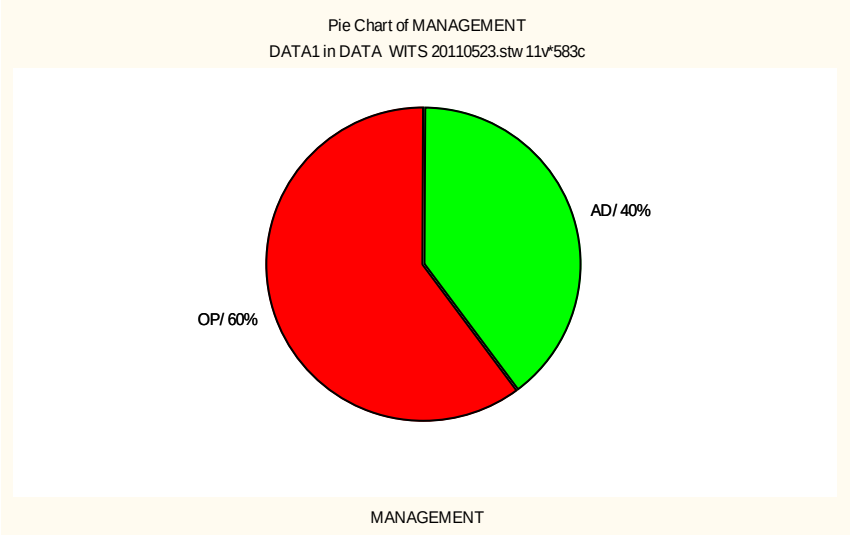
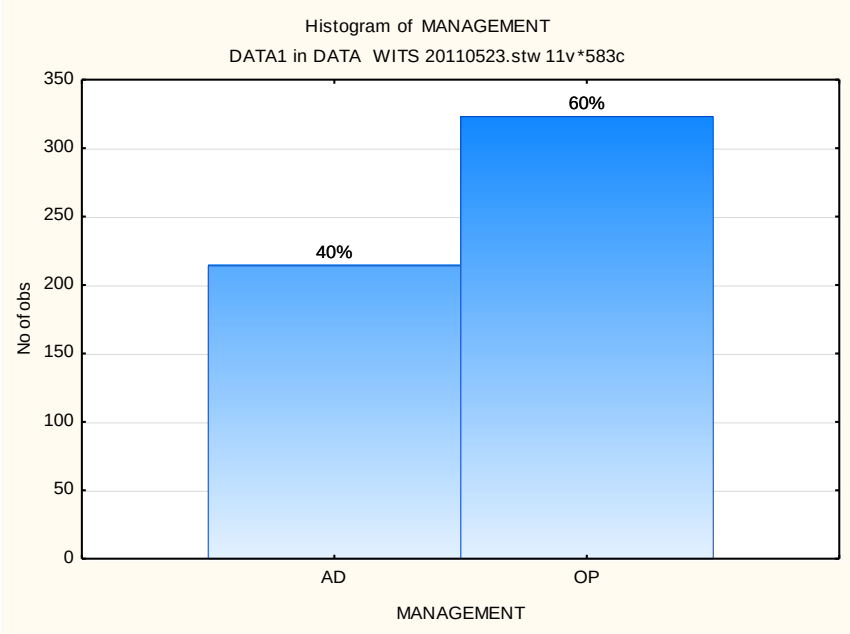


Table 26.Histogram of management



6.8. TBI HOSPITAL LENGTH STAY

The mean hospital length stay of TBI patients at Vryheid hospital **was 2.2 days stayed**. Moreover, 61.6% of patients stayed less than a day in the hospital and constitute the majority of TBI.

Table 27.Standard Deviation

Variable	Descriptive Statistics (DATA1 in DATA WITS 20110523.stw)									
	Valid N	Mean	Mediar	Min	Max	Lower Quartile	Upper Quartile	Range	Quartile Range	Std.Dev.
AGE	580	27.87	26.00	0.10	80.00	20.00	35.00	79.90	15.00	14.38
HOSPITAL DURATION	528	2.20	0.00	0.00	129.00	0.00	3.00	129.00	3.00	7.13

Table 28.Histogram of hospital duration

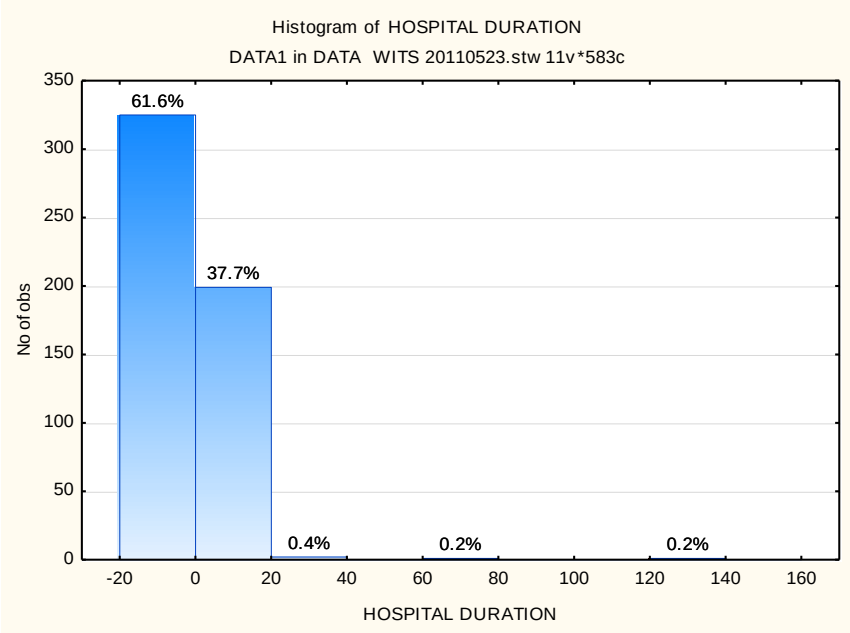


Table 29.Frequency table: Hospital duration

	Frequency table: HOSPITAL DURATION (DAT			
Category	Count	Cumulative Count	Percent	Cumulative Percent
0	325	325	61.5530	61.553(
1	20	345	3.7878	65.340
2	43	388	8.1439	73.484
3	42	430	7.9545	81.439
4	25	455	4.7348	86.174
5	23	478	4.3560	90.530
6	9	487	1.7045	92.234
7	5	492	0.9469	93.181
8	8	500	1.5151	94.697
9	5	505	0.9469	95.643
10	4	509	0.7575	96.401
11	2	511	0.3787	96.780
12	2	513	0.3787	97.159
13	3	516	0.5681	97.727
14	1	517	0.1893	97.916
15	1	518	0.1893	98.106
17	3	521	0.5681	98.674
18	1	522	0.1893	98.863
19	1	523	0.1893	99.053
20	1	524	0.1893	99.242
31	1	525	0.1893	99.431
32	1	526	0.1893	99.621
62	1	527	0.1893	99.810
129	1	528	0.1893	100.000

6.9. TBI TYPES AND AGE

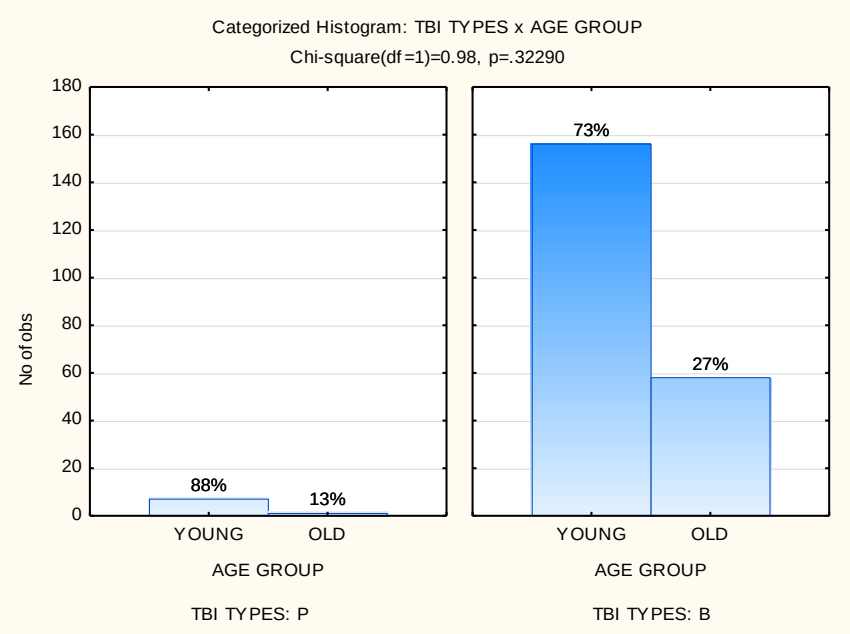
87.5 % of penetrating injuries and 73 % of blunt TBI occurred in younger than 35 years of age.

Table 30.2-Way Summary Table: Observed frequencies

Marked cells have counts > 10. Chi-s

TBI TYPES	AGE GROUP YOUNG	AGE GROUP OLD	Row Totals
P	7	1	8
Row %	87.50%	12.50%	
B	156	58	214
Row %	72.90%	27.10%	
Totals	163	59	222

Table 31. Categorized Histogram: TBI types x age group



6.10. TBI TYPES AND GENDER

78.8 % of blunt trauma and 87.5 % of penetrating injuries were observed in male patients at Vryheid hospital.

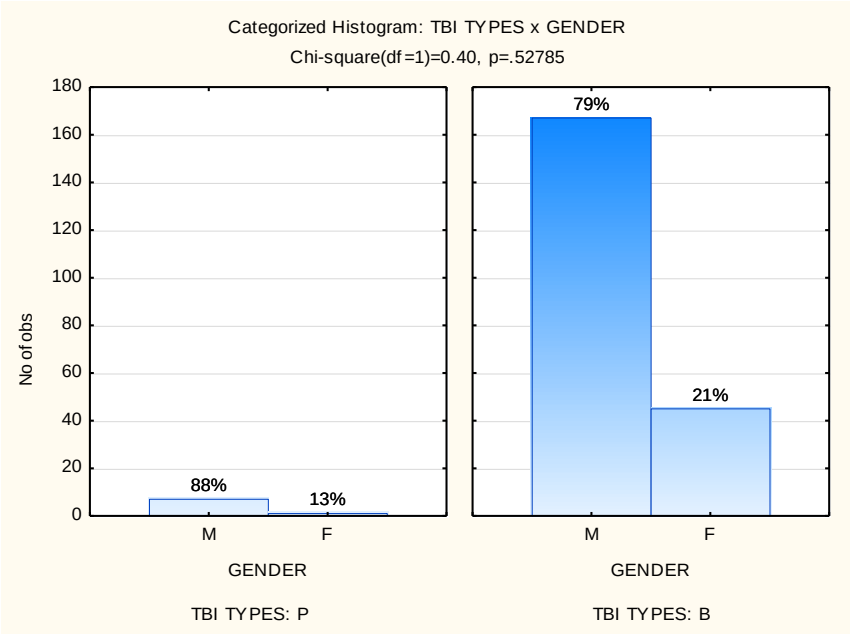
Female patients only had 12.55 of penetrating injuries and 21.5 of blunt trauma.

However, the difference between these groups is not statistically significant (p> 0.05)

Table 32. 2-Way Summary Table: Observed frequencies of TBI types x gender

	Marked cells have counts > 1(		
TBI TYPES	GENDER M	GENDER F	Row Totals
P	7	1	8
Row %	87.50%	12.50%	
B	167	45	212
Row %	78.77%	21.23%	
Totals	174	46	220

Table 33. Categorized Histogram: TBI types x gender



6.11. TBI TYPES VERSUS RACE

87.5 % of penetrating trauma and 96.7% of blunt injuries occurred in black population group.

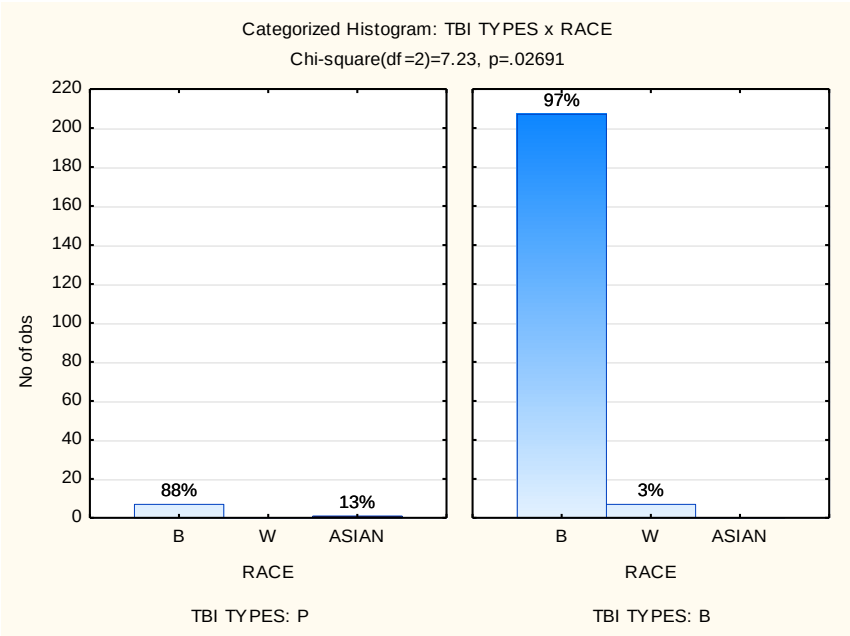
White and Asian population groups are characterized respectively by the absence of penetrating and blunt injuries.

Moreover, the above differences in types of traumatic brain injuries between theses various racial groups are statistically significant (p=0.02)

Table 34. 2-Way Summary Table: Observed Frequencies

TBI TYPES	RACE B	RACE W	RACE ASIAN	Row Totals
	Marked cells have counts > 10. Cl			
P	7	0	1	8
Row %	87.50%	0.00%	12.50%	
B	207	7	0	214
Row %	96.73%	3.27%	0.00%	
Totals	214	7	1	222

Table 35. Categorized Histogram: TBI types x race



6.12. TBI TYPES AND TBI CAUSES

In this study, penetrating traumatic brain injuries (TBI) are exclusively due to assault with 37.5% of injuries due to gunshot alone, 12.5 % to stabbed injuries and the remaining 50% to other types of assaults.

Half of blunt trauma is due to motor vehicle injuries but assault injuries account for

45 %.

Thus, gunshot injuries constitute the main cause of assault related TBI in Vryheid while motor vehicle accidents are responsible for 50% of blunt related TBI.

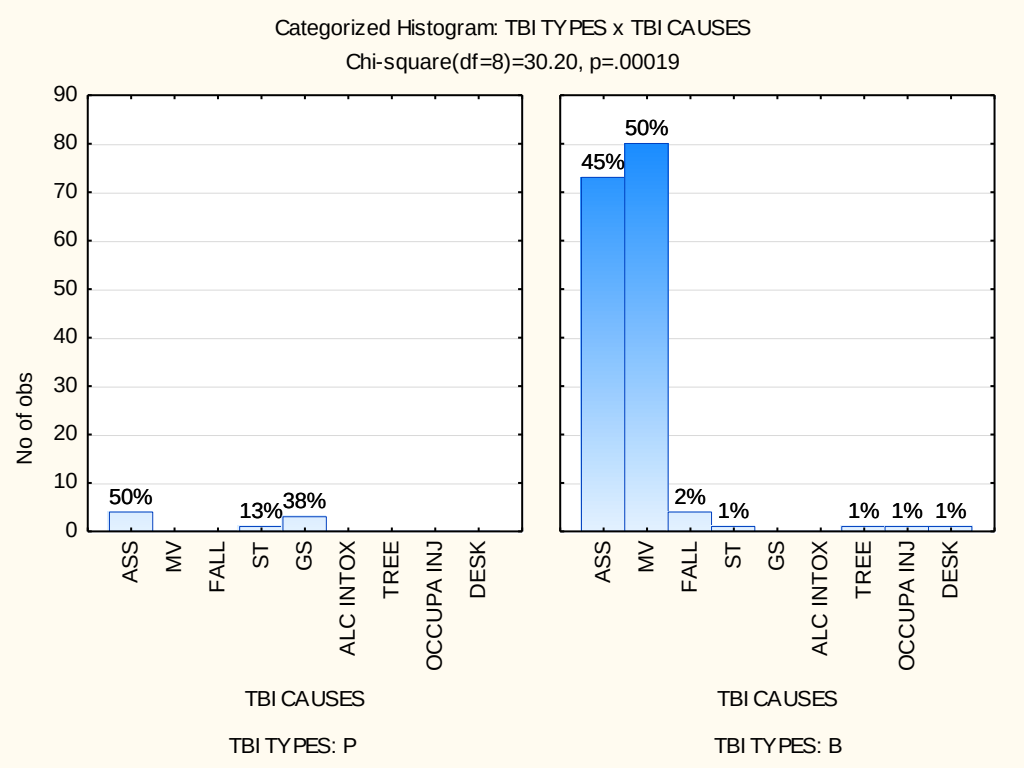
The difference between these various groups is statistically significant (p=0.00019)

Table 36. 2-Way Summary Table: Observed Frequencies

Marked cells have counts > 10. Chi-square(df=9)=30.20, p=.00041

TBI TYPES	TBI CAUSES ASS	TBI CAUSES MV	TBI CAUSES FALL	TBI CAUSES ST	TBI CAUSES GS	TBI CAUSES ALC INTOX	TBI CAUSES TREE	TBI CAUSES OCCUPA INJ	TBI CAUSES GUNSHOT	TBI CAUSES DESK	Row Totals
P	4	0	0	1	1	0	0	0	2	0	8
Row %	50.00%	0.00%	0.00%	12.50%	12.50%	0.00%	0.00%	0.00%	25.00%	0.00%	
B	73	80	4	1	0	0	1	1	0	1	161
Row %	45.34%	49.69%	2.48%	0.62%	0.00%	0.00%	0.62%	0.62%	0.00%	0.62%	
Totals	77	80	4	2	1	0	1	1	2	1	169

Table 37.Table Categorized Histogram: TBI types x TBI causes



6.13. AGE AND TBI TYPES

The mean age for blunt trauma is 29 years and 28 years for penetrating injuries.

The difference in age between Blunt and penetrating injuries is not statistically significant as p value is greater than 0.05

Table 38. TBI types; LS Means - frequency table

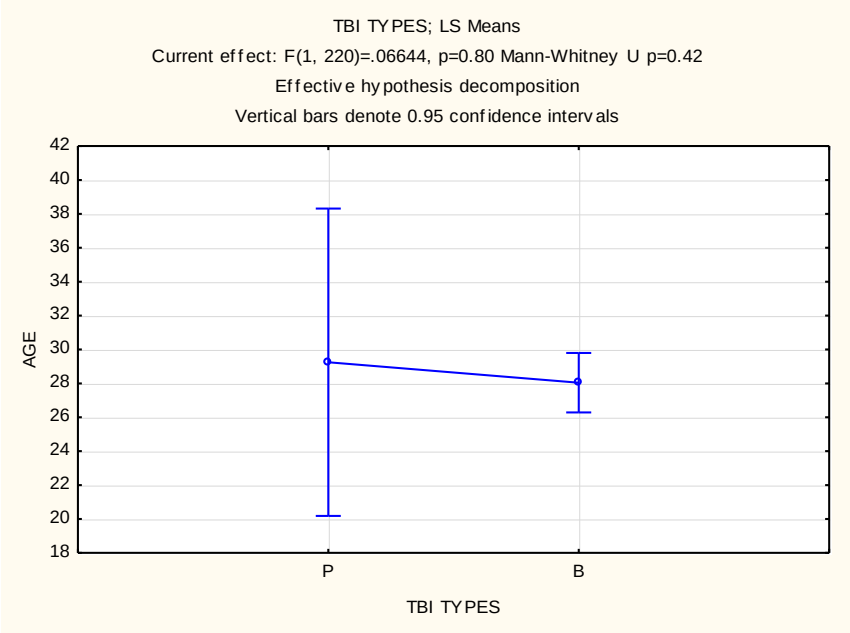
	TBI TYPES; LS Means (DATA WITS 20110523- CORRECTE Current effect: F(1, 220)=.06644, p=.79683 Effective hypothesis decomposition					
Cell No.	TBI TYPES	AGE Mean	AGE Std.Err.	AGE -95.00%	AGE +95.00%	N
1	P	29.2500	4.60102	20.1822	38.3177	8
2	B	28.0420	0.88959	26.2888	29.7952	214

For penetrating injuries, the lower limit is at age 20 years and the upper limit at 38 with a confidence interval of 0.95.

Blunt injuries on the other hand have a lower limit at age 26 and upper limit at 30 with confidence interval of 0.95.

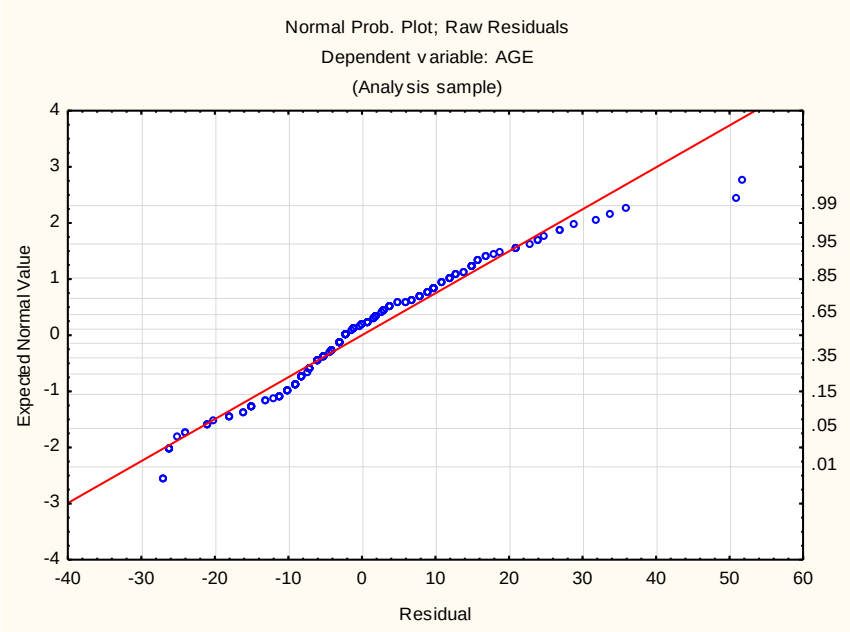
However the difference in mean age between these 2 groups is not statistically significant (p= 0.79683).

Table 39. TBI types; LS Means



With the vertical bar denoting 0.95 confidence intervals above and a p value greater than 0.05 (p= 0.42), penetrating and blunt injuries do not differ from each other as far as mean age is concerned .

Table 40. Age distribution



This data is pretty close to the red line; therefore it indicates that the data for each group is indeed normally distributed.

Table 41. Descriptive Statistics

Effect	Descriptive Statistics (DATA WITS 20110523- CORRECTED.sta						
	Level of Factor	N	AGE Mean	AGE Std.Dev.	AGE Std.Err	AGE -95.00%	AGE +95.00%
Total		222	28.0855	12.9861	0.87157	26.3679	29.8032
TBI TYPES	P	8	29.2500	4.3342	1.53238	25.6264	32.8735
TBI TYPES	B	214	28.0420	13.2024	0.90249	26.2630	29.8210

6.14. PROGNOSIS AND OUTCOMES

99.8 % of discharged patients had a good prognosis and only 0.2% was transferred out.

However, 69% of patient with bad prognosis on admission died, 24% were transferred to tertiary health facilities and only 7% were discharged.

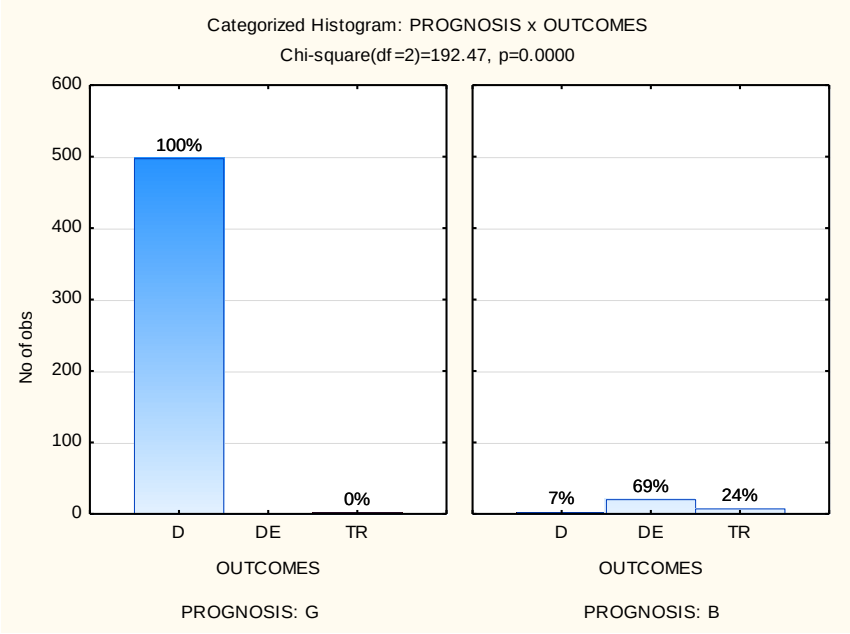
Thus, most of TBI with good prognosis on admission were discharged.

Death has been common in TBI patients with bad prognosis on admission.

Table 42. 2-Way Summary Table: Observed Frequencies

PROGNOSIS	Marked cells have counts > 10. Chi-square(df=2)=1			
	OUTCOMES D	OUTCOMES DE	OUTCOMES TR	Row Totals
G	497	0	1	498
Row %	99.80%	0.00%	0.20%	
B	2	20	7	29
Row %	6.90%	68.97%	24.14%	
Totals	499	20	8	527

Table 43. Categorized Histogram: Prognosis x Outcomes



6.15. GENDER AND OUTCOMES

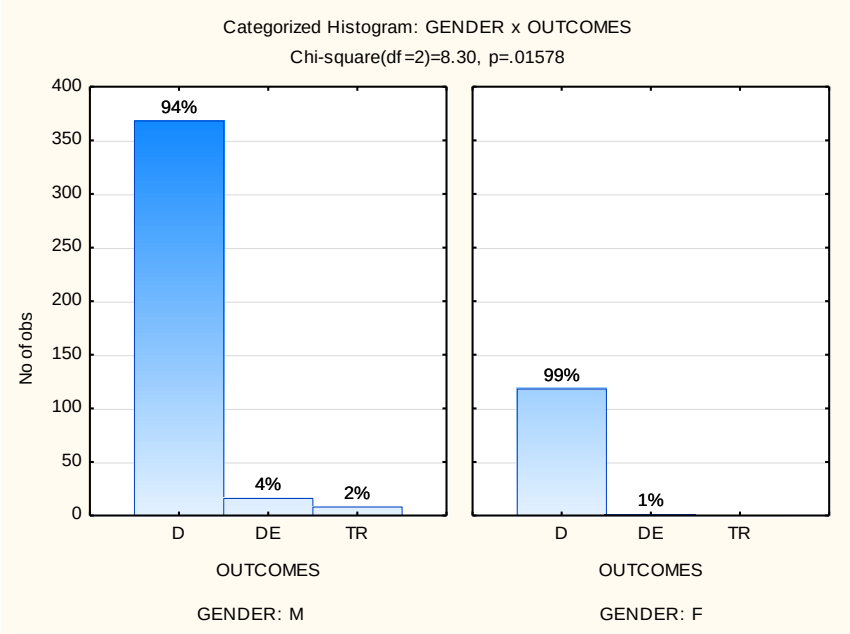
In the male category: 94% were discharged, 4% died and 2% transferred out.

In the female counterpart: 99% of patients were discharged, 0.8% died and 0% transferred. TBI injuries in female patients have been associated with good outcomes. This difference is statistically significant as the p value is less than 0.05 (p= 0.015).

Table 44. 2-Way Summary Table: Observed Frequencies

	Marked cells have counts > 10. Chi-square(df=2)=8.30, p=.01			
GENDER	OUTCOMES D	OUTCOMES DE	OUTCOMES TR	Row Totals
M	368	16	8	392
Row %	93.88%	4.08%	2.04%	
F	118	1	0	119
Row %	99.16%	0.84%	0.00%	
Totals	486	17	8	511

Table 45. Categorized Histogram: Gender x outcomes



6.16. RACE AND OUTCOMES

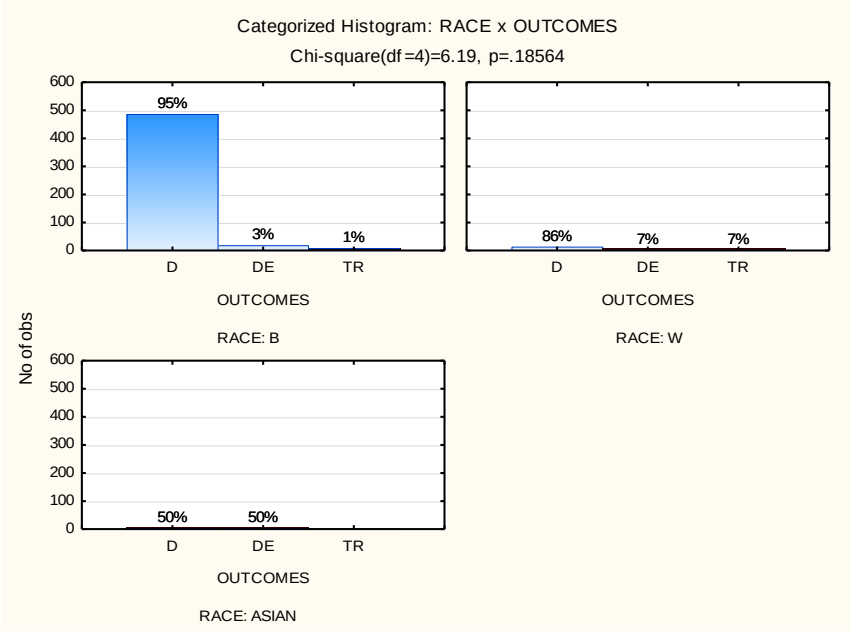
95% of TBI in black population and 86% in White group were discharged. Asian group has been associated with high death rate (50%) and only 50% of its patients were discharged.

This difference is not statistically significant because p value is >0.05 (p=0.18564)

Table 46. 2-Way Summary Table: Observed Frequencies

	Marked cells have counts > 10. Chi-square(df=4)=6.19, p=.18			
RACE	OUTCOMES D	OUTCOMES DE	OUTCOMES TR	Row Totals
B	485	17	7	509
Row %	95.28%	3.34%	1.38%	
W	12	1	1	14
Row %	85.71%	7.14%	7.14%	
ASIAN	1	1	0	2
Row %	50.00%	50.00%	0.00%	
Totals	498	19	8	525

Table 47. Categorized Histogram: Race x outcomes



6.17. AGE AND OUTCOMES

The mean age for “discharged” outcome is 27.4 years whereas for “death” it is 33 years with a minimum of 26 and a maximum of 40.

Nevertheless, the difference in mean age is not statistically significant as p value is greater than 0.05.

Table 48. Outcomes- LS Means

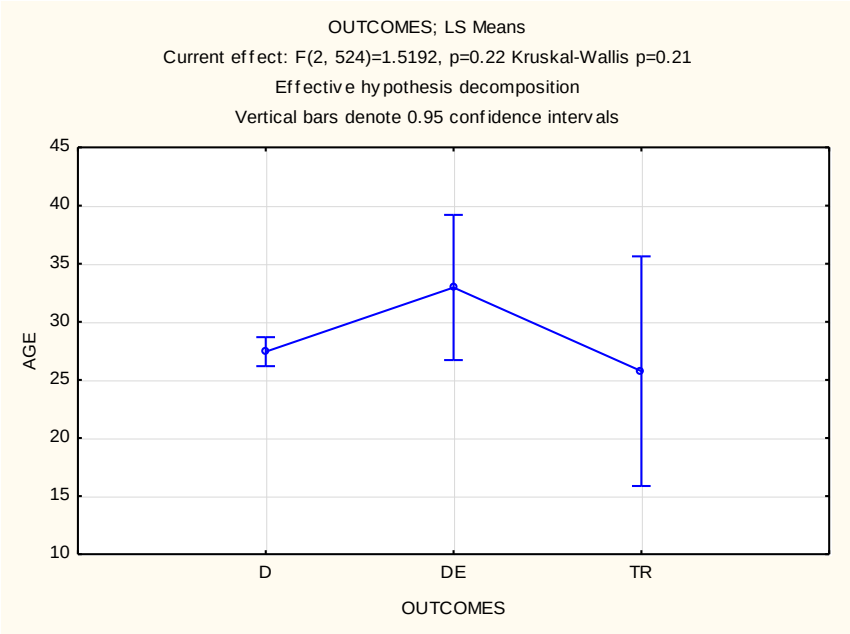


Table 49. Outcomes - LS Means

Cell No.	OUTCOMES; LS Means (DATA1 in DATA WITS 20110523.st Current effect: F(2, 524)=1.5192, p=.21984 Effective hypothesis decomposition OUTCOMES	AGE Mean	AGE Std.Err.	AGE -95.00%	AGE +95.00%	N
1	D	27.4260	0.63681	26.1750	28.6770	499
2	DE	32.9500	3.18089	26.7011	39.1988	20
3	TR	25.7500	5.02943	15.8696	35.6303	8

Discharged outcome has a lower limit at age of 26 and upper limit of 28.6 and the true mean age is contained in this interval with a confidence of 0.95.

Death and transfer outcomes have a small number (N) of 20 and 8 respectively. Therefore it is difficult to determine with certainty a true mean age for these categories and their confidence intervals are much wider.

Table 50. Descriptive Statistics

Effect	Descriptive Statistics (DATA1 in DATA WITS 20110523.stw)						
	Level of Factor	N	AGE Mean	AGE Std.Dev.	AGE Std.Err	AGE -95.00%	AGE +95.00%
Total		527	27.6102	14.2394	0.62027	26.3917	28.8287
OUTCOMES	D	499	27.4260	14.2688	0.63876	26.1710	28.6810
OUTCOMES	DE	20	32.9500	15.0314	3.36113	25.9150	39.9849
OUTCOMES	TR	8	25.7500	7.0862	2.50535	19.8257	31.6742

6.18. AGE GROUP AND TBI CAUSES

57% of assault and 38 % of motor vehicle related injuries occurred in younger than 35 years of age.

More than half (57%) of TBI in older than 35 years were due to assault injuries. transportation accidents related injuries represent 43% of TBI in this category.

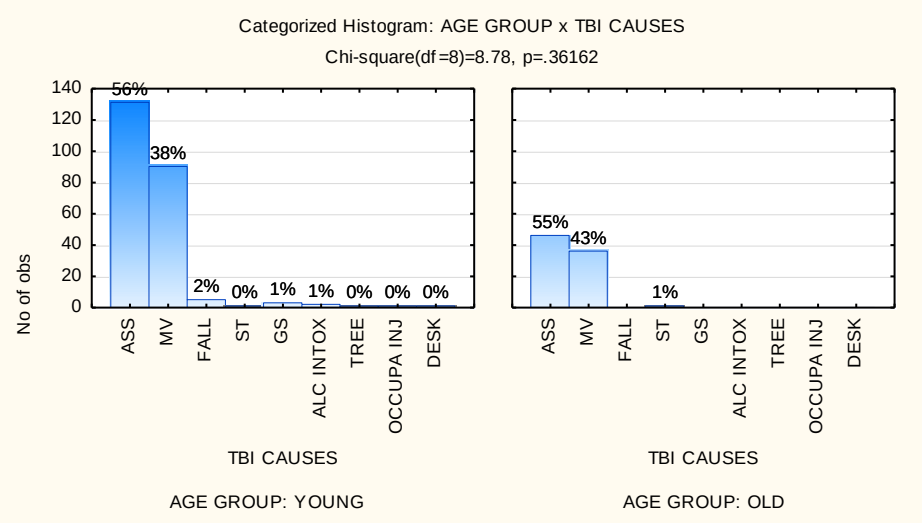
Thus, assault injuries have been found to be the major causes of TBI in both young and older participants in this study.

However, the causes of TBI in both younger and older than 35 years do not differ significantly as p value is greater than 0.05.

Table 51. 2-Way Summary Table: Observed frequencies

AGE GROUP	Marked cells have counts > 10. Chi-square(df=8)=8.78, p=.36162									
	TBI CAUSES ASS	TBI CAUSES MV	TBI CAUSES FALL	TBI CAUSES ST	TBI CAUSES GS	TBI CAUSES ALC INTOX	TBI CAUSES TREE	TBI CAUSES OCCUPA INJ	TBI CAUSES DESK	Row Totals
YOUNG	131	90	5	1	3	2	1	1	1	235
Row %	55.74%	38.30%	2.13%	0.43%	1.28%	0.85%	0.43%	0.43%	0.43%	
OLD	46	36	0	1	0	0	0	0	0	83
Row %	55.42%	43.37%	0.00%	1.20%	0.00%	0.00%	0.00%	0.00%	0.00%	
Totals	177	126	5	2	3	2	1	1	1	318

Table 52. Categorized Histogram: Age group x TBI causes



6.19. GENDER AND TBI CAUSES

61% of assault TBI injuries were recorded in male patients and 48% in female.

Assault remains the main cause of TBI in both male (61%) and female (48%).

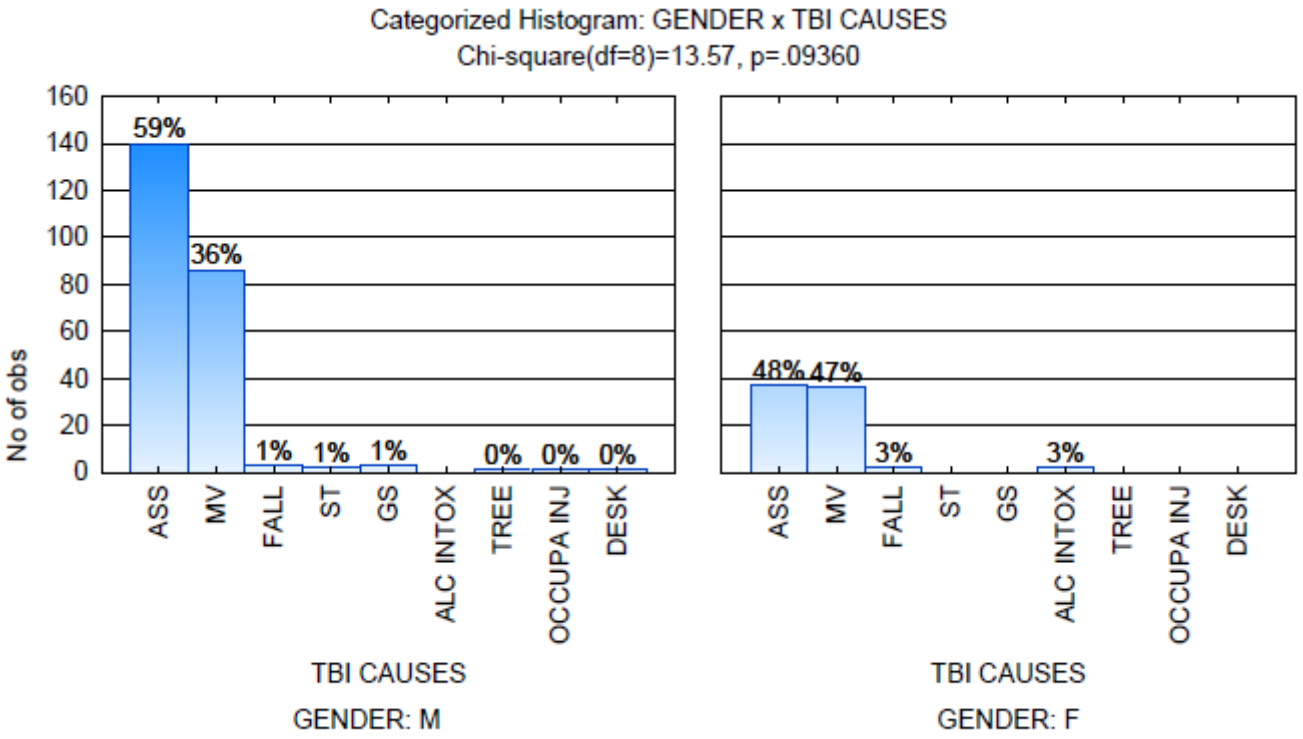
Motor vehicle related injuries are higher in female (47%) than males (36%).

However this difference is not statistically significant as p value is not less than 0.05.

Table 53. 2-Way Summary Table: Observed frequencies

	Marked cells have counts > 10. Chi-square(df=8)=13.57, p=.09360									
GENDER	TBI CAUSES ASS	TBI CAUSES MV	TBI CAUSES FALL	TBI CAUSES ST	TBI CAUSES GS	TBI CAUSES ALC INTOX	TBI CAUSES TREE	TBI CAUSES OCCUPA INJ	TBI CAUSES DESK	Row Totals
M	140	86	3	2	3	0	1	1	1	237
Row %	59.07%	36.29%	1.27%	0.84%	1.27%	0.00%	0.42%	0.42%	0.42%	
F	37	36	2	0	0	2	0	0	0	77
Row %	48.05%	46.75%	2.60%	0.00%	0.00%	2.60%	0.00%	0.00%	0.00%	
Totals	177	122	5	2	3	2	1	1	1	314

Table 54. Categorized Histogram: Gender x TBI causes



6.20. RACE AND TBI CAUSES

58 % of assault injuries have been observed in black population group.

TBI injuries in Asian population are due to assault with gunshot injuries alone accounting for 50%.

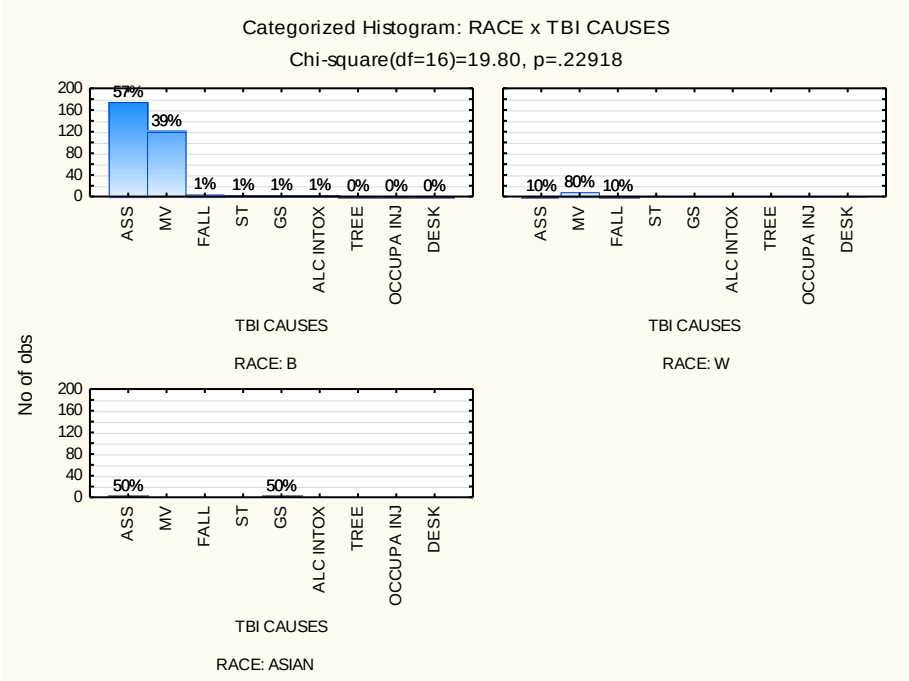
Whereas in white population, 80% of TBI injuries are due to motor vehicle related injuries and fall injuries in this group represent 10%. Moreover, assault injuries are less common in white population (10%) as compared to black (58%).

However the difference between these different races in regards to TBI causes are not statistically significant as p value is > 0.05 (p=0.229).

Table 55. 2-Way Summary Table: Observed Frequencies

RACE	TBI CAUSES ASS	TBI CAUSES MV	TBI CAUSES FALL	TBI CAUSES ST	TBI CAUSES GS	TBI CAUSES ALC INTOX	TBI CAUSES TREE	TBI CAUSES OCCUPA INJ	TBI CAUSES DESK	Row Totals
Marked cells have counts > 10. Chi-square(df=16)=19.80, p=.22918										
B	175	120	4	2	2	2	1	1	1	308
Row %	56.82%	38.96%	1.30%	0.65%	0.65%	0.65%	0.32%	0.32%	0.32%	
W	1	8	1	0	0	0	0	0	0	10
Row %	10.00%	80.00%	10.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
ASIAN	1	0	0	0	1	0	0	0	0	2
Row %	50.00%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	0.00%	
Totals	177	128	5	2	3	2	1	1	1	320

Table 56. Categorized Histogram: Race x TBI Causes



6.21. TBI SEVERITY AND TBI CAUSES

- Severe TBI: 55% of severe TBI are due to motor vehicle related injuries, 45 % to assault injuries with 14% to gunshot injuries.

- Moderate injuries: the main cause of moderate TBI is assault (46%) followed by motor vehicle accidents which accounts for 39%. Fall and alcohol intoxication related injuries representing each 7%.

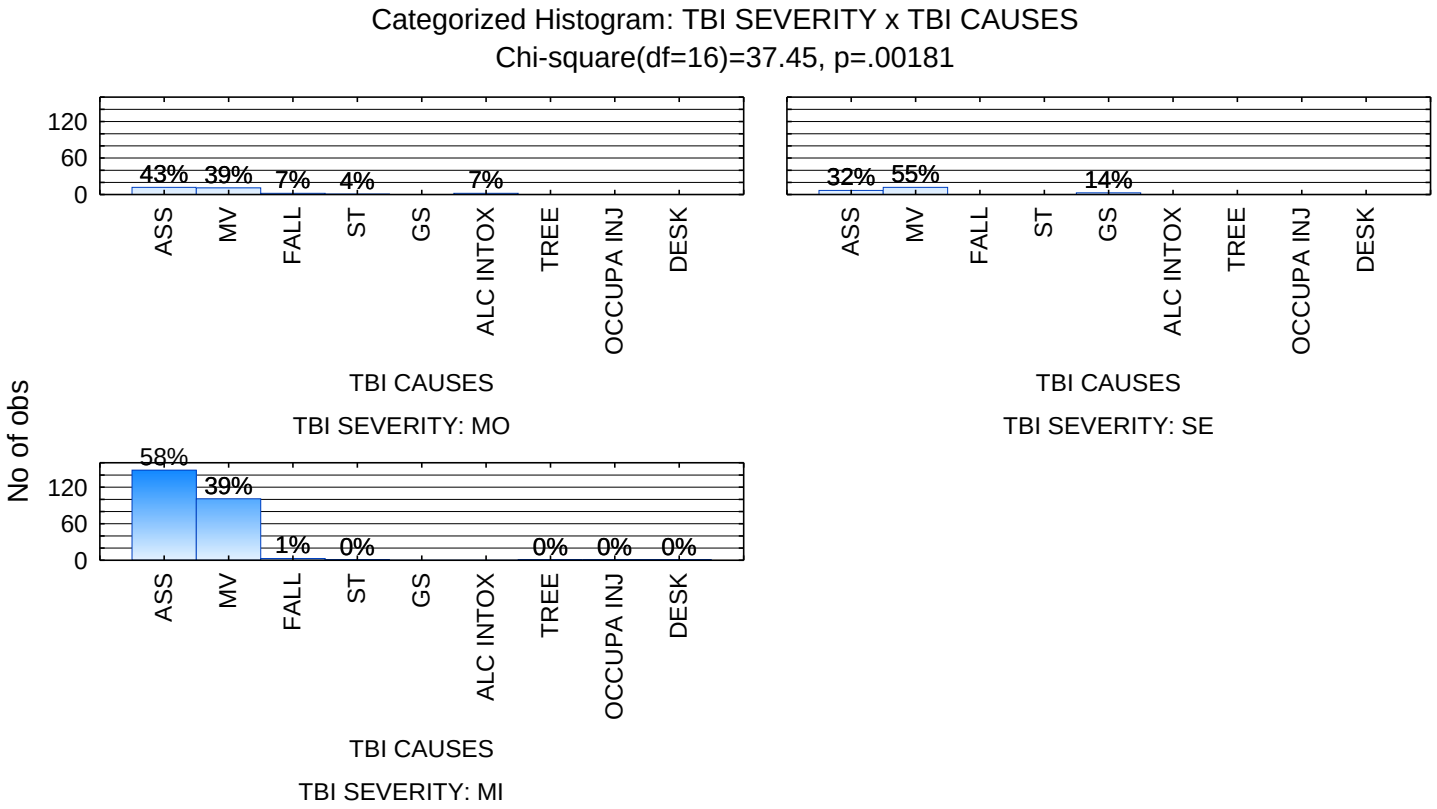
- Mild injuries: assault constitutes the main cause in this category with 58% of all injuries, followed by motor vehicles injuries (39%).

Thus, motor vehicles accidents related injuries have been found to be the main cause of severe TBI whereas assault injuries are the most common causes of mild and moderate TBI at Vryheid.

Table 57. 2-Way Summary Table: Observed Frequencies

	Marked cells have counts > 10. Chi-square(df=16)=37.45, p=.00181									
TBI SEVERITY	TBI CAUSES ASS	TBI CAUSES MV	TBI CAUSES FALL	TBI CAUSES ST	TBI CAUSES GS	TBI CAUSES ALC INTOX	TBI CAUSES TREE	TBI CAUSES OCCUPA INJ	TBI CAUSES DESK	Row Totals
MO	12	11	2	1	0	2	0	0	0	28
Row %	42.86%	39.29%	7.14%	3.57%	0.00%	7.14%	0.00%	0.00%	0.00%	
SE	7	12	0	0	3	0	0	0	0	22
Row %	31.82%	54.55%	0.00%	0.00%	13.64%	0.00%	0.00%	0.00%	0.00%	
MI	148	101	3	1	0	0	1	1	1	256
Row %	57.81%	39.45%	1.17%	0.39%	0.00%	0.00%	0.39%	0.39%	0.39%	
Totals	167	124	5	2	3	2	1	1	1	306

Table 58. Categorized Histogram: TBI severity x TBI causes



6.22. MANAGEMENT AND TBI CAUSES

61% of TBI seen and discharged from casualty department were assault related injuries whereas 50% of admission is due to motor vehicle accidents and 43% to assault. None of the gunshot injuries were discharged from Casualty.

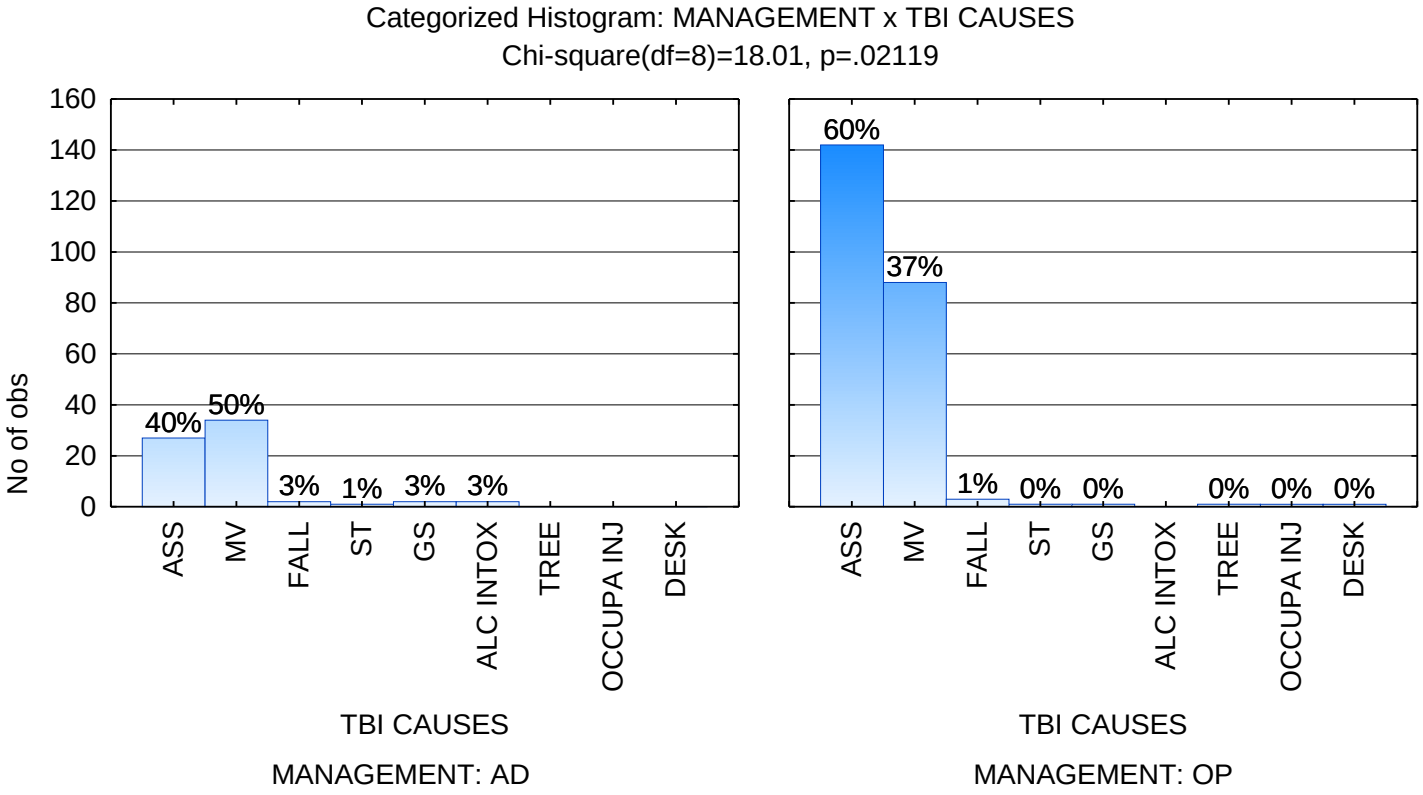
Assault related injuries constitute the major cause of TBI discharged at Vryheid casualty department. These differences are statistically significant (p=0.02).

Table 59. 2-Way Summary Table: Observed Frequencies

Marked cells have counts > 10. Chi-square(df=8)=18.01, p=.02119

MANAGEMENT	TBI CAUSES ASS	TBI CAUSES MV	TBI CAUSES FALL	TBI CAUSES ST	TBI CAUSES GS	TBI CAUSES ALC INTOX	TBI CAUSES TREE	TBI CAUSES OCCUPA INJ	TBI CAUSES DESK	Row Totals
AD	27	34	2	1	2	2	0	0	0	68
Row %	39.71%	50.00%	2.94%	1.47%	2.94%	2.94%	0.00%	0.00%	0.00%	
OP	142	88	3	1	1	0	1	1	1	238
Row %	59.66%	36.97%	1.26%	0.42%	0.42%	0.00%	0.42%	0.42%	0.42%	
Totals	169	122	5	2	3	2	1	1	1	306

Table 60. Categorized Histogram: Management x TBI causes



6.23. OUTCOMES AND TBI CAUSES

62 % of admitted motor vehicle accidents related TBI and 38 % of assault injuries (15% gunshot injuries) died. 50% of gunshot injuries were transferred to tertiary institutions and 57% of assault related TBI were discharged.

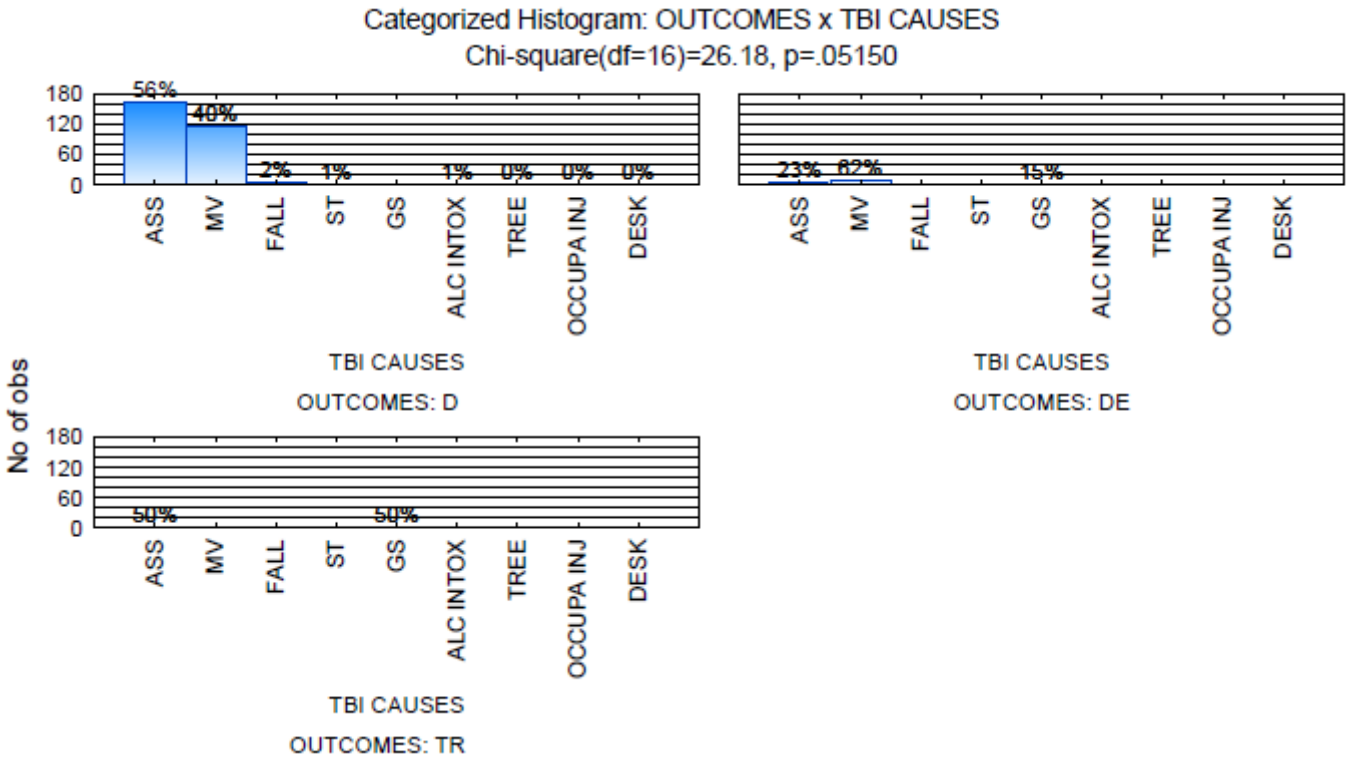
Motor vehicle accidents injuries are the major cause of death of TBI admitted at Vryheid while assault injuries are associated with more than half of discharged at Vryheid.

Table 61. 2-Way Summary Table: Observed frequencies

Marked cells have counts > 10. Chi-square(df=16)=26.18, p=.05150

OUTCOMES	TBI CAUSES ASS	TBI CAUSES MV	TBI CAUSES FALL	TBI CAUSES ST	TBI CAUSES GS	TBI CAUSES ALC INTOX	TBI CAUSES TREE	TBI CAUSES OCCUPA INJ	TBI CAUSES DESK	Row Totals
D	164	115	5	2	0	2	1	1	1	291
Row %	56.36%	39.52%	1.72%	0.69%	0.00%	0.69%	0.34%	0.34%	0.34%	
DE	3	8	0	0	2	0	0	0	0	13
Row %	23.08%	61.54%	0.00%	0.00%	15.38%	0.00%	0.00%	0.00%	0.00%	
TR	1	0	0	0	1	0	0	0	0	2
Row %	50.00%	0.00%	0.00%	0.00%	50.00%	0.00%	0.00%	0.00%	0.00%	
Totals	168	123	5	2	3	2	1	1	1	306

Table 62. Categorized Histogram: Outcomes x TBI causes



6.24. PROGNOSIS AND TBI CAUSES

57% of assault injuries had a good prognosis but 56% of motor vehicle and 44% of assault injuries were associated with bad prognosis, gunshot injuries accounting for 19%.

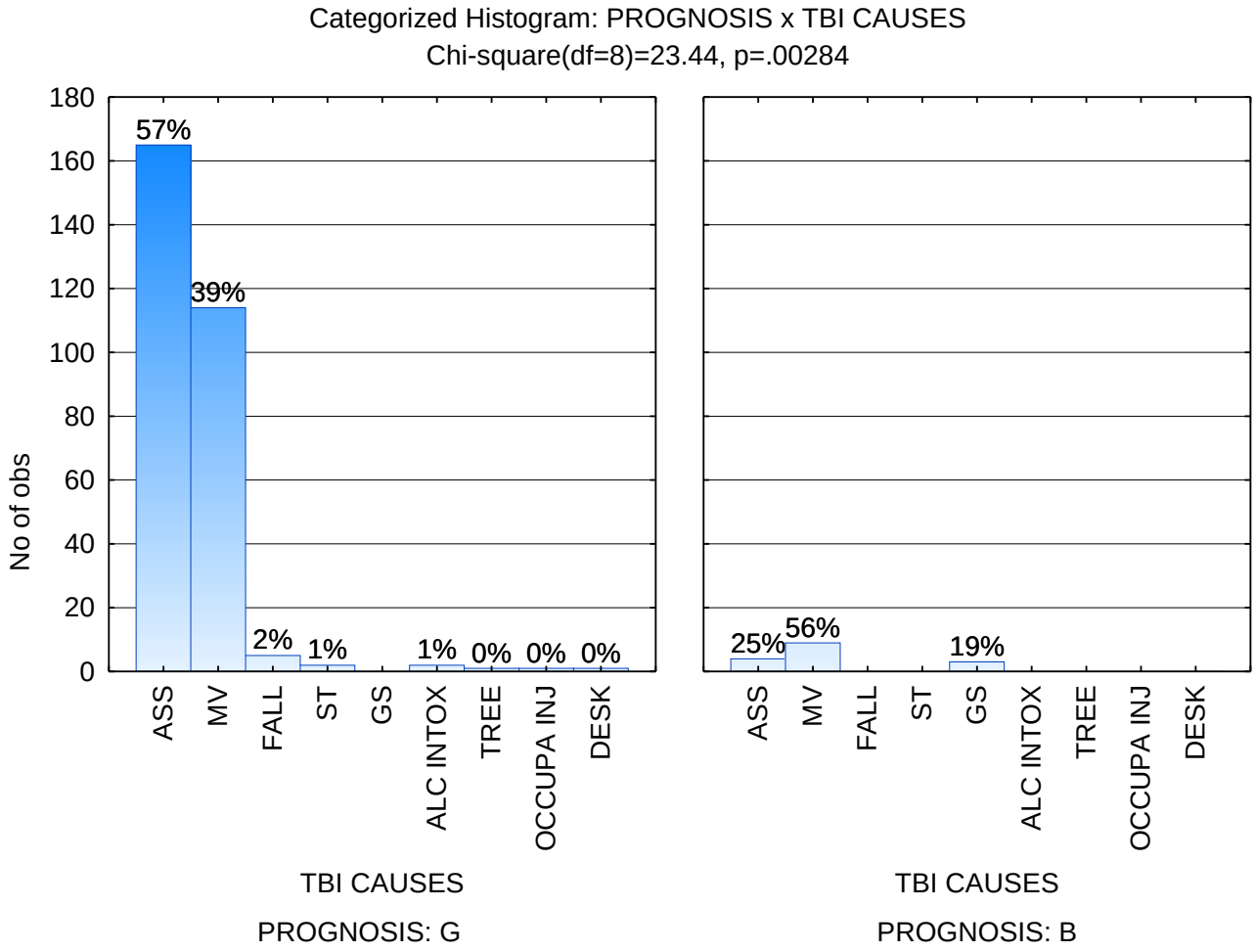
This difference is statistically significant as p value is less than 0.05(p=0.00284).

Table 63. 2-Way Summary Table: Observed frequencies

Marked cells have counts > 10. Chi-square(df=8)=23.44, p=.00284

PROGNOSIS	TBI CAUSES ASS	TBI CAUSES MV	TBI CAUSES FALL	TBI CAUSES ST	TBI CAUSES GS	TBI CAUSES ALC INTOX	TBI CAUSES TREE	TBI CAUSES OCCUPA INJ	TBI CAUSES DESK	Row Totals
G	165	114	5	2	0	2	1	1	1	291
Row %	56.70%	39.18%	1.72%	0.69%	0.00%	0.69%	0.34%	0.34%	0.34%	
B	4	9	0	0	3	0	0	0	0	16
Row %	25.00%	56.25%	0.00%	0.00%	18.75%	0.00%	0.00%	0.00%	0.00%	
Totals	169	123	5	2	3	2	1	1	1	307

Table 64. Categorized Histogram: Prognosis x TBI causes



7. DISCUSSIONS

7.1. MAIN FINDINGS

7.1.1. AGE DISTRIBUTION

75% of Traumatic Brain Injuries studied at Vryheid Hospital occurred mainly in patients younger than 35 years with a peak of injuries between 20 and 30 years and a mean age of 28 years.

However, 25 percent of TBI occurred in older than 35 years of age.

7.1.2. GENDER DISTRIBUTION

78% of TBI at Vryheid Hospital were observed in the male category and only 22% in females.

7.1.3. RACE

Black population has been the most affected by traumatic brain injuries at Vryheid (78%).

Only 0.3% of TBI were recorded in Asian group and 2.4% in white population.

However, coloured population has not been recorded in this study.

7.1.4. TBI TYPES

Blunt trauma represents the majority of traumatic brain injuries in Vryheid (96% blunt).

Penetrating injuries only account for 4% of TBI in this study.

7.1.5. TBI CAUSES

Assault related traumatic brain injuries constitute the major causes of TBI at Vryheid (57%), gunshot and stab related injuries only accounting for 2%.

While motor vehicle accidents with its 40% are the second major causes of all TBI recorded at Vryheid.

7.1.6. TBI SEVERITY

Almost **t**hree-quarter (3/4) of traumatic brain injuries at Vryheid were mild presentations and moderate TB injuries occurred in 18% of cases.

However, severe TBI represent 10% of all TBI seen at the hospital during 2009.

7.1.7. TBI OUTCOMES

95% of patients suffering from TBI at Vryheid hospital were discharged either from the casualty department or after admission to the wards.

Nevertheless, 3.8% of TBI patients died either in casualty or in the wards and 1.5 percent were transferred out either for CT scan or for further management at specialized centres.

Moreover, it is difficult to establish especially in retrospective study if death in these cases was solely due to head injuries or other co- morbidities or multiple injuries.

7.1.8. TBI PROGNOSIS

Traumatic brain injuries at Vryheid hospital have been associated with good prognosis in the majority of cases.

However, a small number of patients (6.3%) had a poor prognosis.

7.1.9. TBI MANAGEMENT PLAN

60% of patients with TBI seen at Vryheid casualty department were treated as ambulatory patients and only 40% were admitted in the wards.

7.1. 10. TBI HOSPITAL STAY LENGTH

The mean duration for hospital stay in patients with TBI at Vryheid was 2.2 days.

The majority of patients spent less than a day in the hospital.

Nonetheless, some patient spent 129 days in the hospital.

It is difficult to differentiate between prolonged stay related to isolated head injuries from other injuries associated with Head injuries.

7.1.11. TBI TYPES AND AGE

Traumatic brain injuries at Vryheid are very common in patients younger than 35 years with 88 percent of penetrating injuries and 73% of blunt TBI occurring in this group alone.

Nonetheless, the difference between younger and older patients with TBI is not statistically significant as p value is greater than 0.05.

7.1.12. TBI TYPES AND GENDER

More than ¾ (third- quarter) of traumatic brain injuries at Vryheid occurred in male patients with 79 % of blunt trauma and 97% of penetrating TBI.

Less than ¼ (quarter) of TBI injuries were observed in female counterpart.

Despite this huge difference between the 2 sexes, it is not statistically significant ($p>0.05$).

7.1.13. TBI TYPES AND RACE

Traumatic brain injuries at Vryheid hospital were mostly observed in the black population: more than ¾ of blunt and penetrating injuries recorded during 2009.

However, blunt and penetrating injuries are not common in white and Asian groups: penetrating injuries are uncommon in white group whereas Asian population is characterized by the absence of blunt injuries.

It is important to note that the difference between theses racial categories is statistically significant ($p<0.05$).

The above observation brings to mind an important thought or question: could black population been considered as high risk group for traumatic brain injuries at Vryheid?

7.1.14. AGE AND TBI TYPES

The mean age for traumatic brain injuries recorded at Vryheid hospital during 2009 is 29 years for penetrating injuries and 28 years for blunt trauma.

For penetrating injuries, the lower limit age is at 20 years and the upper limit at 38 with a confidence interval of 0.95. However, this confidence interval is wider because of the small size of the participants for this particular type of injury. Blunt injuries on the other hand, have a lower limit age at 26 and upper limit at 30 with 95% confidence. The confidence interval in this case is narrowed because of a big number of participants.

The difference in mean age between these 2 groups is not statistically significant (p=0.7).

7.1.15. TBI TYPES AND TBI CAUSES

Assault injuries have been found to be the causes of all penetrating head injuries at Vryheid.

Gunshot injuries represent the main category of assault related injuries at Vryheid hospital.

Half of blunt traumatic brain injuries are due to motor vehicle accidents but assaults accounts for 45 % of these injuries.

The difference between causes of blunt and penetrating injuries is statistically significant.

7.1.16. TBI PROGNOSIS AND OUTCOMES

The majority of TBI with good prognosis on admission were discharged. However, less than half of a percent of patients were transferred out.

It is sad to note that almost 70% of patients with bad prognosis on admission died, only 7% were discharged and almost ¼ of these patients were transferred.

Thus, traumatic brain injuries with bad prognosis are associated with higher mortality and transfer rate.

However, one may not be able to establish if these deaths were solely due to brain injuries alone or associated to other severe injuries.

7.1.17. GENDER AND OUTCOMES

Traumatic brain injuries in female patients at Vryheid were associated with good outcomes: 99% were discharged and death occurred only in o.8%.

In male counterparts, death has been recorded in 4% with a transfer out rate of 2% and 94% of patients were discharged.

The difference between these 2 groups is statistically significant.

7.1.18. RACE AND OUTCOMES

The majority of TBI in black and white populations is associated with good outcomes.

However, Asian group has been characterized by high mortality and poor discharge rates.

This difference is not statistically significant.

7.1.19. AGE AND OUTCOMES

The mean age for “discharged outcome” has been calculated at 27.4 years and 33 years for “death outcome”.

Discharged outcome has a lower limit at age 26 and upper limit at 28.6 and the true mean age is contained in this interval with a confidence interval of 0.95.

Death and transfer outcomes have a small number of participants (N) of respectively 20 and 8 making difficult to determine with certainty a true mean age for these categories and their confidence intervals are much wider.

Nevertheless, the difference in mean age between the above outcomes is not statistically different.

7.1.20. AGE AND TBI CAUSES

Assault and transportation accidents specifically motor vehicle related traumatic brain Injuries constitute the main causes of TBI recorded at Vryheid in both young and older patients with assault injuries causing more than half of TBI.

However the causes of TBI in both younger and older than 35 years do not differ significantly (p= 0.36162)

7.1.21. GENDER AND TBI CAUSES.

The main causes of TBI in both male and female patients are represented by assault and motor vehicles injuries.

Nonetheless, motor vehicle accidents are higher in female than male.

The difference between these 2 groups is not statistically significant (p=0.09360)

7.1.22. RACE AND TBI CAUSES

More than half of TBI in black population is due to assault injuries, whereas Motor vehicle accidents constitute the majority of causes of TBI in white category.

All traumatic brain injuries in Asian group were due to assault. However, only 2 cases of TBI were recorded in this category, making it difficult to make any extrapolation.

The difference between the above categories is not statistically significant (p=0.229)

7.1.23. TBI SEVERITY AND TBI CAUSES

Motor vehicle injuries constitute the common causes of severe traumatic brain injuries in this study.

However, assault injuries have been associated with mild and moderate traumatic brain injuries.

This difference is statistically significant (p= 0.0181).

7.1.24. MANAGEMENT AND TBI CAUSES

The majority of patients with TBI due to assault injuries were discharged and none of gunshot injuries were discharged from casualty.

Half of TBI admission was due to motor vehicle accidents.

However, the difference between these 2 groups is statistically significant (p=0.02119).

7.1.25. OUTCOMES AND TBI CAUSES

Motor vehicle accidents are the main causes of death in patients with TBI admitted to the wards whereas assault injuries constitute the majority of discharged patients.

Moreover, half of gunshot and stab injuries were transferred out to tertiary institutions for further management.

These groups do not differ from each other as p value is 0.05150

7.1.26. PROGNOSIS AND TBI CAUSES

The majority of assault injuries were associated with good prognosis.

Motor vehicle accidents accounted for the majority of TBI associated with bad prognosis.

This difference in prognosis of TBI causes is statistically significant (p=0.00284)

7.2. COMPARISON WITH OTHER STUDIES

This study has revealed the following findings:

- Traumatic brain injuries are very common (97%) in black population than any other racial groups in Vryheid.
- The male sex has the highest rate of occurrence of TBI than females at Vryheid but the difference is not statistically significant.
- The mean duration for hospital stay of TBI patients was 2.2. days with less than one day as the lower limit and 129 days upper limit
- Traumatic brain injuries have been associated with good prognosis in the majority of cases.
- Blunt trauma is the main type of TBI recorded at Vryheid.
- Assault injuries are the main causes of penetrating TBI whereas motor vehicles accidents account for the majority of blunt trauma and severe TBI.
- The mean age for TBI in this study is 28 years and most of the TBI occurred in younger than 35 years: 28 years for blunt trauma and 29 years for penetrating trauma.

- The majority of patients with TBI at Vryheid hospital are mostly discharged from the casualty department**:** 60 % ambulatory versus 40% admissions**.**
- Mild traumatic brain injuries are the main presentation of TBI at Vryheid hospital.
- Severe traumatic brain injuries, although representing 10% of all TBIs at Vryheid, are associated with high mortality.
- Traumatic brain injuries in female patients have been associated with good prognosis.

Most of these findings are not new and have reported in most of the literature consulted.

7.3. STRENGTHS AND WEAKNESSES OF THE STUDY

This type of study has been conducted for the first time at Vryheid and has given an opportunity for further studies in the filed especially the prospective one.

There have been some limitations as one may expect with retrospective study at government health facilities such as lack of complete and detailed information. Glasgow outcome scale could not be used in this study because of the above reason.

One may have an impression that some of the variables or parameters studied have a big number of participants than others. This is attributed to the fact that patients who did not have all the parameters studied were not excluded from the study due to intention to treat analysis approach.

The coloured population which is part of Abaqulusi municipality's racial groups has not been mentioned in this study because there has not been data at the hospital referring to this category during in 2009.This may be attributed to poor record keeping.

8. CONCLUSION AND RECOMMENDATIONS

1. Assault and motor vehicle injuries are the main causes of traumatic brain injuries at Vryheid hospital but motor vehicles have been associated with high mortality rate and severe type of injuries.

2. Black group was the most affected community by traumatic brain injuries at Vryheid during 2009

3. Although most of the traumatic brain injuries are mild injuries, 10 % of TBI are severe. Therefore traumatic brain injuries at Vryheid constitute a public health problem and thus require both local and national level interventions to address this situation. Thus, few recommendations on how to tackle this crisis can be formulated as follows:

- Enforcing road safety laws

- Establishing forums where community members, leaders and authorities can discuss the impact of violence and motor vehicle accidents on the community and adopt strategies to curb the rising of traumatic brain injuries.

4. The results of this study will be shared with the local managers, health workers and community to highlight the impact of traumatic brain injuries at Vryheid.

5.. There is a pressing need for the government to invest in and improve record keeping at public health facilities in order to motivate researchers to conduct retrospective studies at these facilities and assist in drawing recommendations that will help the government in improving the health status of local communities.

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10. APPENDICES

DATA COLLECTION SHEET

Codes	Age	Sex:	Race	Types:	Causes:	Severity:	Hospital stay duration	Prognosis and Outcomes:
Numbers		Female Male	Black White Asian Colour	Blunt Penetrating	MVA Assault Fall Sports Gunshot Occupation shaking	Mild Moderate Severe	< 1 week 1 Week >1 Week	Discharged Admitted Transfer out Death Outpatient
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
etc								

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www.kznhealth.gov.za

Reference : HRKM136/10
Enquiries : Mrs G Khumalo
Telephone : 033 – 3953189

23 August 2011

Dear Dr C N Kibamba

Subject: Approval of a Research Proposal

1. The research proposal titled **'Traumatic Brain Injuries (TBI) at Vryheid hospital during 2009'** was reviewed by the KwaZulu-Natal Department of Health.

   The proposal is hereby **approved** for research to be undertaken at **Vryheid Hospital**.

2. You are requested to take note of the following:
   a. Make the necessary arrangement with the identified facility before commencing with your research project.
   b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Mrs G Khumalo on 033-3953189.

Yours Sincerely

Mrs E Snyman
Interim Chairperson, Health Research Committee
KwaZulu-Natal Department of Health
Date: 23/08/2011

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Crispin N Kibamba

CLEARANCE CERTIFICATE	**M10924**
PROJECT	Traumatic Brain Injury at Vryheid During 2009
INVESTIGATORS	Dr Crispin N Kibamba.
DEPARTMENT	Department of Family Medicine
DATE CONSIDERED	01/10/2010
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 01/10/2010 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Dr John Ouma

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...