

# **Analysis of Traffic Offences in Windhoek**

**P. Kashona**

### ***Acknowledgement***

Firstly, I would like to pay my gratitude and thank God for his blessings and strength he has given me to tackle this challenging task. Secondly, I wish to acknowledge the guidance I have received from my hard working supervisor, Dr. Isak Neema, mostly for helping me on how to address the Problem Statement, without him I would not have succeeded. Moreover, I would like to thank all the lecturers within Statistics Department for the productive and positive comments they made during presentations of my Proposal and Draft report. Let me not forget my friends and my fellow classmates, most specifically Mr. Sigbert Haingura, Ms. Fransina Amutenya and Mr. Maitlhoko Monnawaletsatsi, for giving me courage in my work and helping me out with some ideas to add to my project. I owe thanks to Mr. Bethino Mbirimujo and to the National Road Safety Council in particular, for providing me with the accident Data and helped to explain what the variables meant. Finally, I would like to thank my family members, especially my niece Ms. Albertina Sakeus and my brother Mr. Isak Nangombe who assisted me financially throughout my stay at the University. In loving memory of my mother, Rosalia Iyambo, without whom I would never be the lady that I am today. She is the reason that I work so hard, through difficult times and easy, because no matter what cards were dealt to a person, they can always triumph. May her soul rest in eternal peace.

## **CHAPTER 1**

### **1.1 BACKGROUND INFORMATION**

Namibia has recently adopted an integrated traffic safety management system. This was implemented after the traffic authority realized that its post independence (1989) approach to traffic safety was incapable of delivering adequate priority to traffic safety. The system implemented focused on regulations including alcohol and other drugs abuse, speed management, overloading problem, taxi's, driver training, seat belt wearing, a forgiving road environment and vulnerable road users (Prosser and Pretorius, 1997).

The city of Windhoek has adopted this new traffic laws. Since independence the city of Windhoek grows rapidly. The population has vastly increased, the geographical area for the city has gone beyond expectation and the increase in infrastructure has made the city a destination of choice. Despite its recommendable attractions, the city has been criticized for numerous life threatening incidents. This includes road related accidents and other traffic violations by its inhabitants. A significance increase in traffic violation and subsequent road accidents around the city Windhoek become a concern. Speeding, DUI (Driving under the influence) and other dangerous driving has claimed many lives within the boundary of the city of Windhoek. The city reprimands these road offenders by with fines, also known as traffic tickets. The research on the nature and extent of some of these traffic offences around the city of Windhoek was carried out. Quantitative and qualitative data were collected and a comparative analysis was done to identify relationships between various traffic offences among the offenders.

### **1.2 PROBLEM STATEMENT**

The city has experience a rapid increase in traffic. This traffic congestion has become a headache for the road users around the city. The severe increment of motorists has led to motorists coming into infringement with the traffic regulation authority on a daily basis due to various criminal traffic violations This ranges from a motor vehicle not worthwhile to a driver not having proper documentations to perform duties on a public road and many alike. There may be times when

such situation can even lead to accidents whereby loss of lives or destruction of properties occurs. Some of these incidents could be avoided with more reinforcements from the traffic control department. Therefore the causes of these traffic violations need to be identified and rectified for the safety of the citizens. By law, any form of severe infractions that could carry the penalty of imprisonment is deemed as criminal traffic offense.

### **1.3 SIGNIFICANCE OF THE STUDY**

The aim of this study was to categorize prominent behavior and social characteristics that are common to traffic offenders and may be predictive for future traffic offences they are likely to commit as well as their risk of recidivism. The research is intended to explore the relationship between these traffic violations for possible redemption. It will assist the city of Windhoek in identifying some underlying factors that may be frequently hazardous to the road users. It is only when we understand the root cause as well as patterns allied with these offences that we, as a nation in general and the law enforcement agencies in particular, may address the problem more effectively. It is against this background that an extensive research becomes necessary to analyze and identify patterns upon which traffic offenders can be associated.

### **1.4 RESEARCH OBJECTIVES**

The main topic of interest analyses being reprimanded with a traffic fine (ticket) based on one or possibly many of the following violation: speeding, seat belt, wrong turn, drinking and driving, entering an unauthorized zone and so many other traffic violations deemed punishable by the traffic authorities within the jurisdiction on the city traffic authorities. In particular, the study aims to find answers to the following questions:

- Which gender group is more likely to commit traffic offenders?
- What age group commits more motor vehicle offences around the city of WHK?
- Which month is the most hazardous to road users?
- What are the major causes of traffic felonies among road users around WHK?

Therefore, the outcome of this research will be beneficial to the road authorities and the community of WHK.

### **1.4 HYPOTHESES**

**The study aims to ascertain the following hypotheses:**

1. To assess the courteousness of driving between taxi drivers and non-taxi drivers around the city.
2. To ascertain whether there is a difference in gender based driving among drivers around the city.
3. To determine whether there is a difference in number of traffic violation for each month.
4. To observe the difference in the number of traffic violations perpetrated by the two age groups.

## Chapter 2

### LITERATURE REVIEW

Similar researches were conducted by several researchers from many different countries in this field. Although each research was carried out with different purposes on a similar topic, their findings are significantly related.

An extensive study carried out by the Centre for Accident Research and Road Safety – Queensland

On the relationship between traffic offences and other types of crime have made the following discovery:

- Traffic accidents, drink driving offences and assaults peak after midnight around the closing times of liquor trading places (Chikritzhs et al., 1997; Smith, 1988) and when closing times are varied a shift in the pattern of drink driving offences and traffic accidents occurs to coincide with the new closure times.
- Approximately one third of all types of traffic offences related to driving under the influence of alcohol.
- Youths of 20-24 year old age group committed more traffic offences than other age groups.
- The greatest difference for serious traffic offences was observed for Fridays and Saturdays indicating that serious traffic offences were more likely to occur on these days.

Another distinctive research was carried out by the Hartford Courant's Matthew Kauffman, who found that minorities were ticketed far more often than white drivers when stopped for the same offense: The disparity was most striking among Hispanic motorists, who were more likely than both whites and blacks to be ticketed in each of 13 categories of violations — such as speeding, cell phone violations, running stop signs and improper license-plate display — for which there were at least 1,000 stops.

The study found that in more than 2,600 stops involving improper taillights, black motorists were twice as likely, and Hispanics nearly four times as likely, to be ticketed than white drivers. The traffic reports do not include such information as the circumstances of the stop, the behavior

and driving history of the motorist or the race of the officer, so by themselves don't explicitly prove the widespread existence of racial profiling or racist policing.

Another study carried out in the Netherlands on the relation between traffic offences and crashes found that there is a relation between the number of traffic offences that is committed and the crash involvement that the more traffic offence a person commits, the likely he/she will commit a similar serious traffic accident sometimes in the future.

## **Chapter 3**

### **STUDY METHODOLOGY**

The study was done on the basis of the primary data recorded in the traffic control log book ( see appendix A). The information was recorded as per the offence by the traffic control officers every moment possible. The study was conducted over a four month period commencing from 00:00 hours of Jan 01, 2012 to 24:00 hrs of April 31, 2012. The data collected was summarized and analyzed with non-parametric statistical tests and the subsequent results obtained were used to make the decision on the aforementioned assumptions. A memorandum of understanding was established between the researcher and the police department (see Appendix B).



## **CHAPTER 4**

### **Results**

#### **Causes of traffic offences**

The variable of interest was to identify and analyze prominent causes of traffic violations around the city of WHK. The following variables were identified as causes of motor vehicle offences on the field where data was collected:

1. Speeding: A motorist driving above the speed limit as authorized by the traffic department of the city.
2. License: A motorist driving without proper documentations as authorized to drive such a vehicle, motorist's license is not valid.
3. Road worthiness: A motor vehicle is not roadworthy on any part of it. Lack of clear visibility on the beam, missing extinguisher (Trucks/minibuses/buses) poor quality tyre and many reports were categorized as such.
4. Seatbelt: A motorist fails to wear a seatbelt while operating a motor vehicle on a public road.
5. Ignorance of traffic signals: A motorist has ignored a traffic regulation notice like a STOP sign or a road marking signal like a NO overtaking warning.
6. Loading problem: A motor vehicle is conveying goods that prudent longer that the permissible distance and fails to place the loading signs on the vehicle. A motorist or passenger's body part has prudent outside the vehicle.
7. Number plate problem: The number plate is missing at any part where it supposed to be placed. The number plate is not clearly visible.
8. Overloading: A motorist is carrying more people than permitted on the vehicle.
9. Cell phone use: A motorist is talking on the mobile phone and not using headsets while operating the vehicle.

## **Data validation**

Table 2.1 (a) and (b) below is meant for data screening, cleaning and errors checking

		<b>Statistics</b>							
		reason	gender	nationality	vehicletype	month	date	time	age
N	Valid	2052	2052	2052	2052	2052	2052	2052	2052
	Missing	0	0	0	0	0	0	0	0

**Table 2.1 (a) data validation**

<b>Descriptive Statistics</b>			
	N	Minimum	Maximum
month	2052	1	4
date	2052	1	31
time	2052	0	23
gender	2052	1	2
age	2052	17	75
reason	2052	1	9
nationality	2052	1	2
vehicletype	2052	1	2
Valid N (listwise)	2052		

**Table 2.1 (b) data validation**

From the tables above it is clear that the data are clearly placed and there are no errors. There are 2052 entries and there is no missing value as shown in table 2.1. (a) The minimum and maximum values for the entries and/or codes used are indicated in table 2.1 (b). For instance, the nationality of these individuals is coded as 1 for Namibian or 2 for foreign nationals. Gender is recognized as 1 for male or 2 for female.

## **Data summary**

### **1. Months**

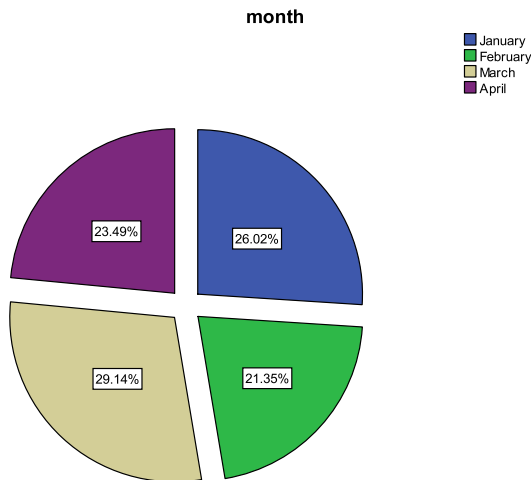
Table 2.2 below shows that during the period observed, the highest number of traffic violation was recorded in March. This represents about 29% of all the data observed as graphed in figure 2.1. There is a

decrease on the number of traffic violations in February by 4.67% compared to the January outputs. However, the number increased in March by 7.79% before it trimmed down again to 23.49% in April, a significance reduction by 5.65%.

**The month on which the offence was committed**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid January	534	26.0	26.0	26.0
February	438	21.3	21.3	47.4
March	598	29.1	29.1	76.5
April	482	23.5	23.5	100.0
Total	2052	100.0	100.0	

**Table 2.2: Frequency for traffic violation from January-April 2012**



**Figure 2.1: Traffic violations for the first quarter of the year 2012**

## 2. Gender

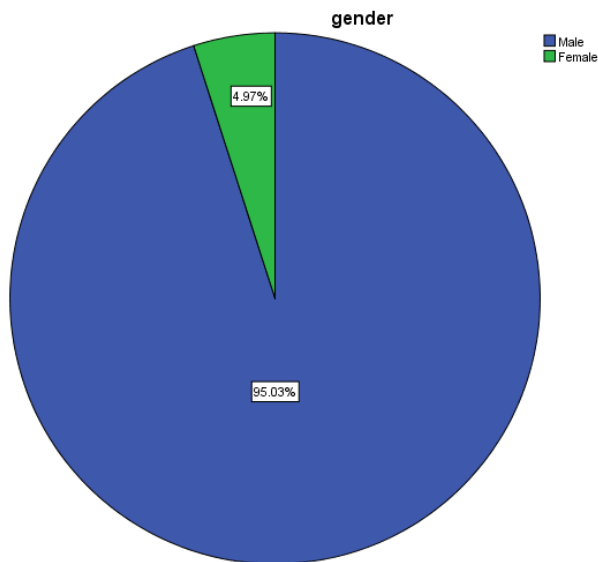
Of all the 2052 offenders studied, 1950 (95%) of them are male. This shows that the majority of the motor vehicle offences were carried out by male drivers during the time frame studied. Of all the 1829 offences perpetrated by Namibian nationals, 1742 (95.2%) of them are by male and of

the 223 foreign nationals reprimanded, 93.33% of them are male. Tables 2.3 (a), (b) and (c) and Fig 2.2 below summarized these descriptive.

**Gender of the motor vehicle offender**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	1950	95.0	95.0	95.0
	Female	102	5.0	5.0	100.0
	Total	2052	100.0	100.0	

**Table 2.3 (a): Frequency for the motorist offenders based on gender**



**Figure 2.2: A pie chart for the gender of motor vehicle offenders during the period under review.**

**gender**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	1742	95.2	95.2	95.2
	Female	87	4.8	4.8	100.0
	Total	1829	100.0	100.0	

**Table 2.3 (b): Frequency of Namibian national traffic offenders on the basis of gender.**

**gender**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	208	93.3	93.3	93.3
	Female	15	6.7	6.7	100.0
	Total	223	100.0	100.0	

**Table 2.3 (c): Frequency of foreign national traffic offenders on the basis of gender.**

**3. Causes of traffic offences (reason)**

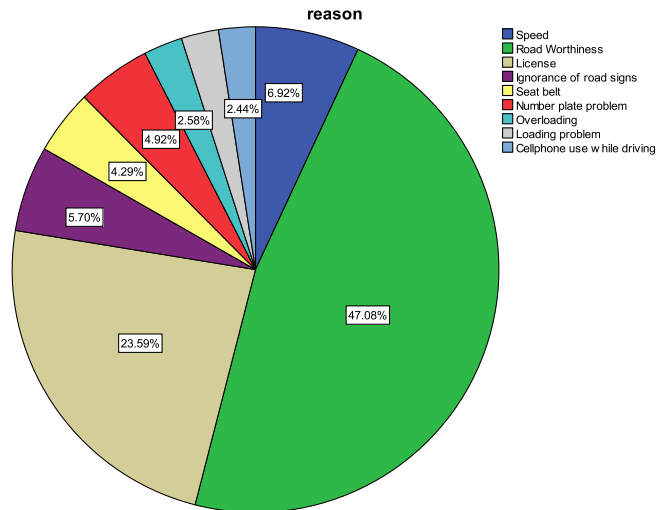
During the period under review, the most prominent cause of traffic violation around the city of Windhoek was road worthiness. Out of 2052 traffic offences registered, 966 are road worthiness related incidents. That is more than 47.% of all the offences. This means that in every 100 motor vehicles fined during that period, 47 are not qualified to be used on the public road for one reason or another, thus, making our public road a dangerous route to use. The second major causes of traffic offence recorded around the city of Windhoek between January and April 2012 was license related issues with 484 fines. That's about a quarter (25%) of all the offences recorded. This means that the four major causes of traffic violations are road worthiness, license, speeding and ignorance of road signs which together are responsible for more than 80% of all the traffic violations recorded.

The third and fourth prominent cause of traffic violation was speeding and ignorance of road signs by motorist with 142 (6.9%) and 117 (5.7%) respectively. Other recorded causes of traffic violations are; Number plate problems 101 (4.9%), Seat belt 88 (4.3%), Overloading 53 (2.6%),

loading problems 51 (2.5%) and cell phone use while driving 50 (2.4%). This is summarized in table 2.4 as well as figure 2.3.

		reason			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Speed	142	6.9	6.9	6.9
	Road Worthiness	966	47.1	47.1	54.0
	License	484	23.6	23.6	77.6
	Ignorance of road signs	117	5.7	5.7	83.3
	Seat belt	88	4.3	4.3	87.6
	Number plate problem	101	4.9	4.9	92.5
	Overloading	53	2.6	2.6	95.1
	Loading problem	51	2.5	2.5	97.6
	Cellphone use while driving	50	2.4	2.4	100.0
	Total	2052	100.0	100.0	

**Table 2.4 causes of traffic violation in the city of Windhoek between Jan-April 2012**



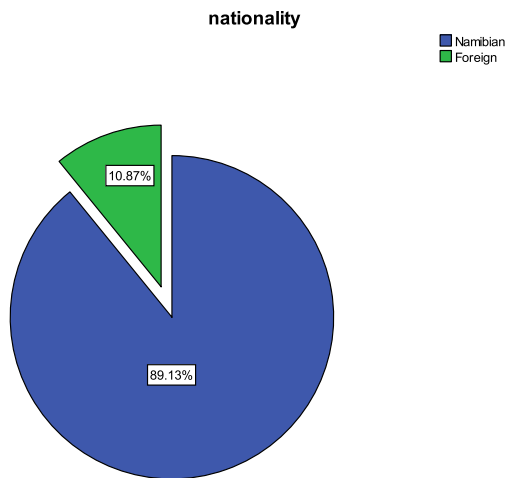
**Figure 2.3 A Pie Chart for the causes of traffic offences in the city of Windhoek between Jan-April 2012**

#### 4. Nationality

During the period under review, it was recorded that close to 90% of the traffic offenders are Namibian national or permanent residents of the country. Of the 1829 local residents recorded, 1742 (95%) are male as compared to 87 (5%) of the opposite sex. It was also discovered that among the 223 foreign nationals penalized, 208 (93%) are male as compared to a 5% female nationals. In both national categories, more than 90% of the offenders are males. See table 2.5 (a) and (b) and Fig 2.4 for illustration.

		nationality			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Namibian	1829	89.1	89.1	89.1
	Foreign	223	10.9	10.9	100.0
	Total	2052	100.0	100.0	

**Table 2.5 (a) number of motor vehicle offenders on the basis of nationality**



**Figure 2.4 A Pie Chart for the gender of the motor vehicle offenders**

**gender**

nationality			Frequency	Percent	Valid Percent	Cumulative Percent
Namibian	Valid	Male	1742	95.2	95.2	95.2
		Female	87	4.8	4.8	100.0
		Total	1829	100.0	100.0	
Foreign	Valid	Male	208	93.3	93.3	93.3
		Female	15	6.7	6.7	100.0
		Total	223	100.0	100.0	

**Table 2.5 (b) frequency for gender of motor vehicle offenders on the basis of nationality**

**5. Vehicle type**

During the period under review, it was found that only 100 of the 2052 motor vehicle fined were operating as taxis. This is only 5% of the total vehicles compounded by the traffic authorities as compared to a whopping 1952 (95.1%) of the non-taxi motor vehicles reprimanded. It also shows that around 89% of all non-taxi motor vehicles fined by the traffic officers were driven by the Namibian citizens. This report is summarized in table 2.6 (a) and 2.6 (b)

**vehicletype**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Others	1952	95.1	95.1	95.1
	Taxi	100	4.9	4.9	100.0
	Total	2052	100.0	100.0	

**Table 2.6 (a) Type of vehicle used at the time of the traffic violation offence.**



**nationality**

vehicletype			Frequency	Percent	Valid Percent	Cumulative Percent
Others	Valid	Namibian	1729	88.6	88.6	88.6
		Foreign	223	11.4	11.4	100.0
		Total	1952	100.0	100.0	
Taxi	Valid	Namibian	100	100.0	100.0	100.0

**Table 2.6 (b) the nationality of the driver for the type of vehicle involved in a traffic violation**

**Investigations**

The month of March recorded the highest number of traffic offences during the period under review. It is imperative to further examine that month in order to find out the possible reason behind the high motor vehicle offences among others. It is crucial to examine the behaviors and spot if there are any time series components among the outputs. Considering table 2.7 (a) below: It seems there is a clear pattern on the days of the week of which the offence increase. The three highest motor vehicle offences were 52, 51 and 46, recorded on the Fridays 9, 23 and 30 respectively.

Tables 2.7 b. and c. below shows the time of the days on which most of the offences took place during the month of March. From there tables, the most frequent time in which motor vehicle offences takes place is from 7-11 AM as well as from 16-18 PM. These times are regarded as rush hours since the vast majority of the people are either going or coming from work. These rush hours together made up 441 (almost 3/4) of the total 598 offences recorded in March. This pattern was similarly discovered in the other three months under study i.e. January, February and April.

**date**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	7	1.2	1.2	1.2
	2	19	3.2	3.2	4.3
	3	10	1.7	1.7	6.0
	4	6	1.0	1.0	7.0
	5	19	3.2	3.2	10.2
	6	16	2.7	2.7	12.9
	7	23	3.8	3.8	16.7
	8	14	2.3	2.3	19.1
	9	52	8.7	8.7	27.8
	10	12	2.0	2.0	29.8
	11	15	2.5	2.5	32.3
	12	19	3.2	3.2	35.5
	13	28	4.7	4.7	40.1
	14	14	2.3	2.3	42.5
	15	25	4.2	4.2	46.7
	16	16	2.7	2.7	49.3
	17	5	.8	.8	50.2
	18	11	1.8	1.8	52.0
	19	24	4.0	4.0	56.0
	20	28	4.7	4.7	60.7
	21	20	3.3	3.3	64.0
	22	27	4.5	4.5	68.6
	23	51	8.5	8.5	77.1
	24	13	2.2	2.2	79.3
	25	23	3.8	3.8	83.1
	26	1	.2	.2	83.3
	27	18	3.0	3.0	86.3
	28	14	2.3	2.3	88.6
	29	17	2.8	2.8	91.5
	30	46	7.7	7.7	99.2
	31	5	.8	.8	100.0
	Total	598	100.0	100.0	

**Table 2.7 (a) the number of traffic violations per day for the month of March only**

		time			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	4	.7	.7	.7
	1	5	.8	.8	1.5
	2	4	.7	.7	2.2
	3	4	.7	.7	2.8
	4	3	.5	.5	3.3
	5	1	.2	.2	3.5
	6	7	1.2	1.2	4.7
	7	49	8.2	8.2	12.9
	8	63	10.5	10.5	23.4
	9	53	8.9	8.9	32.3
	10	64	10.7	10.7	43.0
	11	54	9.0	9.0	52.0
	12	22	3.7	3.7	55.7
	13	12	2.0	2.0	57.7
	14	11	1.8	1.8	59.5
	15	31	5.2	5.2	64.7
	16	57	9.5	9.5	74.2
	17	55	9.2	9.2	83.4
	18	46	7.7	7.7	91.1
	19	27	4.5	4.5	95.7
	20	11	1.8	1.8	97.5
	21	9	1.5	1.5	99.0
	22	2	.3	.3	99.3
	23	4	.7	.7	100.0
	Total	598	100.0	100.0	

**Table 2.7 (b):** The number of offences at a given time during the month of March.

**The time fluctuations between am and pm**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	am	1000	48.7	48.7	48.7
	pm	1052	51.3	51.3	100.0
	Total	2052	100.0	100.0	

**Table 2.7 (c) numbers of traffic violations for the 24 hour during the month of March**

The research categorizes motorists for up to the age of 35 as youth. Of the 2052 offences recorded, about 52% are youths. This is only a 2% difference from the adults. Conclusively, it seems to be significant that the youth are more reckless drivers, though the difference is minimal.

The study also found that the youth groups are to blame for most of the licensing violations. Of the 484 licensing cases, they got a share of 290. That's almost 60%. They are also to blame for driving and failing to wear seat belt (58%), speeding (55%), and number plate problems (54%) from the overall outputs. However, the study found that only 46% of the youths use cell phone while driving. Other minimal offences perpetrated by the youths include Loading problem (39%) and Overloading (36%). This indicates that only 19 cases of overloading were recorded from the youth category, compared to their opposite group. The comparisons were based on the tables and 2.8 (a) and (b) below which shows the causes of traffic offences by the youths and their frequency:

recoyouth \* Cause of the offence (Reason for punishment) Crosstabulation

Count		Cause of the offence (Reason for punishment)								Total	
		Speed	Road Worthiness	License	Ignorance of road signs	Seat belt	Number plate problem	Overloading	Loading problem		Cellphone use while driving
recoyouth	youth	78	475	290	60	51	55	19	20	23	1071
	adults	64	491	194	57	37	46	34	31	27	981
Total		142	966	484	117	88	101	53	51	50	2052

**Table 2.8 (a) Number of traffic offences by the youths**

**reason**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Speed	78	7.3	7.3	7.3
	Road Worthiness	475	44.4	44.4	51.6
	License	290	27.1	27.1	78.7
	Ignorance of road signs	60	5.6	5.6	84.3
	Seat belt	51	4.8	4.8	89.1
	Number plate problem	55	5.1	5.1	94.2
	Overloading	19	1.8	1.8	96.0
	Loading problem	20	1.9	1.9	97.9
	Cellphone use while driving	23	2.1	2.1	100.0
	Total	1071	100.0	100.0	

**Table 2.8 (b) Number of traffic offences by the youths and their percentages.**

**Correlation between variables**

**Correlations**

			month	date	time	gender	age	reason	nationality	vehicletype
Spearman's rho	month	Correlation Coefficient	1.000	-.040	-.057*	-.060**	.039	.142**	-.036	.034
		Sig. (2-tailed)	.	.069	.010	.006	.078	.000	.107	.123
		N	2052	2052	2052	2052	2052	2052	2052	2052
date		Correlation Coefficient	-.040	1.000	.018	.008	.003	.074**	-.035	.039
		Sig. (2-tailed)	.069	.	.423	.701	.883	.001	.109	.074
		N	2052	2052	2052	2052	2052	2052	2052	2052
time		Correlation Coefficient	-.057*	.018	1.000	.014	-.044*	.008	.001	-.025
		Sig. (2-tailed)	.010	.423	.	.524	.045	.703	.956	.250
		N	2052	2052	2052	2052	2052	2052	2052	2052
gender		Correlation Coefficient	-.060**	.008	.014	1.000	-.009	-.034	.028	-.052*
		Sig. (2-tailed)	.006	.701	.524	.	.684	.123	.202	.019
		N	2052	2052	2052	2052	2052	2052	2052	2052
age		Correlation Coefficient	.039	.003	-.044*	-.009	1.000	-.044*	.058**	-.098**
		Sig. (2-tailed)	.078	.883	.045	.684	.	.049	.009	.000
		N	2052	2052	2052	2052	2052	2052	2052	2052
reason		Correlation Coefficient	.142**	.074**	.008	-.034	-.044*	1.000	-.023	.110**
		Sig. (2-tailed)	.000	.001	.703	.123	.049	.	.293	.000
		N	2052	2052	2052	2052	2052	2052	2052	2052
nationality		Correlation Coefficient	-.036	-.035	.001	.028	.058**	-.023	1.000	-.079**
		Sig. (2-tailed)	.107	.109	.956	.202	.009	.293	.	.000
		N	2052	2052	2052	2052	2052	2052	2052	2052
vehicletype		Correlation Coefficient	.034	.039	-.025	-.052*	-.098**	.110**	-.079**	1.000
		Sig. (2-tailed)	.123	.074	.250	.019	.000	.000	.000	.
		N	2052	2052	2052	2052	2052	2052	2052	2052

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 3.1 the correlation table**

There is a weak linear relationship between each of these variables as shown in table 3.1 above

### 3.1 Test for normality

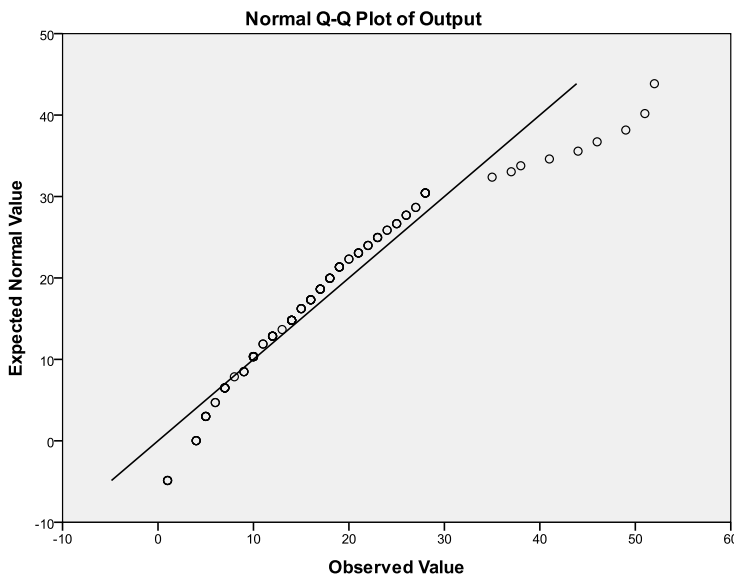
The Q-Q plot shown on figure 3.1 below illustrates the deviation of the frequency from a normal distribution. From this plot we can clearly see that the data are not normally distributed. The standard deviation of 10.4 shown in table 3.2 below emphasize on the violation of the assumptions of normality. Since, we will apply the non-parametric tests to justify our hypothesis. The skewness of 1.182 implies that the distribution is positively skewed.

#### Statistics

The outputs

N	Valid	120
	Missing	0
Std. Deviation		10.440
Skewness		1.182
Std. Error of Skewness		.221
Minimum		1
Maximum		52

**Table 3.2 the normality table**



**Figure 3.1 the normality Q-Q plot test**

The graph shows the deviation of the data output from the normal straight line which enable us to conclude that the data are not normally distributed. This shows that the data violate the assumption of normality on normal distribution. The extreme value of the standard deviation supports the violation of the assumption of normality as well. This implies that the data can only be analyzed using the method of non parametric.

### 3.2 Data analysis

#### Statistical tests for the hypotheses

It should be mentioned that all statistical test carried out in this research was done at a 95% level of confidence. The threat of the researched topic with regard to human life has necessitated the level of confidence selected. The hypothesis mentioned were tested and concluded as follow:

*3.3.1 Is there a difference in the courteousness of driving between taxi drivers and non-taxi drivers around the city?*

Test statistic:

**Test Statistics**

			Cause of the offence (Reason for punishment)
Mann-Whitney U			70490.500
Wilcoxon W			1976618.500
Z			-4.996
Asymp. Sig. (2-tailed)			.000
Monte Carlo Sig. (2-tailed)	Sig.		.000 <sup>a</sup>
		95% Confidence Interval	
		Lower Bound	.000
		Upper Bound	.001
Monte Carlo Sig. (1-tailed)	Sig.		.000 <sup>a</sup>
		95% Confidence Interval	
		Lower Bound	.000
		Upper Bound	.001

a. Based on 2052 sampled tables with starting seed 1241531719.

b. Grouping Variable: Vehicle driven at the time of the offence

**Table 3.3 a test statistic**

Table 3.3 above indicates a p-value of 0.0001. Since the p - value is less than 0.025; we reject the hypothesis that there is no difference in the courteousness of driving between taxi drivers and non-taxi drivers around the city of Windhoek with a 95% level of confidence.

*3.3.2 Are female drivers more responsive and courteous than their male counterparts?*

Test statistics:

Test Statistics <sup>b</sup>			Cause of the offence (Reason for punishment)
Mann-Whitney U			90994.000
Wilcoxon W			96247.000
Z			-1.544
Asymp. Sig. (2-tailed)			.123
Monte Carlo Sig. (2-tailed)	Sig.		.124 <sup>a</sup>
	95% Confidence Interval	Lower Bound	.110
		Upper Bound	.139
Monte Carlo Sig. (1-tailed)	Sig.		.059 <sup>a</sup>
	95% Confidence Interval	Lower Bound	.049
		Upper Bound	.069

a. Based on 2052 sampled tables with starting seed 562334227.

b. Grouping Variable: Gender of the motor vehicle offender

**Table 3.4 a test statistic**

Table 3.4 above indicates a p-value of 0.59. Since the p-value is greater than 0.05, we do not have sufficient evidence to reject the hypothesis that female drivers are more responsive and courteous than their male counterpart. We are 95% confidence in making such a conclusion from the data studied.



3.3.3 *Did age have any influence in the numbers of traffic violations?*

**Test Statistics<sup>a, b</sup>**

		Cause of the offence (Reason for punishment)
Observed Control Group Span		1957
	Sig. (1-tailed)	.000
Trimmed Control Group Span		1855
	Sig. (1-tailed)	.733
Outliers Trimmed from each End		53

a. Moses Test

b. Grouping Variable: recoyouth

**Table 3.5 test statistic**

Table 3.5 above indicates a p-value of 0.733. Since the p-value is greater than 0.05, we do not have enough evidence to reject this hypothesis and, therefore conclude with a 95% level of confidence that the age have an effect to the numbers of traffic violation around the city of Windhoek.

3.3.4 *Is there a difference in the number of traffic violation during the four months studied?*

Test statistic:

**Test Statistics<sup>b, c</sup>**

		Cause of the offence (Reason for punishment)
Chi-square		108.765
df		3
Asymp. Sig.		.000
Monte Carlo Sig.	Sig.	.000 <sup>a</sup>
	95% Confidence Interval	
	Lower Bound	.000
	Upper Bound	.001

a. Based on 2052 sampled tables with starting seed 303130861.

b. Kruskal Wallis Test

c. Grouping Variable: The month on which the offence was committed

**Table 3.6 test statistic**

Table 3.6 above shows a p-value of 0.0001. Since the p-value is less than 0.05; we reject this hypothesis. We can, therefore, conclude with a 95% level of confidence that the distribution of traffic violation output is not identical for the four months studied. This implies that some months are worse off than others as far as the motor vehicle violations.

**3.4 Post hoc test**

Since the test result in the rejection of the hypothesis that the distribution is identical during the four months of studies, it is imperative to find out the months which differ from others. The Post hoc test will help us in this regard. We will still be testing the assumption at a 95% level of confidence. It is also worth noting that using the Mann-Whitney during this process will inflate the type I error rate and, therefore, we will instead apply the Bonferroni method. This can be achieved by dividing alpha (0.05) with the number of tests performed. That is  $0.05/3$  to get 0.0167. Thus, the critical value to compare our test statistic will be 0.0167.

Test statistics:

<b>Ranks</b>				
The month on which t...		N	Mean Rank	Sum of Ranks
Cause of the offence (Reason for punishment)	March	598	541.75	323964.00
	April	482	538.95	259776.00
	Total	1080		

<b>Test Statistics<sup>a</sup></b>	
	Cause of the offence (Reason for punishment)
Mann-Whitney U	143373.000
Wilcoxon W	259776.000
Z	-.159
Asymp. Sig. (2-tailed)	.874

a. Grouping Variable: The month on which the offence was committed

The only months with identical number of traffic violation were March and April with a p-value of 0.874, greater than a critical value of 0.0167 as seen in the table above. All other months were found to have a p-value less than 0.0167 and thus, rejecting the initial assumption with a 95% level of confidence. This will lead us to conclude that the average number of offences is only identical during the months of March and April and differs otherwise.

### **3.4 Forecasting**

It is imperative to forecast the expected number of motor vehicle violations in the future using the records available. This can be achieved with a forecast model. The model will be developed using the time series analysis.

month	Week 1	Week 2	Week 3	Week 4	Total
January	123	120	125	166	534
February	88	120	68	162	438
March	100	154	129	215	598
April	133	96	144	109	482
Total	444	490	466	652	2052

Month	Period n=16	Y (Output)	X	XY	X <sup>2</sup>
January	W1	123	1	123	1
January	W2	120	2	240	4
January	W3	125	3	375	9
January	W4	166	4	664	16
February	W1	88	5	440	25
February	W2	120	6	720	36
February	W3	68	7	476	49
February	W4	162	8	1296	64
March	W1	100	9	900	81
March	W2	154	10	1540	100
March	W3	129	11	1419	121
March	W4	215	12	2580	144
April	W1	133	13	1729	169
April	W2	96	14	1344	196
April	W3	144	15	2160	225
April	W4	109	16	1744	256
<b>Total</b>		<b>2052</b>	<b>136</b>	<b>17750</b>	<b>1496</b>

Using the method of least square, the slopes will be:

$$b_1 = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

$$b_1 = \frac{16 \cdot 17750 - 136 \cdot 2052}{16 \cdot 1496 - 136^2}$$

$$= 0.91$$

And

$$b_0 = \bar{y} - b_1 \bar{x}$$

$$b_0 = 128.25 - 0.91 \cdot 8.5$$

$$= 120.55$$

Therefore, the predictive model will be:

$$Y = 120.55 + 0.91x \quad \text{where} \quad x = 1 \text{ in Jan Week 1}$$

$$= 2 \text{ in Jan Week 2}$$

= 3 in Jan Week 3 and so on

Based on this model, we can be able to predict future number of traffic offences. However, it is crucial noting that there could be seasonalities in the number of traffic offences. Festival months might be totally different. Therefore, it could be achieved with a total data record of at least four to five years available.

## Chapter 5

### Conclusion and Recommendations

1. It seems most of the motor vehicles operating on the public roads are not roadworthy and thus, it is advisable that our traffic department pays more attention on that area. In the Netherlands, a motor vehicle found not roadworthy is immediately stopped, the fined and the disc will be removed momentarily and the owner will be cautioned not to operate it in public road until the problem it fixed. We may need to consider that or any other similar measures of control.
2. A 95% of all motor vehicle offences were perpetrated by male. This is worrisome. Reinforcements need to be put in place to cater for this.
3. It seems many road users are still ignorant of the traffic signs and regulations. A high record in speeding, ignorance of signs (reckless driving), overloading, belt and cell phone use shows this. Therefore, more educational campaigns on road safety awareness still need to be reinforced throughout.
4. It is advisable that the traffic officers completely fill the record book as required. This is crucial in situations where the information recorded need to be categorized, studied and analyzed for different reasons and understandings. Thus, more emphasis should be placed on the importance of a fully detailed record.
5. It is imperative that the traffic department employ the database system capturing all information in the traffic control log book (ticket form). This information can be very useful in tracing prominent patterns in “danger zones”. For instance, Information about the location of the majority of speeding fines helps the authority in spotting the danger areas and speed humps should be erected in that street. It is only when the root cause of the problem is identified that the target solution is applicable with minimal cost.

## REFERENCES

1. [http://www.carrsq.qut.edu.au/documents/publication\\_036.pdf](http://www.carrsq.qut.edu.au/documents/publication_036.pdf)
2. <http://blog.motorists.org/minorities-hit-with-more-traffic-violations/>
3. <http://www.dutchmobility.com/657/more-traffic-offences-means-more-road-crashes/>
4. [http://www.carrsq.qut.edu.au/documents/publication\\_036.pdf](http://www.carrsq.qut.edu.au/documents/publication_036.pdf)
5. <http://www.swov.nl/uk/research/newsletter/articles/2011/201111-offences-crashes.pdf>

