Statistical analysis of traffic offences around the city of Windhoek: A management perspective

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Abstract. Since independence the city of Windhoek has grown rapidly, the geographical area for the city has gone beyond expectation and the increase in infrastructure has made the city a destination of choice for tourists and businessmen. Despite its commendable attractions, the city has been criticized for numerous life threatening incidents which include road accidents and other traffic violations. A significant increase in traffic violation and subsequent road accidents around the city has become a concern as it interferes with smooth flow of business, health and general wellbeing of Windhoek. The city reprimands these road offenders with fines and tickets but it is not clear whether these are punitive enough. Daily data from January to April 2012 was collected and analyzed using descriptive statistics and non-parametric tests to establish the nature and extent, and relationships between various traffic offence variables. Results indicated that some vehicles operating on the public roads are not roadworthy (47.1%). Ninety five percent of all motor vehicle offences were perpetrated by males. A considerable number of motorists drive without licenses (23.6%). Few road users ignored the traffic signs and regulations (5.7%). Speeding (6.9%), overloading (5.1%), not wearing belt (4.3%) and cell phone use while driving (2.5%), were noted. More stringent measures and educational campaigns on road safety awareness need to be reinforced.

Keywords: Statistics, traffic offences, Windhoek.

INTRODUCTION

Namibia has recently adopted an integrated traffic safety management system. This was implemented after the traffic authority realized that its 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 has 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 with fines, also known as traffic tickets. Research on the nature and extent of some of these traffic offences around the city of Windhoek was carried out. Quantitative and quantitative data were collected and a comparative analysis was done to identify relationships between various traffic offences among the offenders.

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.

An extensive study carried out by the Centre for Accident Research and Road Safety in Queensland on the relationship between traffic offences and other types
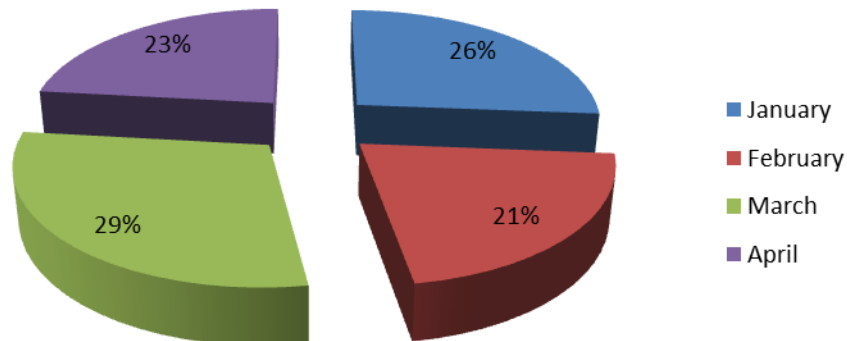
Number of traffic offences

Figure 1. Monthly traffic violation figures for the first quarter of 2012.

of crime revealed that traffic accidents, drink driving offences and assaults peak after midnight around the closing times of liquor trading places (Chikritzhs et al., 1997) 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 to 24 years 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 Kauffman (2012) 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. Their study also 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 do not 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 (Goldenbeld et al., 2011). According to Palk et al. (2007) alcohol related offences particularly those

related to disturbances and sexual offences were significantly reduced following introduction of the a lockout policy which prevented patrons from entering or re-entering late night trading licensed premises for a specific period prior to closure, even though traffic offences remained unchanged. On the other hand, serious traffic offences, disturbances and offences against the person share similar characteristics and occur in concentrated places at similar times and there is an association between serious traffic offending and general criminality (Palk and Davey, 2005).

MATERIALS AND METHODS

The study was conducted on the basis of the primary data recorded in the traffic control log book (Appendix A) of the Namibia Ministry of Safety and Security, Department of Police. The study was conducted over a four month period commencing from 00:00 hrs of Jan 01, 2012 to 24:00 hrs of April 31, 2012. A total of 2052 records were successfully captured. The data was captured into MS Excel and analyzed using IBM SPSS version 20. Descriptive summary statistics in form of frequency distributions, charts and graphs were constructed. Bivariate correlation analysis was conducted to establish relationships between variables. A time series regression forecasting was also carried out to forecast the weekly number of traffic offences for the month of May 2012.

RESULTS AND DISCUSSION

Figure 1 shows that during the period observed, the highest number of traffic violation was recorded in March (29%). There seems to be no clear picture in the intensity of traffic offences over the four months.
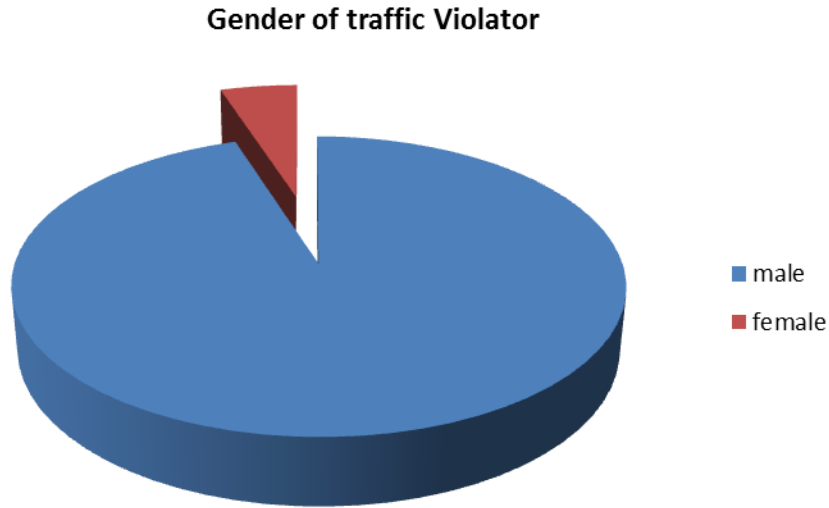
Gender of traffic Violator

■ male
■ female

Figure 2. Pie chart showing gender of traffic offender.
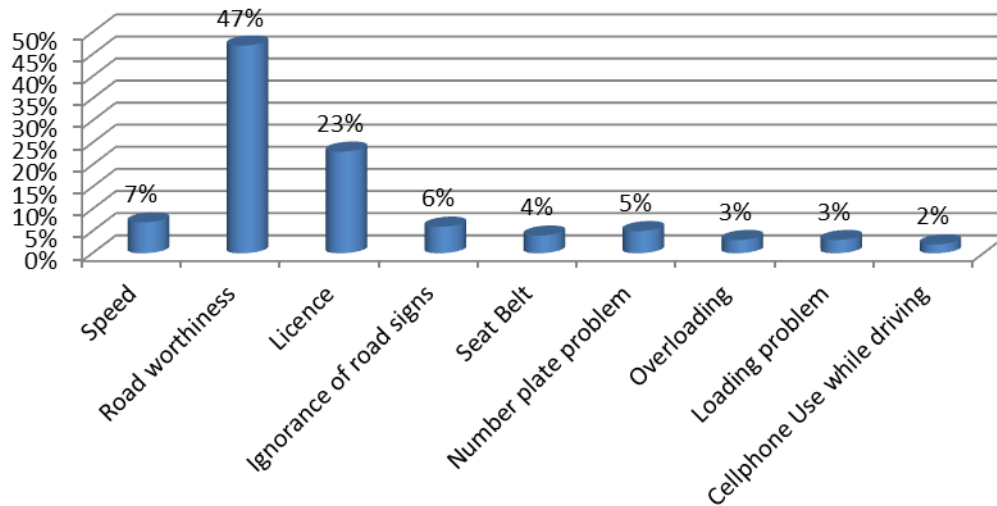

Figure 3. Categories of traffic offences.

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. There was a clear pattern on the days of the week of which the offence increased. The three highest motor vehicle offences were 52, 51 and 46, recorded on the Fridays 9, 23 and 30 respectively.

The most frequent time of the days on which most of the offences took place during the month of March was from 7 to 11 AM as well as from 16 to 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. A pattern was similarly observed in the other three months under study, that is, January, February and April.

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. This could also mean that there are relatively few women motorists in Namibia compared to their male counterparts (Figure 2).

During the period under review, the most prominent cause of traffic violation around the city of Windhoek was road worthiness of the vehicles (Figure 3). 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,

Table 1. Crosstabulation of age category and nature of traffic offence.

		Cause of the offence (Reason for punishment)									
		Speed	Road worthiness	License	Ignorance of road signs	Seat belt	Number plate problem	Overloading	Loading problem	Cellphone use while driving	Total
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

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 is 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%).

The research categorizes motorists for up to the age of 35 as youth. Of the 2052 offences recorded, about 52% were youths. This seems to suggest that youth are more reckless drivers and are often caught on the wrong side of the traffic law.

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 is, 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 Table 1 which shows the causes of traffic offences by the youths and their frequency.

Correlation analysis was also performed to assess whether relationships existed between traffic offence category and various variables. At 5% level of significance, the non-parametric Spearman's Rank correlation coefficient, there were significant associations between the traffic offence category and age of the offender ($r = -0.044$, $p = 0.049$), month in which the offence occurred ($r = 0.142$, $p < 0.001$) and the type of vehicle involved ($r = 0.110$, $p < 0.001$). However, the time of the day when the offence occurred ($r = 0.008$, $p = 0.703$), nationality of the offender ($r = 0.023$, $p = 0.293$) were not significantly associated with the nature of the traffic offence.

It was also of interest to forecast the expected number of motor vehicle violations in the future using time series regression analysis. The time plot of the number of traffic offences is given in Figure 4.

Using the method of least squares which minimizes the sum of squares of the errors, the estimates of the model parameters were given by:

$$b_1 = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2} = \frac{16*17750 - 136*2052}{16*1496 - 136^2} = = 0.91$$

$b_0 = \bar{y} - b_1\bar{x}$ = 128.25 - 0.91*8.5 = 120.55

Therefore, the predictive model will be:
Estimated Number of traffic offences= 120.55 + 0.91x
where x = 1 in Jan Week 1, 2 in Jan Week 2 and 3 in Jan Week 3 and so on.

Traffic offences for the month of May 2012 were predicted using this model as shown in Table 2.

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.

CONCLUSIONS

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. Ninety percent of all motor vehicle offences were perpetrated by males. This is worrisome. More deterrent measures need to be put in place which is punitive enough to discourage traffic offences. It seems a considerable number road users are still ignorant
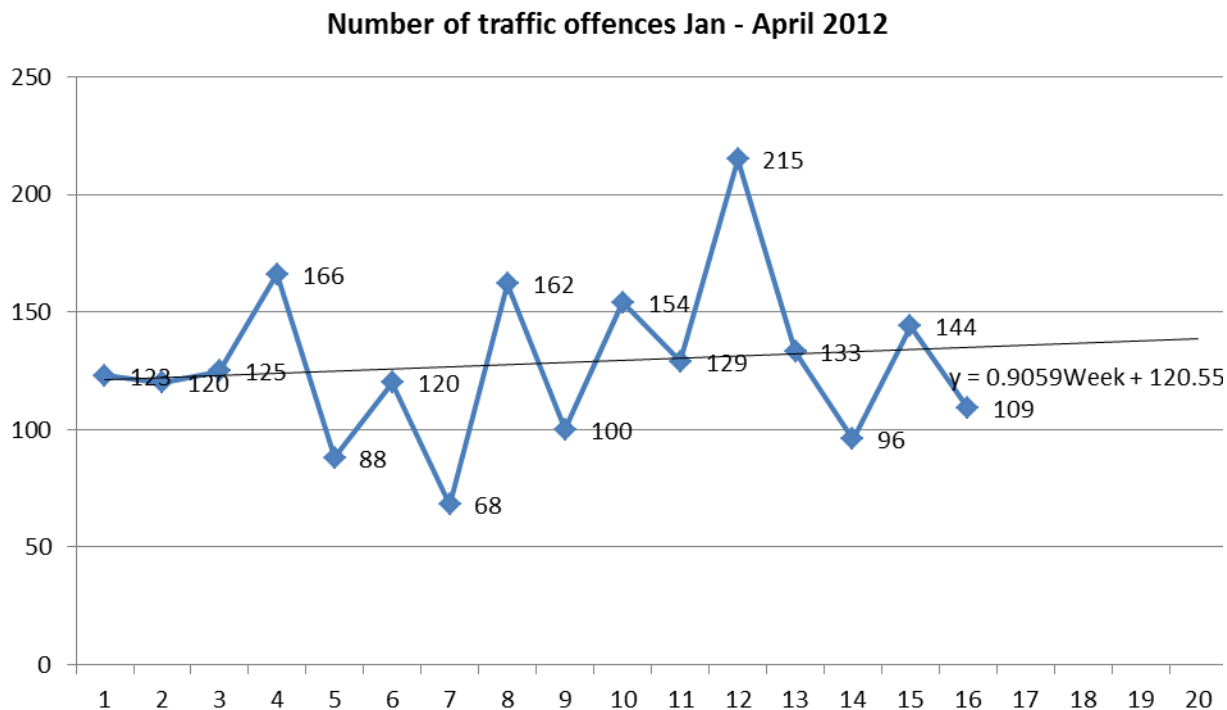
Number of traffic offences Jan - April 2012

Figure 4. Time series plot for the number of traffic offences.

Table 2. Traffic offences for the month of May 2012.

Month	Week	Estimated number of traffic offences
	1	120.55 + 0.91(17) = 136
May 2012	2	120.55 + 0.91(18) = 137
	3	120.55 + 0.91(19) =138
	4	120.55 + 0.91(20) =139

of the traffic signs and regulations. Therefore, more educational campaigns on road safety awareness still need to be reinforced throughout.

Traffic control efforts should be further increased during peak periods and month end Fridays to reduce the number of traffic offences.

It is advisable that the traffic officers completely fill all sections of the record book as required to enable a thorough and more comprehensive categorization and analysis for various purposes. A soft database system capturing all information from the traffic control log book would also make data more readily available.

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APPENDIX A

3-2/0005

REPUBLIC OF NAMIBIA

MINISTRY OF SAFETY AND SECURITY
DEPARTMENT OF POLICE

A 3120401

NOTICE TO APPEAR IN COURT

(Section 56 of Act 51 of 1977)

Police Station	CR No.	Investigation Officer	
District/Division	Place of Trial	Court No.	Date of Trial

TO: Name

Residential Address		Occupation or Status

Business Address

Sex	Age	Nationality	Identity Number

You are hereby called upon in terms of section 56 of the Criminal Procedure Act, 1977 (Act 51 of 1977) to appear before the above-mentioned Court on the date stated above at 09h00 there to answer a charge of ....

....

....

or such other charge as the Public Prosecutor may bring against you on the grounds that upon or about .... h ....

on the day of .... 20 .... *on a public road/*to wit ....

.... in the said district you did wrongfully and unlawfully ....

....

....

An admission of guilt fine of 1) N$ .... 2) N$ .... 3) N$ .... 4) N$ ....

may be accepted and if you intend paying an admission of guilt fine, payment must be made on or before:-

.... 20 .... and the admission of guilt fine may only be paid to the clerk of the above-mentioned

magistrate's court or any police station within the area of jurisdiction of the said court.

WARNING: If you fail to comply with this notice you may be arrested and sentenced to a fine of N$100,000 or three months imprisonment

The original hereof was today handed to the above-mentioned accused personally and the contents thereof explained to him/her.

Place ....

Date ....   Peace Officer

    Capacity ....

SEE OVERLEAF

*Delete if not applicable

IMPORTANT - SEE OVERLEAF