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Analysis of Accidents on the Southern Expressway

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1. Introduction

Road accidents are among the top ten leading causes of deaths according to latest data from World Health Organisation (WHO). It is placed in the 9thplace at present and anticipated to rise to 5thplace within the next 10 years.

According to the latest statistics from traffic headquarters, Sri Lanka records 8 deaths per day due to traffic accidents.

The expressway road system is mainly affected by the demand from the new free trade zone and the improvement of efficiency it facilitates. This attempt is to investigate the effect of expressways on road traffic accidents.

2. Literature Review

Desai and Patel (2011) show safety measures for controlling road accident injuries and fatalities in India. Road accident statics in Gujrat for the years 2000 to 2009 and the road safety policy for the area were analysed using a fatality index and compared with the Indian average as well as that of other developing counties. Key road safety problems were categorised as driver-vehicle and road-related defects.

Ramya (2016) has analysed and predicted road accidents in Bangalore South. Patterns in data were constructed and a combination of variables that reliably predicts a desired outcome was found.

Singh and Suman (2012) introduced a model for accident analysis and prediction on national highways, based on a 70km stretch of NH-77 from Hajipur to Mazaffarpur. The data collected between years 2000 and2009 were analysed to evaluate the effect of influencing parameters.

3. Methodology

This research contains an analysis of accident records in the Southern Expressway in the year of 2014 from Kottawa to Matara (126.1km), comprising data on 294

accidents from the Kottawa to Matara direction (Left Hand Side - LHS) and 309 accidents from the Matara to Kottawa direction (Right Hand Side - RHS).

Accident data are categorised by month, days of the week (i.e., weekdays or weekends) and by whether a given day was a holiday or not. Threats of accidents were calculated according to intervals of time.

The location of the highest frequency of accidents can be verified by accident frequency analysis. In this research, there are two types of frequency analysis. First stretches of expressway are considered in5km sections and then sections are separated from interchange to interchange.

Accident rate analysis is used to compare the number of accidents at a given location with the number of vehicles driven or that number of vehicle-kilometres of travel in that location. This can be stated in terms of accidents per million vehicles and accidents per million vehicle kilometres.

4. Results

4.1. Monthly Analysis

Monthly variation of accidents is shown in Figure 4.1.

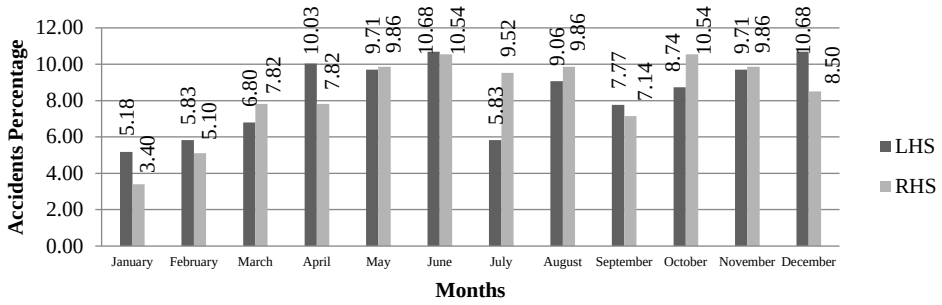

Figure 4.1: Accident variation by Month

On both sides, accidents are observed to have peaked in June.

4.2. Accident Rate by Type of Day

Table 4.1 shows the accidents rate per day on different types of day.

Table 4.1: Accidents Rate by Type of Day

	Number of Days	Number of accidents		Accident Rate per day %	
		LHS	RHS	LHS	RHS
Weekdays	244	199	203	82	83
Weekends	104	80	85	77	82
Holidays	17	15	21	88	124

The highest rate per day, on both sides, occurs on Holidays.

4.3. Time Analysis

Accident data are separated into two-hour intervals each day as shown in Figure 4.2.

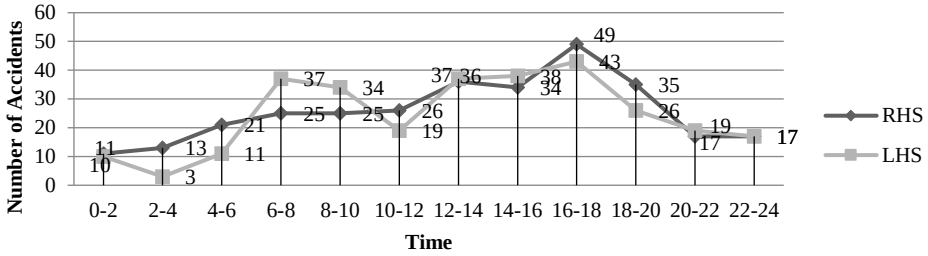

Figure 4.2: Number of Accidents by two-hour time interval

The highest number of accidents occurs between 1600 and1800 hours in both sides. In LHS data, a morning peak time between0600 to 0800 hours is clearly visible.

4.4. Accident frequency analysis

Sections are considered by 5kmstretches. These results are shown in figure 4.3

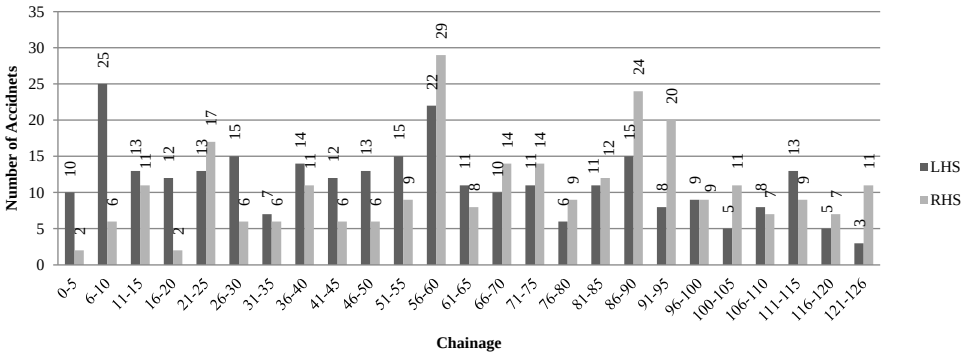

Figure 4.3: Variations of Accidents by 5km stretch

In LHS, it is shown that the 6-10 km and 56-60 km stretches involve a higher number of accidents. In RHS the 56 - 60km, 86 - 90km and 91 - 96km stretches experience the highest number of accidents. Table 4.2 and Figure 4.4 show the frequencies of accidents by stretch of expressway and by interchange.

Table 4.2: Category of Interchange

No	Section	
	From	To
1	Kottawa	Kahathuduwa
2	Kahathuduwa	Galanigama
3	Galanigama	Dodangoda
4	Dodangoda	Welipanna
5	Welipanna	Kurudugaha
6	Kurudugaha	Baddegama
7	Baddegama	Pinnaduwa
8	Pinnaduwa	Imaduwa
9	Imaduwa	Kokmaduwa
10	Kokmaduwa	Godagama

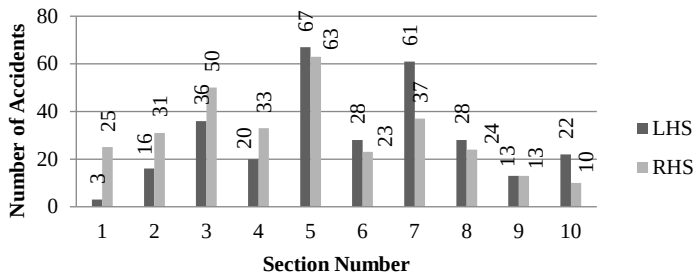

Figure 4.4: Accidents by interchange

The results show that the fifth section is the most dangerous section.

4.5. Accident Rate Analysis

Traffic data and Accident rates are shown in Table 4.3.

Sectional accidents rates per million vehicles and per million vehicles kilometres are shown in Figure 4.5 and Figure 4.6.

Table 4.3: Accident rate by road section

Section No	Section		Traffic Volume of year 2014		No of Accidents		Accidents rate/Million vehicle		Distance /km	Accidents rate /Million vehilce kilometer	
	From	To	LHS	RHS	LHS	RHS	LHS	RHS		LHS	RHS
1	Kottawa	Kahathuduwa	2,303,557	2,158,679	3	25	1.30	11.58	5.9	0.22	1.96
2	Kahathuduwa	Galanigama	2,326,894	2,332,677	16	31	6.88	13.29	7.8	0.88	1.70
3	Galanigama	Dodangoda	1,932,894	1,909,647	36	50	18.62	26.18	21.1	0.88	1.24
4	Dodangoda	Welipanna	1,640,015	1,610,919	20	33	12.20	20.49	11.2	1.09	1.83
5	Welipanna	Kurudugaha	1,520,162	1,520,775	67	63	44.07	41.43	21.6	2.04	1.92
6	Kurudugaha	Baddegama	1,336,676	1,335,349	28	23	20.95	17.22	12.2	1.72	1.41
7	Baddegama	Pinnaduwa	1,227,471	1,238,400	61	37	49.70	29.88	15.5	3.21	1.93
8	Pinnaduwa	Imaduwa	718,009	701,944	28	24	39.00	34.19	12.2	3.20	2.80
9	Imaduwa	Kokmaduwa	648,977	631,375	13	13	20.03	20.59	7.7	2.60	2.67
10	Kokmaduwa	Godagama	603,657	595,271	22	10	36.44	16.80	10.9	3.34	1.54

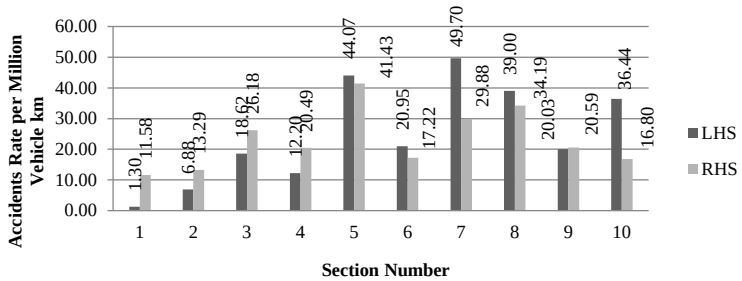

Figure 4.5: Accidents rate per Million Vehicle km by Section

The highest value is found to occur in the 7th and 5th, 8th and 10thsections in LHS and the5th and 8thsections in RHS.

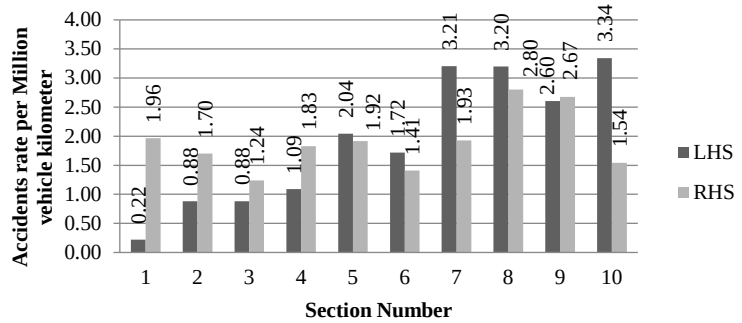

Figure 4.6: Accident rate per million vehicle kilometres

Last four sections 7, 8, 9 and 10 in LHS and 8 and 9 in RHS obtained high accident rates.

5. Conclusion

The results of the study show that accidents are higher during school vacations. The highest accidents on both sides occur on holidays. A large number of accidents are seen in the Welipenna to Kurudugaha stretch on both sides. Baddegama to Pinnaduwa section is the section with the highest accident rate per million vehicles in LHS. Welipanna to Kurudugaha and Pinnaduwa to Imaduwa have high rate of accidents in RHS.

6. References

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[2] Desai, M.M., Patel, A.K. (2011). Safety measures for Controlling Road Accident Injuries and Fatality, National Conference on Recent Trends in Engineering & Technology, B.V.M. Engineering College, V.V. Nagar, Gujarat, India, 13-14 May 2011

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Keywords: *accident analysis, southern expressway, interchange, vulnerable*