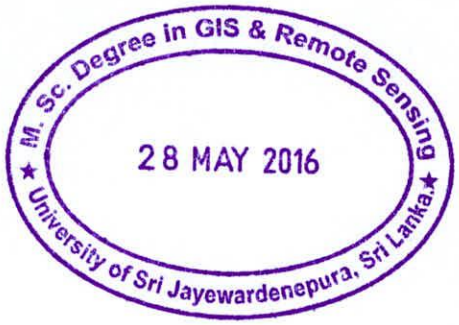
Analyzing Traffic Accidents in Gampaha District Colombo - Kandy Road

By

W. A. J. K. Senadeera



Thesis Submitted to the Faculty of Graduate Studies University of Sri Jayewardenepura For the Partial Fulfillment of Master's of Science Degree in GIS and Remote Sensing on 20th March 2016

DECLARATION OF THE CANDIDATE

I do hereby declare that work described in this thesis was carried out by me under the supervision of Prof. R. M. K. Ratnayake, and Dr. Shirantha Heenkenda, and report on this thesis has not been submitted in whole or in part to any University or any other institution for another Degree / Diploma.

Date 29 March 2016

.....29/3/16.....

W. A, J. K. Senadeera
239 C, Ihalakaragahamuna
Kadawatha

ACKNOWLADGEMENTS

I take this opportunity to express my heartfelt gratitude to all those who helped me in preparing this thesis and would like to acknowledge the efforts, support, guidance, cooperation and encouragement they gave me to undertake this study.

I wish to express my sincere thanks to my supervisors, Prof. R. M. K. Ratnayake and Dr. Shirantha Heenkenda for their untiring efforts in guiding me, their patience, guidance, encouragement and support in shaping the outlook of this thesis. Their valuable advice and guidance gave me invaluable insights and enhanced my thinking and understanding;

I am also grateful to all lecturers and other members of staff at the Department of Geography at the University of Sri Jayewardenepura.

I would also like to thank all the respondents and key informants including senior and junior Police Officers attached to traffic administration and road safety for answering my questions and enabling me to complete this study.

Last but not the least, my appreciation goes to my DIGs handling Logistics, and staff of the office of DIG Logistics, my wife, mother, brother , Mr. Chamara Udugama and his office staff, Mr. Sugath Kaldera, Attorney-at-Law, C.I Nipuna Dehigama and university colleagues for their ardent support rendered to complete my study.

Chapter Structure

List of Tables

List of Figures

Analyzing Traffic Accidents in Gampaha District Colombo-Kandy Road

W. A. J. K. Senadeera

ABSTRACT

Out of the districts in Sri Lanka Gampaha District takes prominence in fatal accidents from 2011 – 2014. The main objective was to analyze road accidents, to examine the road designing and engineering aspects, to investigate the human negligence causing fatal accidents and to analyze the mechanical defects in vehicles.

This thesis discusses the risk factors associated with fatal accidents along the Colombo-Kandy A1 Road. The cause of fatal accidents are clearly identified in this study. Kernel density analysis through ArcGis and the GIS system were applied to identify fatal accidents. The methodology and procedure for data collection employed in the field was based on both qualitative and quantitative approaches within a framework of a case study approach. Questionnaires were issued to Police Officers dealing with traffic administration and road safety and to the general public to obtain their views about the facts that contribute to fatal accidents. The study has revealed the pattern and trends of motor traffic accidents along the Colombo-Kandy A1 Road in Gampaha district from 2011 to 2014. It shows that the accident occurrence was increasing every year due to the negligence of drivers and riders. Maps and figures were used to identify accident prone areas.

As per the study undertaken, Police should commence an awareness program throughout the year for drivers, riders and other road users with the assistance of the print/mass media and the Motor Commissioner's Dept. Special foreign and local training should be given to Police Officers with regard to traffic administration and road safety. A special enforcement program has been recommended in the study area for Wanawasala, Kadawatha, Nit vii wa and Pasyala.

Key words - GIS, GPS, Road safety, Geographical Patterns, Gampaha Districts

Chapter One - Introduction

1.1 Introduction

Road traffic accidents which are generally unintended and preventable are a common risk every day to life that can happen to almost every one, anywhere. The problem of road traffic accident is increasingly becoming a threat to public health and national development in many developing countries. Road traffic accidents contribute to poverty by causing deaths, injuries, disabilities, grief, and loss of productivity and material damages. The British Medical Journal of 11th May 2002 indicated that more people die on the road traffic accidents than from malaria worldwide; and that traffic accidents cause about 1.2 million deaths. Many people do not know that road traffic accidents are preventable. (Krug, 2002) Road traffic accidents are the most frequent causes of injury-related deaths worldwide (Astrom, et al. 2006). According to the World Report on Road Traffic Injury Prevention (Peden et al., 2004) traffic accidents account for about 3000 daily fatalities worldwide.

Statistical projections show that during the period between 2000 and 2020, fatalities related to traffic accidents will decrease with about 30% in high income countries. The opposite pattern is expected in developing countries, where traffic accidents are expected to increase at a fast rate in the years to come. World Health Organization (WHO) strategy of 2001 reports that currently road traffic injuries are the leading cause of deaths and injuries, the 10th leading cause of all deaths and 9th leading contributor to the burden of disease worldwide based on disability adjusted life years. The numbers of deaths resulting from road traffic crashes have been projected to reach 8.4 million in the year 2020.

The first road accident in Sri Lanka occurred when a calf was overrun by a horse driven cart of King Lara's son.

Road accidents have been divided into four categories such as Fatal Accidents, Grievous Accidents Non Grievous Accidents and Damage only Accidents

- As a result of fatal accidents - one or many persons get killed.
- Grievous accidents - Serious injuries are caused, hands and legs get amputated, getting disabled and staying in hospitals for a longer period.
- Non Grievous accidents - at least one person sustains minor injuries
- As a result of Damage only accidents – vehicles and properties get damaged.

Worldwide, the transportation problems faced by various nations have increased manifold, necessitating search for methods or alternatives that ensure efficient, safe, feasible and faster means of transport.

The advancements in GIS and GPS can be put to effective use in accident analysis. Although GIS has been used for over thirty years however, it has only been recently used in the field of transportation. In addition to promoting linkage between various types of data and maps GIS is able to manipulate and visually display numerous types of data for easy comprehension. GIS is a technology for managing and processing location and related information. It visually displays the results of analysis thus enabling sophisticated analysis and quick decision making. Development of a system that uses GIS to analyze traffic accidents has been pursued towards improving the efficiency and effectiveness of traffic accident counter measures. Also GIS would make analysis less time consuming and less tedious which otherwise would become very labour sensitive. Thus GIS will offer a platform to maintain and update accident record database and use it for further analysis.

1.2 Study Problem

A considerable number of people in the world fall a prey to natural disasters such as volcanoes, earth slips, earth quakes, floods etc.

People who live in Sri Lanka occasionally have faced natural disasters but they do not occur frequently. This is the truth.

However, Sri Lanka faced a disastrous war for nearly 30 years and during this period a large number of civilians, military personal and politicians were killed and a huge amount of valuable resources were lost forever. But now this situation is completely erased. Yet people also get killed in riots and for other reasons. However, the current reasons that cause problems are: Negligence of pedestrians, drivers, motorcycle riders, pedal cyclists and other road users. Road infrastructure defects and un-roadworthy vehicles contribute to accidents.

Pedestrians cross roads haphazardly without using the pedestrian crossings. Some dash on to the roads without looking around to see whether any vehicles are passing by. They fail to use the pavements. At pelican crossings pedestrians, cross the road when the green light is on as well as when the red light is on. They walk on the wrong direction. They are supposed to walk on the right but they walk on the left. While accompanying children pedestrians have to take them on their right but some of them take their children on the left.

The above two categories are engaged in reckless and dangerous driving due to competition. On most occasions they violate road rules such as driving on the wrong direction, stopping at places as and when

they want and do not care for other road users. They do not signal when they turn or stop the vehicle, stopping at places where there are no bus halts and some of them are rude to the road users.

The lorry drivers without looking at the road condition take overloads. They too try to move fast without giving any consideration to other road users. They ignore the road situation such as pedestrian movement in congested areas. The container drivers behave in the same manner when they drive huge empty trailers.

There is a trend of an increase in three wheelers. Hence three wheel drivers completely ignore road rules. They try to creep through any little space they find, their driving is reckless and dangerous, they turn their vehicle all of a sudden in the middle of the road. They are contributing towards the increase in road accidents.

There is a considerable increase in motor cycles in the country. In most cases every house has a motor cycle. Motor cycle riders ride recklessly ignoring all road rules. They too have a tendency to creep though even through a small space. Most of them fail to use safety helmets. They too ignore other road users. They are engaged in drunk riding and do not take safety precautions while riding. For nearly 10 years we witness through print and mass media that they also contribute towards road accidents.

In most rural areas and Northern Province movement of pedal cyclists is rampant. These riders do not take safety measures such as proper lighting system, reflectors and bells not installed, While riding cycles they do not adhere to road rules. In the absence of street lights in rural areas they are supposed to wear light colours so that they can be easily be identified. But these cyclists wear dark colours and this causes accidents.

Other road users such as passengers, persons traveling in tippers, open vehicles and tractors fail to follow safety measures.

Road Development Authorities (RDA) and Local Authorities are responsible to maintain roads. We could see defects such as lack of street lights, no proper drainage systems, no proper pavements etc. When roads are designed no pedestrian paths are set up. In most cases there are no pedal cycle tracks on the roads. Improper road markings are seen. Pedestrian crossing is drawn close to the bus halts. Road signs are not placed in the proper directions. When road sign boards and street lights are damaged during accidents they are not replaced immediately and no road signs are placed where they are needed. When pedestrian crossings and road markings are erased they are not replaced immediately.

Breaking completed roads to insert service lines frequently, taking much time to repair bridges, lack of proper maintenance to pavements and no prompt action to remove un-authorized structures along pavements and streets are some of the major shortcomings faced.

Where Sri Lanka is concerned vehicles over 300000 - 400000 ply on the roads. Most of the vehicles do not have brakes. Wasted tyres, broken side mirrors, lack of proper signals etc. are the defects found public transport, private buses and lorries.. Further some vehicles emanate smoke affecting the environment. Law enforcement authorities do not take action on these vehicles. These vehicles also contribute to accidents.

It may be mentioned that for the past 30 years people getting injured and killed has been on the rise. These people are supposed to be engaged in some sort of work. They fall under the age group of 16 – 55 and who contribute towards the development of the country in a great way. But this age group is diminishing little by little. This situation has been conspicuous during the past 30 years. This state of affairs is gradually increasing and no change could be witnessed.

The number of road accidents in Gampaha reported from 2005 to 2014 is 73017. This accounts to 15 % of the total road accidents of 472,842 that took place in Sri Lanka. During this period fatal, serious and minor injuries in Sri Lanka amounted to 246,702 This accounts to 35,557 in Gampaha District which is 14 % of the total reported in Sri Lanka. **(Table 1.2.1. and Table 1.2.2)**

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Fatal Accidents	2101	2069	2224	2176	2263	2579	2498	2317	2190	2260	26655
Grievous Injury Accidents	4795	4729	5082	4941	5379	6124	6965	7209	6870	7071	67306
Non Grievous Injury Accidents	13213	12158	11860	11288	10945	12560	13196	14680	13525	12781	152741
Damage Only Accidents	20423	14801	12816	11459	14507	16390	17599	17939	15292	13854	226110
Total	**40532**	**33757**	**31982**	**29864**	**33094**	**37653**	**40258**	**42145**	**37877**	**35966**	**472842**

Total No of Accidents Reported in Sri Lanka. (Table 1.2.1)

Source - MAAP Data Base - Police Traffic Headquarters

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Fatal Accidents	367	288	367	344	344	382	363	335	313	323	4087
Grievous Injury Accidents	677	704	728	714	764	744	887	878	882	857	8992
Non Grievous Injury Accidents	1891	1593	1865	1830	1727	2007	2020	1968	1746	1781	22478
Damage Only Accidents	3024	1523	2272	1877	2852	3300	3317	2863	2337	2349	37460
Total	**5959**	**4108**	**5232**	**4765**	**5687**	**6433**	**6587**	**6044**	**5278**	**5310**	**73017**

Total No of Accidents Reported in Gampaha District (Table 1.2.2)

Source - MAAP Data Base - Police Traffic Headquarters

Among the road accidents reported in Sri Lanka accidents in the Gampaha District have It may be mentioned that the number of accidents reported in the Gampaha District during the past 10 years have increased very much, except for a few years.

This indicates that the country is facing a critical situation. It is observed that although the Government is taking action in this regard there seems to be no reduction in accidents. The increase in the number of accidents in Gampaha District should be taken into serious consideration.

1.3 Significance of the study

The study will add knowledge on understanding what risk factors contribute to the occurrence of road traffic accidents and related injuries in a restricted risk area in Gampaha District. The data obtained in this study, can be used by the road safety authorities for planning and evaluating road safety measures. The recommendations given if considered are going to benefit the public at large on Prevention of road accidents. The data can also be utilized as baseline data in future related researches.
Thus GIS will offer a platform to maintain and update an accident record database and use it for further analysis.

In recent years, GIS has been developed rapidly and used broadly in the field of traffic safety. In developed countries, especially the US and Western Europe, GIS technology has been widely applied to urban traffic information management.

Worldwide, the transportation problems faced by various nations have increased manifold, necessitating search for methods or alternatives that ensure efficient, safe, feasible and faster means of transport. The advancements in GIS and GPS can be put to effective use in the accident analysis. Although GIS has been used for over thirty years it has only been recently used in the field of Transportation. In addition to promoting linkage between various types of data and maps GIS is able to manipulate and visually display numerous types of data for easy comprehension. GIS is a technology for managing and processing location and related information. It visually displays the results of analysis thus enabling sophisticated analysis and quick decision making. Development of a system that uses GIS to analyze traffic accidents has been pursued towards improving the efficiency and effectiveness of traffic accident countermeasures. Also GIS would make analysis less time consuming **(International journal of scientific & technology research volume 2 issue on 2nd February 2013)**

1.4 Objectives

Main Objective

1. To analyze road accidents with the help of GIS in Gampaha District.

Sub Objectives

2. To examine the road designing and road Infrastructure defects.
3. To investigate the human negligence causing accidents
4. To analyze the mechanical defects in vehicles