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Editorial Note

In the recent times higher education has become more and more interdisciplinary. An educated individual is expected to understand the basic issues of almost all the subjects apart from the main area of his specialization. For instance a trained management graduate is expected to have an orientation of all the functional areas along with his main specialization. Needless to say that he should possess the skills of computer along with mathematical and statistical skills. The decision making capacity of the trained graduates improves with all these newly acquired traits.

The B-schools realizing this emerging trend in the business environment are modifying their curriculum by introducing the new concepts. The educated post-graduate student at all levels is expected to be multi-skilled and ready to work in the new and dynamic environment. Personality development oriented courses are being given as add-on modules for better employability.

Recognizing these trends in the higher education and the requirement in the job market, we have encouraged articles of interdisciplinary nature in the present issue. The articles range from study of exports, accidents, pollution and other related issues. A book review on an important topic of financial management has also been included in this issue. All these articles are applied in nature and demonstrate the use of statistical techniques for writing good research articles. Therefore it is hoped that the research papers published in the present issue will serve as a good reference for researchers in all fields.

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Editor

A STUDY OF ACCIDENTS IN KOLHAPUR

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Abstract: In this study the information about the accidents in Kolhapur is collected from the records of police stations during the period of last six years. The collected information is classified according to many characteristics and analyzed statistically The results of the study show that the younger age group commit more number of accidents than the older. There is a significant difference in the average age of male and female who are responsible for accidents. There is no significant difference in the number of accidents, injuries and deaths in different years. The accidents were not uniform over different months in a year as well as it not uniform in all hours of a day. It shows that the accidents were mainly due to the negligence in driving, lack of awareness and experience.

Key words: Accidents, Statistical Significance, Negligence, Awareness

1.0 INTRODUCTION

Scientific development, literacy and awareness of various causes for diseases, have led to the death rate decrease substantially. But due to accidents the death rate is increasing rapidly. The accidents mainly cause loss of human lives, injuries and huge loss of vehicles. From the available records of Central Government it is revealed that, the losses due to accidents in the years 1982, 1992 and 2002 are approximately 230 crores, 5000 crores and 55,000 crores respectively .The accidents are not purely random. There are several causes for accidents, namely lack of proper maintenance of roads, inadequate knowledge of rules of driving and so on (M.V.act 59 of 1988)

2.0 NEED FOR THE STUDY

In this study the information about the accidents in Kolhapur District is collected from the records of various Police Stations and District Superindent of Police (DSP) office of Kolhapur (Daroga Singh and Chaudhary 1986). The information about vehicles is from RTO office of Kolhapur during the last six years. The information includes the number of accidents, deaths, injuries, age and gender of the person mainly responsible for accidents. The collected data is classified according to various characteristics and analyzed statistically and the following results are obtained. Such a study in Kolhapur especially using the police records has not been conducted earlier. In this research paper we attempt to fill this research gap.

(i) There is a significantly higher proportion of deaths due accidents in rural area than the urban area.

(ii) There is a significant difference in the average age of male and female who is responsible for accidents.

(iii) The younger age group is more in number than the older age for committing accidents.

(iv) The accidents are not distributed uniformly throughout the year as well as in all hours of a day.

(v) The accidents, injuries and deaths in the last six years independent of each other.

3.0 METHODOLOGY AND ANALYSIS:

The accidents in Kolhapur District during the years 2006 to 2011 are collected from the records of various Police Stations of Kolhapur District and DSP office of Kolhapur. The collected data is classified according to many characteristics such as region, gender, age, deaths and injuries in different years, months and time of accident. To study the significance of various causes Z-test and chi square tests are applied.
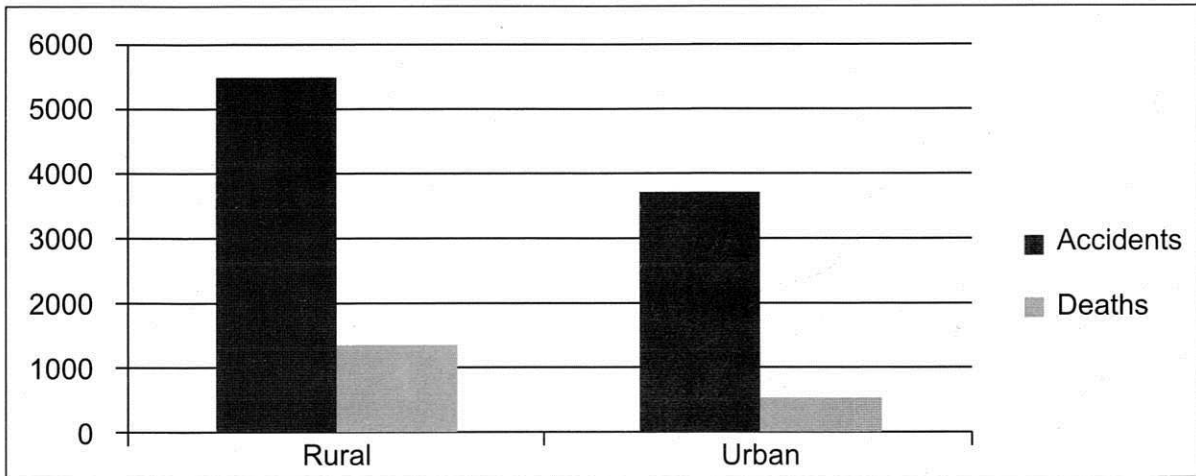
3.1 Region-wise Distribution of Accidents and Deaths:

A contingency table representing the region-wise accidents and deaths is as follows (Bishop, Fineberg and Holland.1975)

Table No. 1: Region wise Accidents

Region	No of accidents	No of deaths	Proportions
Rural	5528	1362	0.2463
Urban	3736	563	0.1507
Total	9264	1925	0.2078

Graph No. 1: Region wise Accidents

3.1.1 Test for equality of proportions:

Let P_1 and P_2 be the proportion of accidents in rural and urban area. Then corresponding sample proportions are p_1= 0.2463 and p_2=0.1507. The null hypothesis is $H_0 : P_1 = P_2$ against the alternative $H_1: P_1 > P_2$ .Under H_0 , value of the test statistic is Z_0 =11.125.At level of significance $\alpha = 0.05$, the critical value is 1.64.Therefore Z_0> 1.64 ,hence reject H_0 (ParimalMukhopadhyay 2006)

3.2.0 The distribution of age and gender of accident committers:

The distribution of age & gender of the persons who are responsible for accidents is as follows

Table No. 2: Age and Gender wise Distribution

Age	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70
Male	727	1873	2613	1001	881	391	158	107	84	47	19
Female	81	145	206	268	281	163	102	78	37	00	00

Graph No. 2: Age and Gender wise Distribution
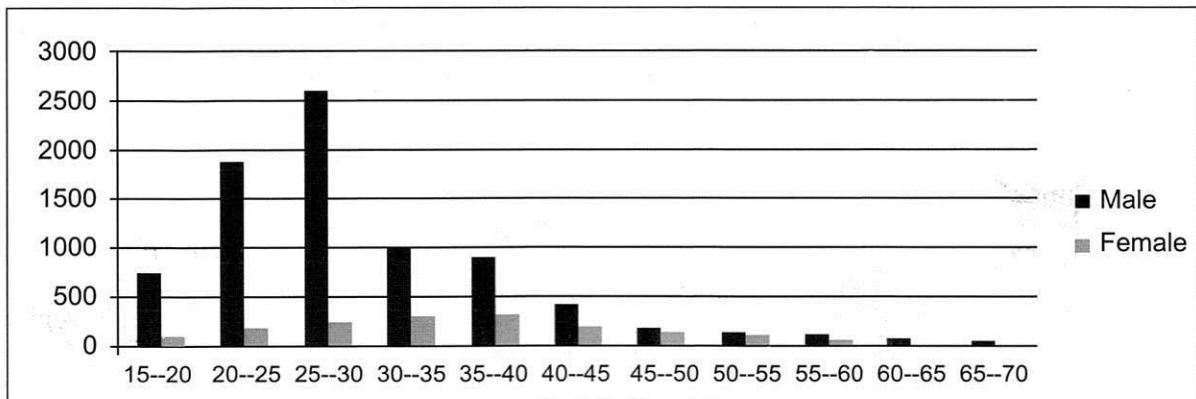
3.2.1 Test for equality of average age of male and female accident committers:

Let μ_1 and μ_2 be the average age of male and female persons who are responsible for accidents. The corresponding sample mean and variances are $X_1 = 29.25$, $X_2 = 34.965$ s_1^2 =2.98876 and $s_2^2 = 3.8267$. The hypothesis are $H_0 : \mu_1 = \mu_2$ against the alternative $H_1: \mu_1 < \mu_2$ .Under H_0 , value of the test statistic is $Z_0 = -101.15$.At level of significance $\alpha = 0.05$, the critical value is -1.64.Therefore $Z_0 < -1.64$,hence reject H_0

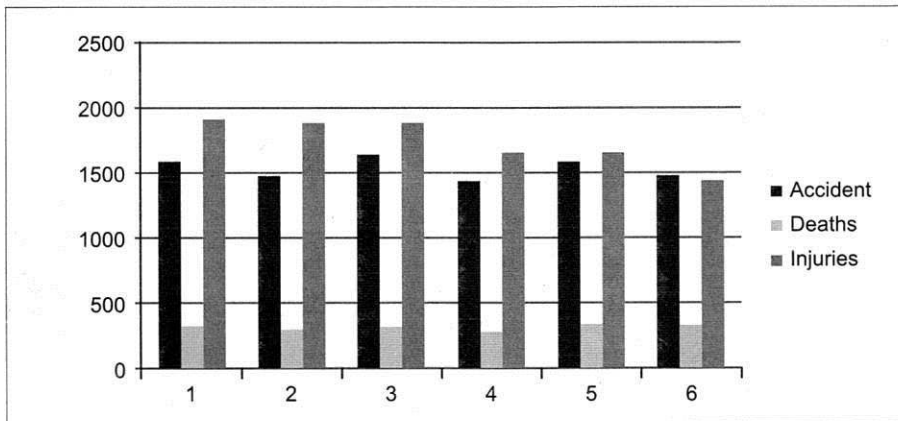## 3.3 Distribution of Annual Accidents, Deaths and Injuries:

Table No. 3 Annual Accidents

Years	2006	2007	2008	2009	2010	2011	Total
Accidents	1598	1486	1648	1446	1597	1489	9264
Deaths	327	306	319	289	340	344	1925
Injuries	1924	1898	1888	1661	1666	1442	10459

Graph No. 3 Annual Accidents

Chi-square test for independence of these three factors in different years :

Let A denote the accidents, deaths and injuries in the given year and B denote different years of accidents. The hypothesis are H_0: A and B are independent against H_1:A and B are not independent. Under H_0 ,the value of the test statistic is $\chi_0^2 = $ Therefore accept H_0

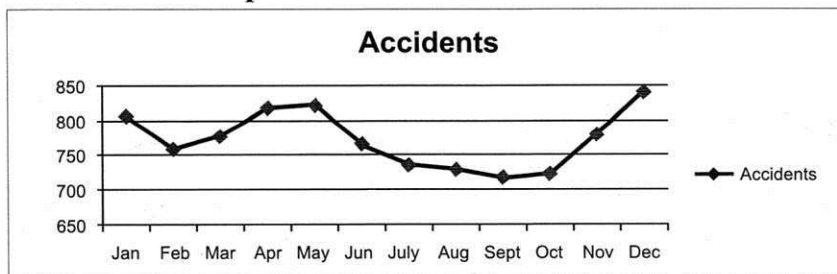## 3.4 Distribution of Monthly Accidents:

The month-wise distribution of accidents is as follows

Table No. 4: Month wise Accidents

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Accidents	805	757	776	817	821	766	735	729	718	722	779	839

Graph No. 4: Month wise Accidents

3.4.1 Let A denote the accidents in a given month and B denote different months of a year. The hypothesis are H_0: A and B are independent against H_1: A and B are not independent. Under H_0, the value of the test statistic is χ_0^2 =24.5642. At level of significance α=0.05, the critical value is 19.6751. Therefore $\chi_0^2 >$ 19.6751, and hence we reject H_0
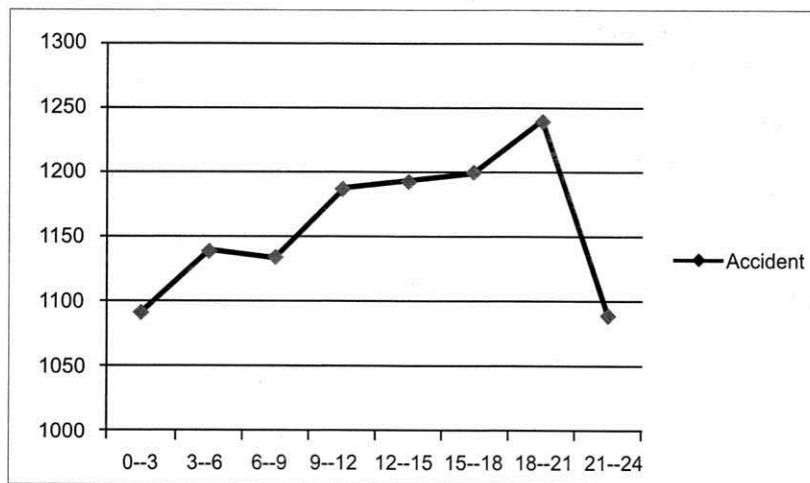
3.5 Distribution of accidents in different hours of a day:

The distribution of accidents in different hours of a day is as follows :

Table No. 5: Hourly Accidents

Hours	0-3	3-6	6-9	9-12	12-15	15-18	18-21	21-24
Accidents	1090	1138	1133	1186	1192	1198	1239	1088

Table No. 5: Hourly Accidents

3.5.1 Let A denote the number of accidents in the given time of a day and B denote different time interval of a day. The hypothesis are H_0: A and B are independent against the alternative, H_1: A and B are not independent. Under H_0, the value of the test statistic is χ_0^2 =17.8325. At level of significance α=0.05, the critical value is 14.10671. Therefore $\chi_0^2 >$ 14.0671, hence we reject H_0

4.0 FINDINGS:

* Proportion of deaths due to accidents is significantly higher in rural area than the urban area
* Average age of the male who commits' accident is significantly smaller than the female.
* The accidents, deaths and injuries are independent in different years.
* The accidents are significantly different in different months in a year.
* The accidents are significantly different in different hours of a day.
* There is a significantly higher proportion of deaths due accidents in rural area than the urban area.
* There is a significant difference in the average age of male and female who is responsible for accidents.
* The younger age group is more in number than the older age for committing accidents.
* The accidents are not distributed uniformly throughout the year as well as in all hours of a day.
* The accidents, injuries and deaths in the last six years independent of each other.
* The death due accidents in rural area is higher because of bad maintenance of roads and inadequate knowledge of driving.
* There is no development in minimizing the road accidents during the last six years period.
* The highest number of accidents is expected in

the months of April, May, December and January.
- The accidents are large in numbers during the hours from 9am to 12 noon and from 6pm to 9pm in a day.

5.0 SUGGESTIONS:
Based on the study conducted we give the following suggestions for reducing accidents in Kolhapur
- The detective machines in roads are applied in order to identify and to regulate the violators of traffic rules.
- Imposition of heavy fine for petty traffic rule violators and confiscations of license in case of major accidents as well life imprison for negligence when death occurred for poor victim.
- There should be proper tress pass throughout the road system in order to make convenience for crossing the road by pedestrians.

- Proper signals and speed breakers are necessary near schools, hospitals and intersection of roads.
- There should be special vigilance team in sensitive areas.

6.0 SUMMARY
In the study a survey was undertaken about the accidents in Kolhapur city. Based on the data collected, preliminary analysis in done through graphical method. In order to test the different hypothesis about accidents in Kolhapur, Statistical techniques are adopted. From the entire study it can be concluded that the accidents in younger age group and middle age is higher. Improvement in the quality of roads and greater monitoring are the only ways where the accidents and fatalities in the city can be minimized.

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