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# A Study of Accidents in Kolhapur

KEYWORDS

AITHAL.U.B
The New College Kolhapur

**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 and following results were investigated. The younger age group commits more number of accidents than the older age. There is a significant difference in the average age of male and female who is responsible for accident. 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.*

**1. Introduction**

Due to scientific development, literacy and awareness of various causes for diseases, the death rate is decreased substantially, but due to accidents the death rate is increasing rapidly. The accidents mainly causes loss of human lives, injuries and huge loss of vehicles. From the avail records of Central Government reveals 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, and several causes for accidents are namely lack of proper maintenance of roads, inadequate knowledge of rules of driving and so on (M.V.act 59 of 1988)

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 are 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.

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.

**2. Methodology and Analysis:**

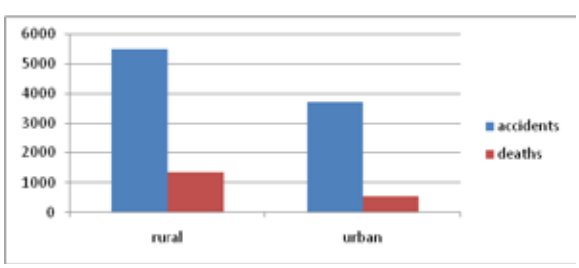
The accidents in Kolhapur District during the years 2006 to 2011 are collected from the records of various Police Stations of Kolhapur District and DSP office of Kolhapur. The collected data is classified according to many characteristics such as region, gender, age, deaths and injuries in different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

i) 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)

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

a) The bar chart representing above data is




b) 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 hypothesis are $H_0 : P_1 = P_2$ 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 $H_0$ (Parimal Mukhopadhyay 2006)

ii) The distribution of age and gender of accident committers:

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

| 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 |

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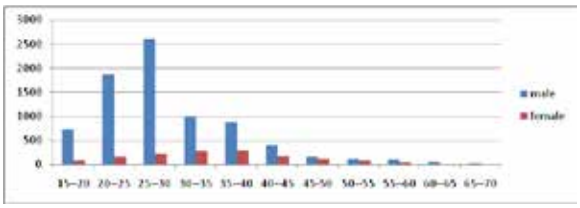
a) The bar chart representing the above distribution is



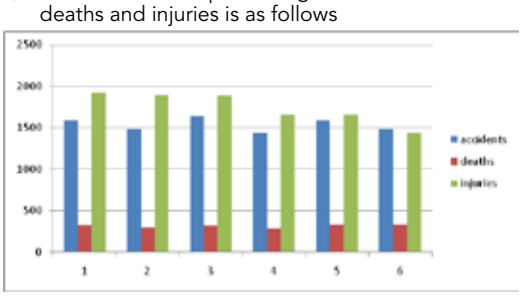

b) Test for equality of average age of male and female accident committers:

Let $\mu_1$ and $\mu_2$ 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 $H_0$

iii) Distribution of Annual Accidents, Deaths and Injuries:

| 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 |

a) The bar chart representing the number of accidents, deaths and injuries is as follows



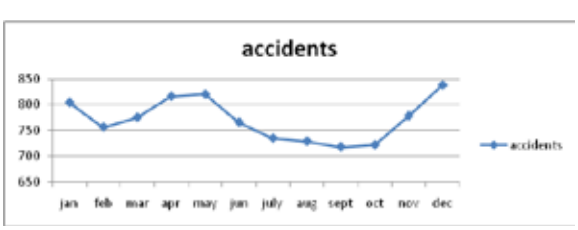

b) Chi-square test for independence of these three factors in different years :

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 $H_0$

iv) Distribution of Monthly Accidents:

The month-wise distribution of accidents is as follows

| 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 |



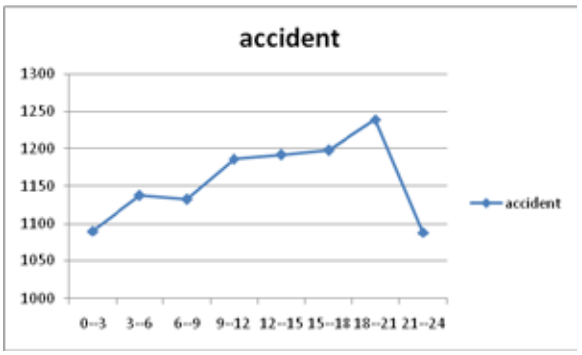

b) Let A denote the accidents in a given month and B denote different months of a year. The hypothesis are $H_0$: A and B are independent against $H_1$: A and B are not independent. Under $H_0$ ,the value of the test statistic is $\chi_0^2$ =24.5642.At level of significance $\alpha$=0.05,the critical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

v) Distribution of accidents in different hours of a day:

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

| 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 |

a) The graph representing above distribution is




b) 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 $\chi_0^2$ =17.8325.At level of significance $\alpha$=0.05, the critical value is 14.10671. Therefore $\chi_0^2$ > 14.0671, hence reject $H_0$

**3. Conclusions:**

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.

**4. Findings:**

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. Suggestions:**

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.

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