"Education for Knowledge, Science and Culture"

-Shikhanmaharshi Dr. Bapuji Salunkhe

VIVEKANAND COLLEGE, KOLHAPUR (Autonomous)

DEPARTMENT OF STATISTICS

A PROJECT REPORT

on

"Statistical Analysis of Road Accidents in Kolhapur Region"

Submitted by

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Mr. Makrand Mahesh Zure

in partial fulfillment for the award of

the degree of

BACHELOR OF SCIENCE

in

STATISTICS

2019-20

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-Shikhanmaharshi Dr. Bapuji Salunkhe

(स्वायत्त) कोल्हापूर

VIVEKANAND COLLEGE, KOLHAPUR(Autonomous)
DEAPRTMENT OF STATISTICS

Certificate

This is to Certify that,

Sr. No.	Name	Roll No.
1	Mr. Suraj Shahji Patil	8228
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4	Mr. Shreyash Anna Patil	8236
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Have satisfactorily completed the project work on **"Statistical Analysis of Road Accidents in Kolhapur Region"** as prescribed by ***Vivekanand College, Kolhapur*** in partial fulfilment for **B. Sc. III** skill enhancement course in **STATISTICS**, in the academic year **2019-20**.

This project has been completed under our guidance and supervision. To the best of our knowledge and belief, the matter presented in this project report is original and has not been submitted elsewhere for any other purpose.

Project Guide

(Ms. Makandar A. M.)

Examiner

Head

(Ms. Pawar V. V.)

VIVEKANAND COLLEGE ESTD JUNE 1964 KOLHAPUR - 416003

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ACKNOWLEDGEMENT

We take great pleasure in submitting this project report on **"Statistical analysis of road accidents in Kolhapur region"**. It is our foremost duty to express our deep sense of gratitude and respect to the supervisor Prof. Makandar madam, Prof. Ms. V.V. Pawar madam for their up-lifting tendency and inspiring us for making of this project work complete and successful. We are indebted to the library personal for offering all the help in completing the project work. Last but not the least we are thankful to our colleagues and those helped us directly or indirectly throughout this project work.

Sincerely,
Project Team

DECLARATION

We undersigned, hereby declare that the project report entitled **"Statistical analysis of road accidents in Kolhapur region"** Written and submitted to Vivekanand college, Kolhapur partial fulfilment of B.Sc. III (Statistics) under the guidance of Prof. Makandar madam are our original work. The empirical results in this project are based on the data collected by ourselves. We understand that any copying is liable to be published as the authorities deem fit.

Date:

Place: Kolhapur

Mr. Suraj Shahaji Patil
Mr. Somesh S Swami Hiremath
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INTRODUCTION

Kolhapur is one of the oldest cities in the country. It derives its importance from its past political association and its position as a great commercial historical religious and education center. As of now Kolhapur has become an epitome of royalty, luxury and has grown tremendously in various aspects which makes Kolhapur one of the prosperous cities in south Maharashtra. The growth in population is one of the factors which is to be considered for economical and subsequent administrative growth. The growth in population also relates to the transportation of people which is one of the main factors responsible in the overall look. Today as we see the city roads which were to be empty a few decades back is now fully rushed of vehicles ranging from 2 wheelers to cars and big transport vehicles. Urban transport facilities in most of the areas are inadequate and deteriorating over the years. The development of public transport though fully customized has not kept pace with the traffic demand. As a result, the use of personalized transport, mainly two-wheelers and intermediate public transport, mainly Rickshas, is growing at rapid speed. Roads and footpaths today ae heavily encroached by parked vehicles, hawkers, and roadside business forcing pedestrians to walk on the road. This results not only in restricting the traffic flow, but also putting pedestrians' life at a great risk. Besides encroachment it is found that road surface in most of the areas is substandard. In addition, lane marking and traffic signs are usually missing and the intersections often require corrections. Wholesale goods centers and malls are usually located in center of the city, which attract substantial goods traffic on congested city roads.

As we would expect, one of Maharashtra's rich and densely populated cities, Kolhapur is noisy, crowded, and typically chaotic. Kolhapur is located at south of Maharashtra connecting its borders with Karnataka, and Goa in the deccan plateau of rich black soil. It is well connected with the rest of the state and other states by railways, roadways, and airways. The demographic characteristics of Kolhapur city indicates that it has added around 4 lakhs people in the last one decade. As a result of population growth city is expanding. The existing road network in the city is inadequate. Functionally the roads do not have any hierarchy as each individual road changes its characteristics after a short distance. Moreover, the vehicular population is quite high, with 1257358 registered motor vehicles in 2017 to 1359884 in 2018 an increase of 102526 motor vehicles in the span of one year. Furthermore, the lack of effective mass transport system has given a rise to a tremendous increase in Intermediate Public Transport (IPT) modes and personalized vehicles.

Transport system in Kolhapur

1) Road network

The existing circulation pattern of Kolhapur is of linear type. On the entry in city the road pattern in up and down since the river Panchganga is flowing from east to west across outskirts of city. The circular type of urbanization around the city has given rise to a dominant elliptical orientation of arterial roads. But unfortunately, the city has dense population and small road lengths. The whole road network system is deficient in terms of geometric and traffic management aspects.

2) Growth of vehicles

The vehicular population growth is tremendous in Kolhapur, with just 224354 registered motor vehicles in 1998 to 1359884 in 2018, an increase of 83 % in a span of just two decades. It is interesting to note that vehicular growth has slowed down substantially during the 2000s. from 1990 to 1999, vehicular population in Kolhapur grew at mean annual rate of around 10%, whereas from 2001 to 2010 it slowed down to 8% and in recent years it is around 9%. It is observed that growth of personalized vehicles such as 2-wheelers and cars is very steep due to non-availability of mass transport system. In 1981, cars and two-wheelers population were 161555 and 17891 respectively which has gone up to 1071520 and 136360 during the year 2018.

3) Public transport system

Public transport system in Kolhapur primarily relies on its intermediate public transport (IPT) modes ad Municipal Transport. Since rail services are used only for inter-state (or districts) its role is negligible. The city bus service under Municipal Corporation (KMT) is virtually perfunctory. Which are used by general public and mostly students to travel in city and outside the city. The rickshaws play pivotal role in transportation. The unreliability of bus services and its inefficient operation coupled with deteriorating road conditions has resulted in high patronage of IPT. The lack of effective mass transport has given rise to a tremendous increase of personalized vehicles. The city roads are congested leading to jamming conditions, which has become intolerable disrupting almost every system of the city. Due to high density of 2-wheeler-rickshaw on the road, passenger movement is disturbingly slow.

Public transport system in Kolhapur, in general, is inadequate, inefficient, and unplanned and therefore, it is not able to serve the travel demand of the public in the best possible way. Particularly, the city bus system which should play a major role in providing the passenger transport service suffers from many deficiencies. The IPT and personalized modes of transport has resulted into a high degree of congestion in the city besides a huge social, economic, and environmental loss.

4) Type of accidents

The accidents are mainly classified into three categories namely, fatal, severe and minor fatal accidents include deaths of passengers or drivers whereas severe include severely injured persons.

5) Type of vehicles

The vehicles are basically categorized based on the wheels the vehicle has. The vehicles are categorized into 5 classes, 2-wheelers, 3-wheelers, 4wheelers, small carriage vehicles and heavy carriage vehicles. 2-wheelers consists of motor cycles, scooters, moped etc. 3-wheelers consists of mainly rickshaws and IPT's. 4-wheelers consisted of LMV, SUV, etc. small carriage vehicles consist of pickup, Piaggio, etc. and heavy carriage vehicles consists of bus, trucks, tractors, etc.

AIM & OBJECTIVES

AIM:

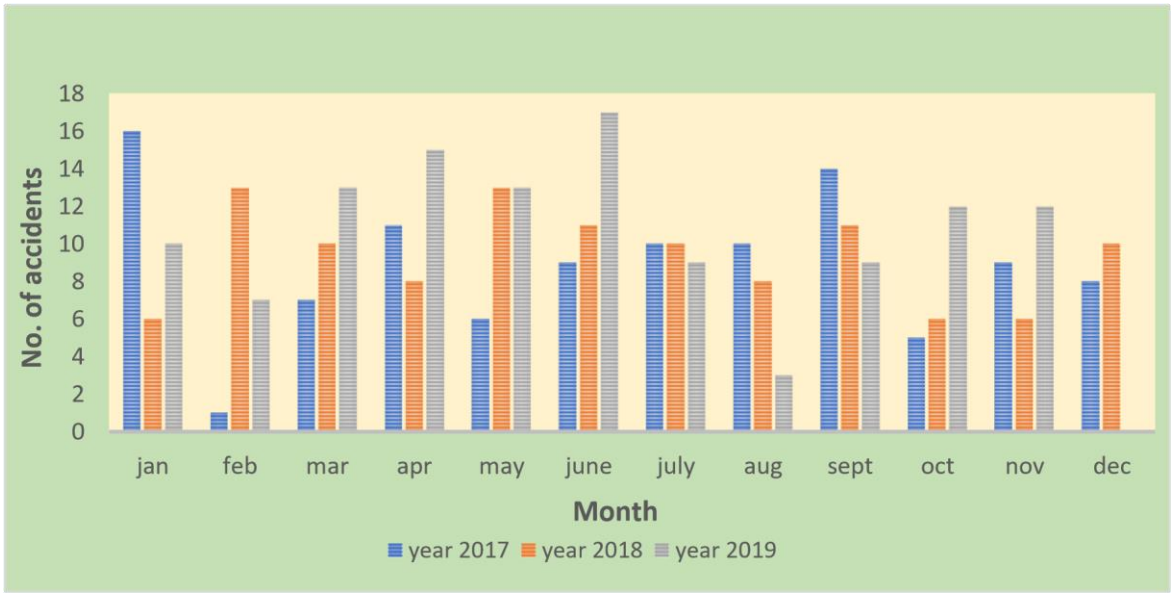
To Analyze Road accidents in Kolhapur region statistically.

OBJECTIVES:

- Investigate seasonal pattern of occurrence of road accidents.
- Check whether there is trend in road accidents.
- To check whether the road accidents are uniformly distributed over the year.
- To check whether age, vehicle, and gender affects the number of accidents.
- To check whether the road accidents are uniformly distributed over the day.

GRAPHICAL REPRESENTATION

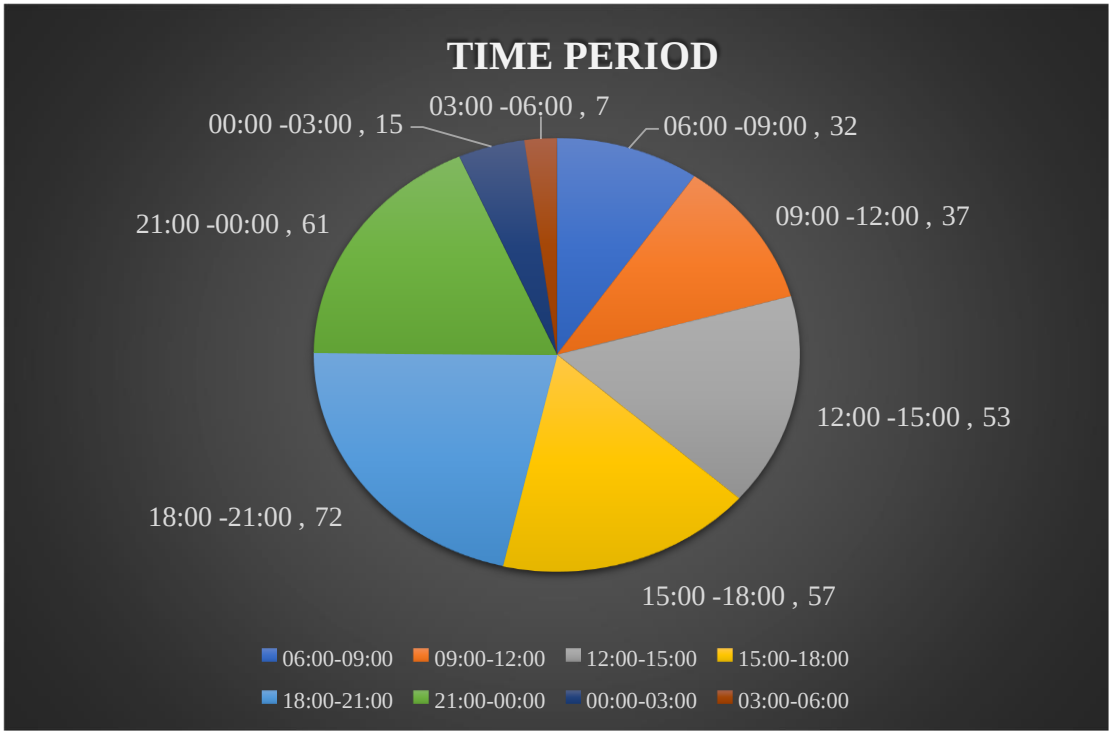
1. Month wise distribution of road accidents



Conclusions:

- On an average there are 9 accidents per month.
- Most of road accidents occurred in the months April to June and in year 2019.

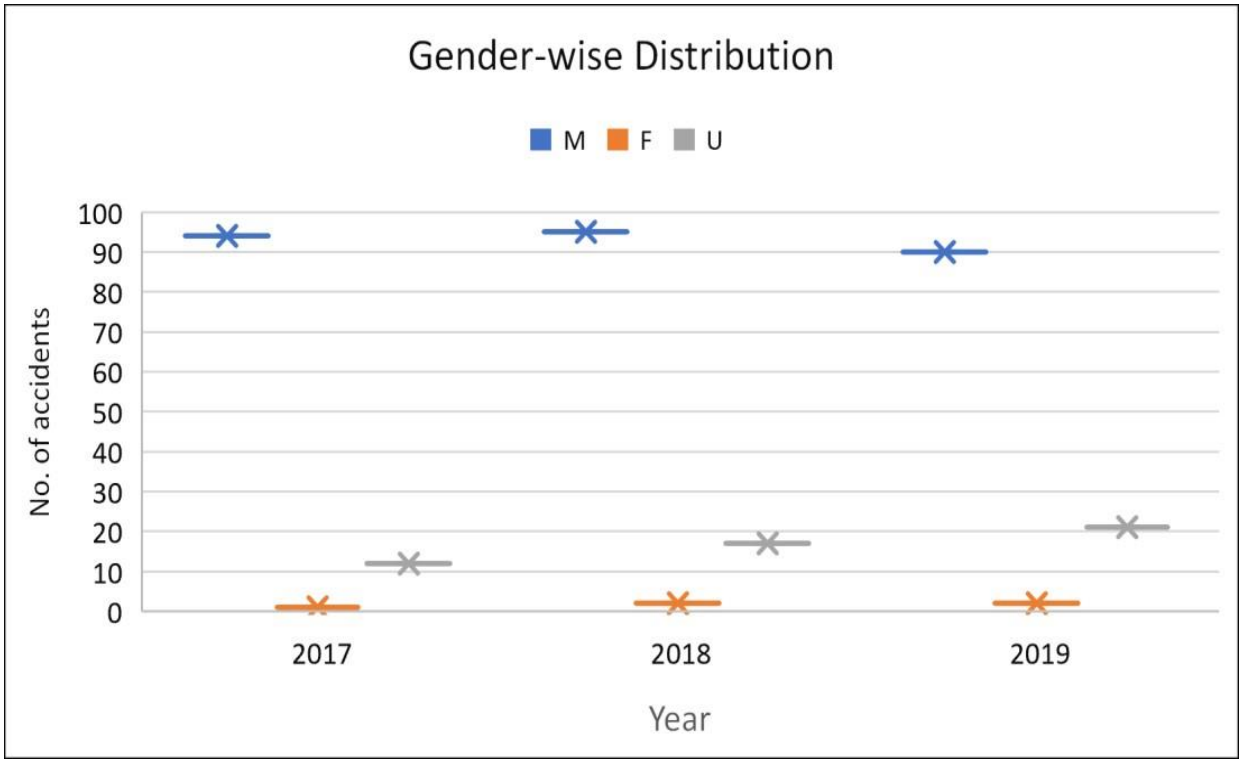
2. Time period wise distribution of road accidents



Conclusions:

- The occurrence of accidents at day time is more than night time
- Road accidents are not uniformly distributed over the day.
- Most of them occur in time period 18:00 to 21:00.

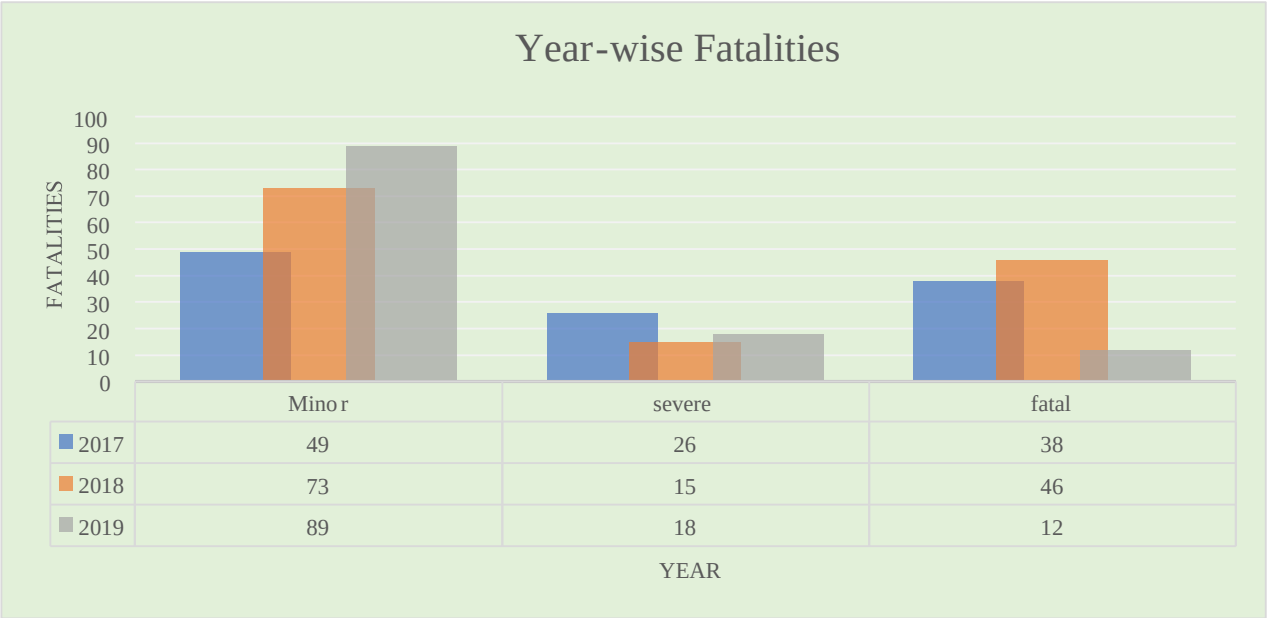
3. Gender wise distribution of road accidents



Conclusions:

- Men are prone to cause road accidents than women.
- The number of unknown people causing road accidents is also more than that of women drivers.

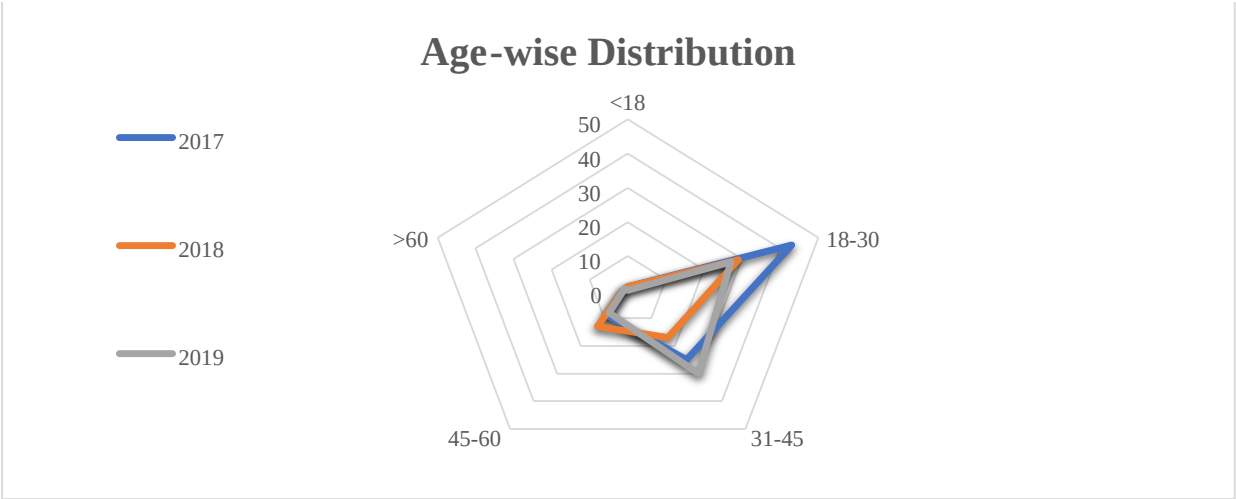
4. Year wise fatalities caused by road accidents



Conclusions:

- In the city area minor fatalities are more than fatal accidents as compared to severe injuries.
- Yearly minor fatalities are on increase

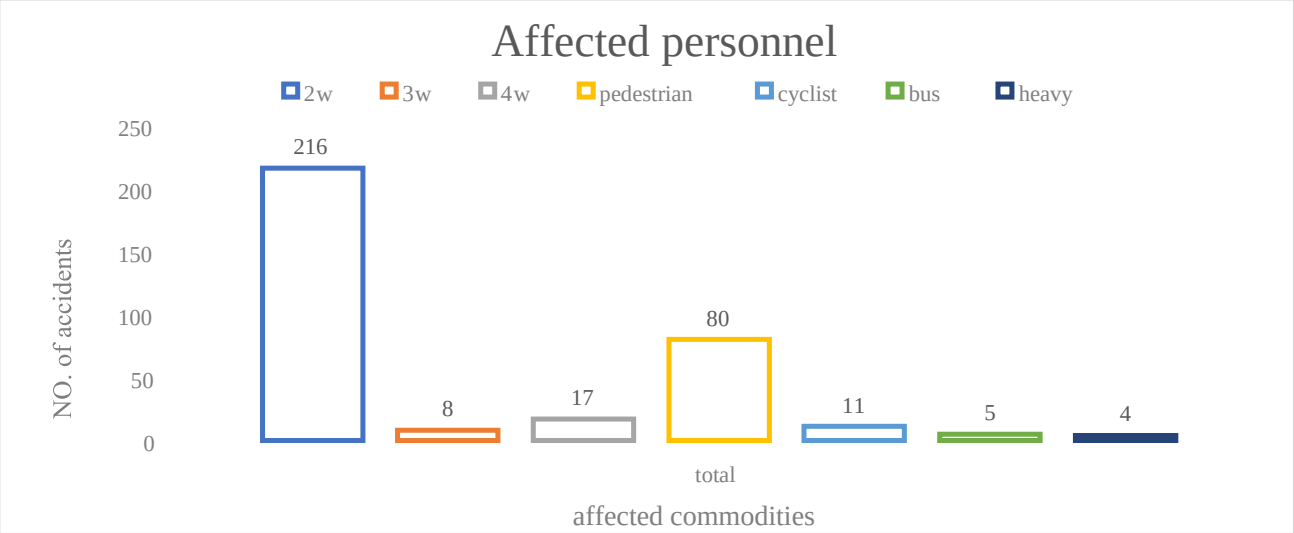
5. Age wise distribution of road accidents



Conclusions:

- Most of road accidents are of the people of age group 18-30 and people of age group 45-60 mate lesser accidents.

6.Vehicle wise distribution of road accidents



Conclusions:

- People driving 2 W & pedestrians are more prone to accidents.
- Heavy vehicle people get less affected.

STATISTICAL ANALYSIS

- **To check whether the road accidents are uniformly distributed over a day following data is analyzed using continuous uniform distribution.**

We have to test

H_0: Road accidents are uniformly distributed over a day
H_1: Road accidents are not uniformly distributed over a day

Under H_0 test statistic is given by,

$$\chi^2 = \sum_{i=1}^{n} \frac{(Oi-Ei)^2}{Ei}$$

where, n = number of observations after pulling and

k = number of estimated parameters Here

χ^2_{cal}= 88.27545

χ^2_{tab} = 14.07

$\chi 2cal > \chi 2$ tab

Hence, we reject H_0 at 5% L.O.S

Thus, Road accidents are not uniformly distributed over a day.

❖ **To check whether the road accidents are uniformly distributed over a year following data is analyzed using continuous uniform distribution**

- **For year 2017**

We have to test

H_0: Road accidents are uniformly distributed over a year
H_1: Road accidents are not uniformly distributed over a year

Under H_0 test statistic is given by,

$$\chi^2 = \sum_{i=1}^{n} \frac{(Oi - Ei)^2}{Ei}$$

where, n = number of observations after pulling and
k = number of estimated parameters

Here,
χ^2_{cal}=19.66045
χ2tab = 19.68
χ2cal < χ2 tab
Hence,
We accept H_0 at 5% L.O.S
Thus,
Road accidents are uniformly distributed for year 2017.

Similarly,

- **For year 2018**

Road accidents are uniformly distributed for year 2018.

- **For year 2019**

Road accidents are not uniformly distributed for year 2019.

❖ **To check whether road accidents are gender wise independent. The following data is analysed using χ^2- test for independence of attributes.**

We have to test

H_0: Gender wise road accidents are independent.

H_1: Gender wise road accidents are not independent.

Under H_0, the test statistic for χ^2 test for independence of attributes is,

$$\boldsymbol{\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{s}\frac{[(AiBj)-(AiBj)e]^2}{(AiBj)e} \sim \chi^2_{(r-1)\,(s-1)}}$$

Here,

$\chi^2_{cal} = 2.77$

$\chi^2_{tab} = 9.49$

$\chi 2cal < \chi 2$ tab

Hence,

We accept H_0 at 5% L.O.S.

Thus, Gender wise road accidents are independent.

❖ **To check whether road accidents are type of vehicle wise independent. The following data is analysed using χ^2- test for independence of attributes.**

We have to test

H_0: vehicle type wise road accidents are independent.

H_1: vehicle type wise road accidents are not independent.

Under H_0, the test statistic for χ^2 test for independence of attributes is,

$$\boldsymbol{\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{s}\frac{[(AiBj)-(AiBj)e]^2}{(AiBj)e} \sim \chi^2_{(r-1)\,(s-1)}}$$

Here,

χ^2_{cal}=9.218593

χ^2_{tab} = 15.51

χ2cal < χ2 tab

Hence,

We accept H_0 at 5% L.O.S

Thus, vehicle type wise road accidents are independent.

CONCLUSIONS

- Road accidents are uniformly distributed for years 2017 and 2018.
- Road accidents are not uniformly distributed over the day.
- The variation in population of number of accidents according to vehicle type are same.
- Gender of a person and age do not have any dependency with road accidents.
- Types of vehicles also do not have any dependency with road accidents.

PRECAUTIONS TO MINIMISE ROAD ACCIDENTS

- Over speeding is the main cause of road accidents. Speed limit signs must be followed strictly.
- Use of helmet and protective items while driving is important.
- Never drive under the influence of alcohol or drugs.
- Don't make the mistake of assuming that other drivers are going to do or what you think they should do.
- No-multi tasking while driving, pay full attention to road and other vehicles.
- speeding is not going to increase your chances of punctuality**.** Get yourself going about 10 minutes early and risk getting there early instead of putting yourself and those around you in danger.
- Wearing your seat belt is an essential safety tip for drivers.
- when you see a stop sign or a red light, it's important to bring your vehicle to a complete stop.
- It is never acceptable to send text messages when operating a motor vehicle.
- When the weather is less than perfect, such as rainy, snowy, or foggy conditions, use extra precautions when driving and follow guidelines for staying safe in the particular situation you are facing.

BIBLIOGRAPHY

- Regional police stations.
- Department of statistics, Vivekanand college, Kolhapur
- Fundamental of mathematical statistics by S. C. Gupta.
- Probability Distribution Theory and Statistical Inference by K C Bhuyan.