The Seybold Report

ISSN 1533-9211

DOI 10.17605/OSF.IO/6KW9S

TRAITS OF DRIVERS LEADING TO ACCIDENTS IN CARS

NIRANJAN G HIREMATH*

Assistant Professor, Department of Civil Engineering, M S Ramaiah Institute of Technology, Bangalore, Karnataka, India. Corresponding author E-mail: niranjanhiremath.g@gmail.com

Dr. J SUMALATHA

Associate Professor, Department of Civil Engineering, M S Ramaiah Institute of Technology, Bangalore, Karnataka, India.

Abstract

This paper aims to study the age-across stability of different factors of the Driver Behaviour with a Driver Behaviour Questionnaire (DBQ) to examine self-driving pattern of 448 taxi drivers in the Indian Mixed Traffic conditions. The questionnaire consisted of 17 questions which were group under 10 main parameters. The sample size consisted of the closed ended questions in which the respondent had to answer with a 'Yes' or 'No'. The responses were analysed using a software which would give the accident proneness in terms of percentage. The DBQ was analysed to arrive at the factor variations considering 9 parameters for the age groups 18-30, 30-50 and 50 & above. It was concluded that time constraint, loopholes in the systems with respect to traffic rules and regulations and distractions were the major criteria causing accidents in the age group of drivers of 18-30, 30-50 and 50 & above respectively.

Keywords: Driver Behaviour Questionnaire (DBQ), Mixed traffic Conditions, Accident Proneness

1. INTRODUCTION

One of the most common problems related with traffic engineering is the road accidents or world-wide known as traffic crashes. While we believe that the accidents happen due to the din and confusion created by the chaos of the traffic on the roads, it may also be worth mentioning that the driver is the key factor to drive the vehicle on the road in the prevailing conditions which is quiet known to him. The driver can be considered to be the sole personality to driver the vehicle, steer the vehicle and also react and stop the vehicle accordingly in the given instances. One of the challenges faced by the Indian drivers is the mixed road traffic conditions. Mixed traffic flow can be defined as a stream containing various vehicles either motorized or non-motorized. It is classified into six categories of vehicles i.e. cars, trucks vans, buses, recreational vehicles and motorcycles.

The studies conducted in the past have provided very little insight into factors which influence the drivers in to accidents. The roadside infrastructure, vehicle streams and human beings are some of the major influencing factors causing the road crashes. And out of these the human factors affect the most for the accidents to be caused. The attitude of the drivers, the experience, socio-economic activities of the drivers are some of the other factors affecting the behavior of drivers on roads whose idea is a basic must to understand the occurrences of accidents.

It was this notion by which we can zero in on the drivers to have the first-hand information about both the personal and traffic problems on the roads. It is to be noted that the driver's tendency on the roads can be generalised but not the situations arising on the roadway systems

The Seybold Report
ISSN 1533-9211
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(1,2). The study of the driver behaviour seems to be a seemingly different task if at all an attempt is made to validate within the laboratory conditions as the field conditions and the laboratory conditions are quite different from each other as the results obtained in the real conditions show that the reaction time of drivers on average is twice as long as in the laboratory conditions (2,3). The driving conditions, especially in the Indian mixed traffic conditions is unpredictable not only due to mixed traffic conditions but also unpredictable nature of the traffic, be it interrupting vehicles or forcible lane changes. Around 50% of drivers might not make a timely lane change in response to a last-minute warning. This indicated that these signals might be insufficient on their own when applied in the real world. 3–5% of drivers might even hit the road works or rumble strips (3,4). The driver is the sole personality to steer, drive and brake the vehicle during emergencies and the range of drivers especially in the traffic scenarios like India varies between 18 to 60 and above. Drivers tend to drive the vehicles with different mindsets and they tend to behave differently to different situations based on their age and experience also. The elderly group showed significantly more delay than the younger group (4,5). The roads cater to all kinds of generations of drivers using a single roadway to move from place to place. There are additional factors apart from the behaviors of the drivers to distract the driving in the given road conditions. The onset of mobile phones, google maps, dashboard features, GPS usage has surely distracted the drivers' attention in this scenario. The main results demonstrated that the driver's speed generally reduced during the phone call whereas the reaction time generally increased, especially under certain driving conditions (urban road, along tangent, using hand-held mobile device) (5, 17). The psychological characteristics of the drivers also, such as anger, anxiety, emotions play a significant role in the behavioural changes of drivers. A study successfully demonstrated that situational anger threatened driving safety by increasing risky driving behaviours such as speeding and by degrading driver's ability to deal with emergency situations occurring in the peripheral areas. However, anger did not necessarily compromise responses to emergency situations falling in the centre areas of the road. Moreover, it was found that angry drivers tended to scan a narrower area and apply a heuristic processing style, both of which resulted in a higher chance of missing potential hazards in the peripheral areas (6, 24).

2. THE STUDY

As a precursor, the information was collected from the writers of the police stations in the urban set-up to understand the first-hand information about the causes and reasons involving the road accidents. The most common causes were listed out under three broad categories as rash driving, negligent driving and over-speeding. Whereas a deep insight into the categories revealed most common problems on the roads as encountered by the drivers such as failing to use the turn signal, driving on the wrong side, lack of awareness of the roads signages, anxiety, anger, nervousness, frustration, stress, fatigue, panicking, missing highway exits, other major reasons were those of distractive driving behaviour. The common parameters featured were distracted driving, over-speeding, drunken driving, glare of the headlights, tailgating, drowsy driving, surprise potholes, tire blowouts, animal crossings etc.

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3. METHODOLOGY

The study was conducted on 448 car drivers meaning they mainly drove cars in the Indian Mixed Traffic condition.

The questionnaire sample is as shown:

1. Have you ever met with an accident?
2. Was the accident because of the behavioural aspect of yourself or any other factor, that is, pressure, anxiety, frustration, aggression or fatigue?
3. Do you think your decision making or behaviour influenced the accidents?
4. Did you take pressure/panic just before the accident?
5. Were you under the influence of any substances like alcohol or drugs?
6. Do you think you could have avoided the accident with more experience/training?
7. Were you driving with time constraints or emergency?
8. Were you stressed due to fatigue, frustration or driving with aggression?
9. Were you distracted just before the accident by external factors (pedestrians/animals)?
10. Was the accident related to weather conditions/time of the day?
11. Were you wearing seatbelt during the accident?
12. Do you think that decrement of speed would have avoided the accident?
13. Was the accident caused due to functional characteristics of the vehicle?
14. What is your age?
15. Do you think your marital status had any influence on the accident?
16. Do you think the efficient rules, regulations, law enforcement would have prevented it?
17. Did any of the design factors that is highway alignment, geometrics or road conditions lead to accidents?

The DBQ method was utilized to arrive at the answers for the questions. Each of the answers for which the answers were good/positive/safe from the perspective of the driver was awarded 1 mark. The scoring pattern was devised giving suitable weightages to the answers selected by the drivers while filling the questionnaire.

The figure gives the tabulation of the survey data. The rows depict the drivers score and the columns depict the questions present in the DBQ. The minimum scores of the driver could attain was 0 (in case of not meeting with an accident). And the maximum score to be attained by the respondent was 100% (in case the driver had met with accidents).

The table 1 shows the data collected during the survey of 448 car drivers and their responses.

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1		<p>Have	<p>Was	<p>Do	<p>Did	<p>Were	<p>Do	<p>Were	<p>Were	<p>Were	<p>Was	<p>Were	<p>Do	<p>Was	<p>What	<p>Do	<p>Do	<p>Did
2	abeer	yes	no	no	no	no	no	no	no	yes	no	yes	no	no	18-30	no	no	yes
3	Aditya Ku	yes	no	yes	no	yes	yes	yes	no	yes	yes	no	yes	no	18-30	yes	yes	no
4	Ajith Kum	yes	yes	yes	yes	no	yes	no	no	yes	no	yes	no	no	18-30	no	yes	yes
5	Ajmal	yes	no	no	no	no	no	no	no	no	no	yes	no	no	18-30	no	no	yes
6	Akash	yes	no	no	no	no	no	no	no	yes	no	yes	yes	no	18-30	no	yes	no
7	Amit Jaisv	yes	no	yes	yes	no	yes	yes	yes	no	yes	yes	yes	no	30-50	no	no	yes
8	Amol Tan	yes	no	yes	yes	no	yes	no	no	no	no	yes	yes	no	30-50	no	yes	yes
9	Amruth	yes	no	no	yes	no	no	no	no	no	no	no	yes	no	18-30	no	no	yes
10	Anand	yes	yes	no	no	no	no	no	yes	no	no	no	no	no	18-30	no	yes	yes
11	Anil	yes	yes	yes	no	no	no	no	no	yes	no	yes	yes	no	18-30	no	yes	yes
12	Anjali	yes	no	yes	no	no	yes	no	no	no	no	yes	no	no	30-50	no	no	no
13	Anoop Ma	yes	no	yes	no	no	no	yes	no	yes	no	yes	yes	no	18-30	no	yes	no
14	Anusha	yes	no	yes	yes	no	no	no	no	no	yes	yes	yes	no	18-30	no	no	yes
15	Apurba bi	yes	yes	yes	yes	no	no	no	yes	yes	no	no	yes	no	30-50	no	yes	yes
16	Arafat	yes	no	yes	yes	no	yes	no	no	yes	no	yes	no	no	30-50	no	yes	yes
17	arijit	yes	no	no	no	no	no	no	no	no	no	yes	yes	no	30-50	no	no	no
18	Asha	yes	no	no	no	no	no	no	no	no	no	yes	no	no	50-70	no	yes	no
19	Ashok Kur	yes	no	no	no	no	yes	no	no	no	no	no	yes	no	30-50	no	no	yes
20	ashutosh	yes	no	no	no	no	yes	yes	no	no	no	yes	no	no	18-30	no	yes	yes
21	Ashwin	yes	yes	yes	no	no	no	no	yes	yes	no	yes	yes	no	30-50	no	no	yes
22	Ayush	yes	yes	yes	yes	no	yes	no	no	yes	no	no	no	no	18-30	no	no	no
23	B. L.RADH	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes	no	no	18-30	no	yes	yes
24	Brendan	yes	no	yes	no	no	no	yes	no	no	no	yes	yes	no	18-30	no	yes	no

Table: 1

The table 2 represents the results obtained by the survey method. It shows the result of the 50 drivers and the scoring pattern obtained by them. The respondent has scored on the scale of 17 points. If the question was answered 'yes' then the respondent would be awarded with one point. The maximum point to be awarded was 16 with a percentage of 94% and the minimum score to be awarded was 3 with a percentage of 18%.

Name	Start Date time	Time	Percent	Points Earned	Points Possible
Abhimanyu	2018-04-11 05:38:36-07:00	00:02:13	47	8	17
Abhinav Menon	2018-04-11 01:03:27-07:00	00:00:55	41	7	17
Abhishek	2018-04-11 07:34:21-07:00	00:01:29	35	6	17
Abhishek HP	2018-04-11 02:02:02-07:00	00:01:45	29	5	17
Ajinkya Harsha	2018-04-11 06:41:23-07:00	00:02:24	24	4	17
Akshay	2018-04-11 05:17:26-07:00	00:03:37	71	12	17
Akshay	2018-04-11 09:49:48-07:00	00:01:59	71	12	17
Ananth Menon	2018-04-10 23:58:12-07:00	00:01:31	35	6	17
Anirudh	2018-04-11 05:17:54-07:00	00:01:48	35	6	17
anusha	2018-04-11 08:14:30-07:00	00:02:20	29	5	17
Arpitha	2018-04-11 10:19:07-07:00	00:02:57	53	9	17
Bhuvan S R	2018-04-11 07:10:40-07:00	00:04:35	47	8	17
Bipin	2018-04-11 10:51:55-07:00	00:01:41	29	5	17

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chaitanya	2018-04-11 07:10:05-07:00	00:01:20	47	8	17
Chandrashekar T M	2018-04-11 11:23:33-07:00	00:01:25	24	4	17
Chetna Rai's	2018-04-11 05:19:25-07:00	00:05:33	35	6	17
Chirag Ramesh	2018-04-11 16:47:53-07:00	00:01:21	41	7	17
Deepak	2018-04-11 10:08:49-07:00	00:03:26	47	8	17
Dhiraj	2018-04-11 18:50:32-07:00	00:01:30	35	6	17
Dishaan Ganapathy	2018-04-11 01:53:44-07:00	00:03:49	29	5	17
Fat p 1	2018-04-11 08:37:48-07:00	00:01:39	35	6	17
ganesh belli	2018-04-11 19:47:54-07:00	00:04:33	59	10	17
Gayatri Nair	2018-04-11 01:04:58-07:00	00:00:39	35	6	17
gsp	2018-04-11 00:05:58-07:00	00:05:00	18	3	17
Harshith	2018-04-11 09:39:43-07:00	00:01:49	47	8	17
Harshitha	2018-04-11 06:40:41-07:00	00:01:31	29	5	17
Indrajit	2018-04-11 06:48:08-07:00	00:02:31	35	6	17
Janice Pinto	2018-04-11 01:25:59-07:00	00:01:31	41	7	17
Jeevitha	2018-04-11 04:24:17-07:00	00:02:36	41	7	17
Jyotiraditya Singh Shivam	2018-04-12 03:16:05-07:00	00:02:04	71	12	17
Kavya	2018-04-11 09:55:38-07:00	00:03:21	53	9	17
Keerthana	2018-04-11 08:10:12-07:00	00:02:35	59	10	17
Keerthi	2018-04-11 05:53:29-07:00	00:01:01	35	6	17
Kishore Hegde	2018-04-11 07:39:56-07:00	00:03:31	24	4	17
Kripaa Shetty	2018-04-11 06:28:22-07:00	00:01:29	18	3	17
Kunal Athri	2018-04-11 07:51:21-07:00	00:01:15	35	6	17
Mahantesh Gudimani	2018-04-10 18:40:32-07:00	00:03:31	88	15	17
Maneesh	2018-04-11 06:52:18-07:00	00:01:26	35	6	17
Manoj Kumar	2018-04-11 09:48:43-07:00	00:01:55	47	8	17
Meer Owais	2018-04-11 05:26:57-07:00	00:03:05	53	9	17
Misba	2018-04-11 06:44:28-07:00	00:01:31	47	8	17
moksha	2018-04-11 05:15:52-07:00	00:02:57	35	6	17
Mustansir	2018-04-11 09:19:43-07:00	00:01:24	47	8	17
Nagarjuna	2018-04-11 05:21:18-07:00	00:01:22	53	9	17
Nidhi	2018-04-11 09:59:32-07:00	00:15:44	76	13	17
Nihal	2018-04-11 05:12:28-07:00	00:02:10	82	14	17
Nihal	2018-04-11 15:10:00-07:00	00:01:20	94	16	17
Nithya	2018-04-11 09:44:15-07:00	00:02:44	71	12	17

Table: 2

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Following the above scoring pattern for each driver, we were also able to narrow down certain characteristics of good and bad drivers. These characteristics helped us formulate certain guidelines that drivers could follow while driving so as to minimize the probability of accident occurrence and to improve the driving capabilities.

4. RESULTS FROM THE QUESTIONNAIRE

After successful conduction of 448 drivers, we were able to summarize the findings with the help of Google forms in the form of bar graphs and pie charts. Following was the data obtained:

The following pie charts were obtained when each characteristic was compared with the age factor.

1. Fig. 1 depicts the pressure/panic taken up by the drivers of age groups 18-30, 30-50 and drivers older than 50years. It is concluded that 75% of the drivers in the age group of 18-30, 24% of the drivers between 30 and 1% of drivers who are 50 years and older are under pressure and panic on Indian roads in the mixed traffic flow conditions.
2. Fig. 2 depicts the thinking capacity of the drivers between the age groups 18-30, 30-50 and drivers older than 50years. It is concluded that 71% of the drivers in the age group of 18-30, 27% of the drivers between 30 and 2% of drivers who are 50 years and older had decision making capacity during just before the accidents on Indian roads in the mixed traffic flow conditions.
3. Fig.3 Shows the distraction caused due to the sudden movement of animals or the pedestrian, using of the mobile phones during driving, due to the music present in the vehicle for the three age groups.
4. Fig.4 shows driving experience or the number of hours of driving for the three age groups.
5. Fig. 5 shows the time constraints of the three age groups when driving on the Indian roads.
6. Fig. 6 shows the reason as over-speeding for the road accidents for the three age groups.
7. Fig. 7 shows the importance/awareness of traffic rules and regulations which if ignored may lead to accidents for the three age groups.
8. Fig. 8 show the psychological thinking/beliefs/superstitions which has led to accidents in the three age groups.
9. Fig. 9 shows the awareness of ill effects of driving for long hours which would cause fatigue for each age group. In other words, this data represents their inclination towards long hours of driving age wise.
10. Fig.10 The histogram reveals that the time constraint is the major cause of road accidents for the age range 18-30 followed by distraction and over speeding.

ISSN 1533-9211

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11. Fig.11 The histogram reveals that lack of awareness of rules and regulations as the major cause of accidents for the age group 30-50 followed by fatigue and failure in decision making prior to accidents.
12. Fig. 12 The histogram reveals that distraction as the major cause of accidents for the age group 50 and above followed by fatigue and behavioural habits such as obsessive-compulsive disorder (OCD).

1. Pressure/Panic – Driving under pressure.

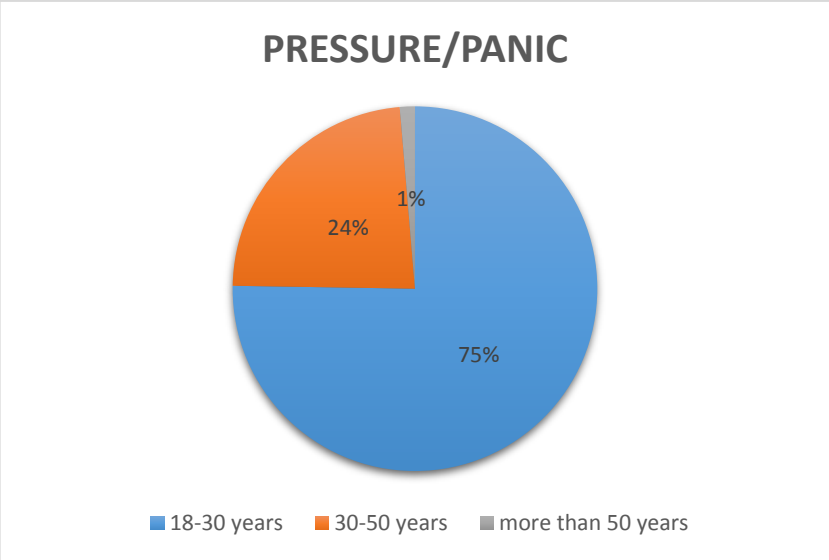

Fig. 1

2. Decision making – the thinking capability of the respondent and making decision at the time of the accident.

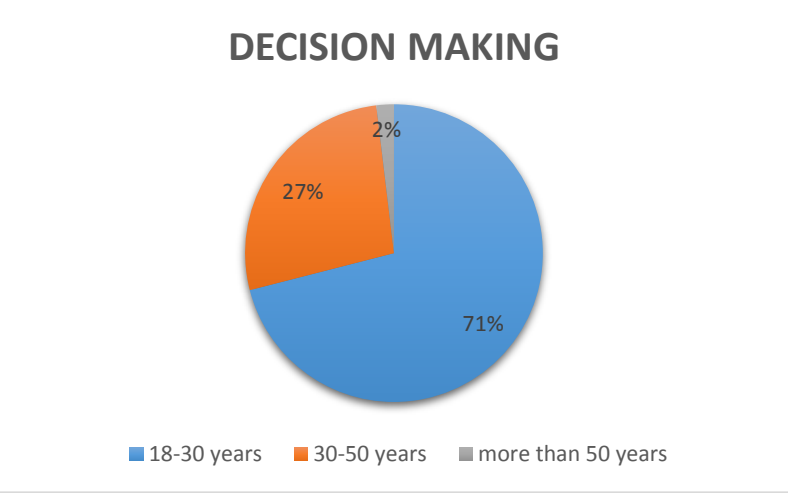

Fig. 2

ISSN 1533-9211

DOI 10.17605/OSF.IO/6KW9S

3. Distraction – Distraction caused due to the sudden movement of animals or the pedestrian, using of the mobile phones during driving, due to the music present in the vehicle.

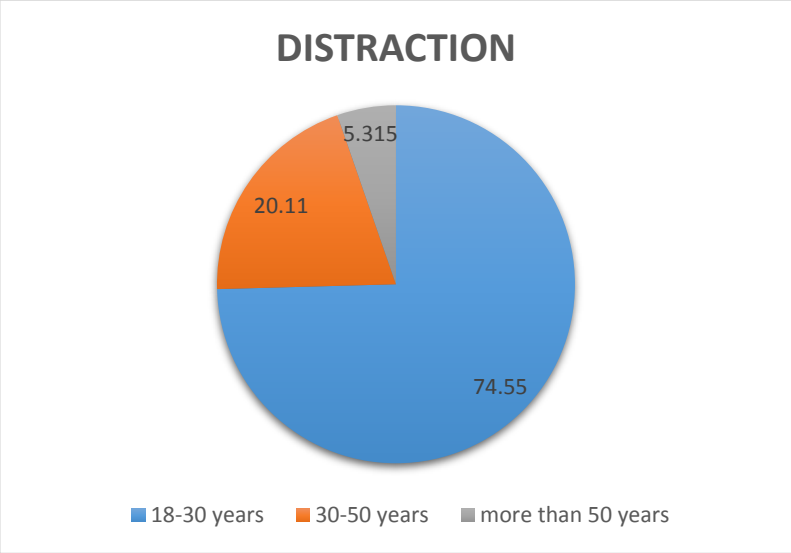

Fig. 3

4. Experience – It depends on the driving experience or the number of hours of driving.

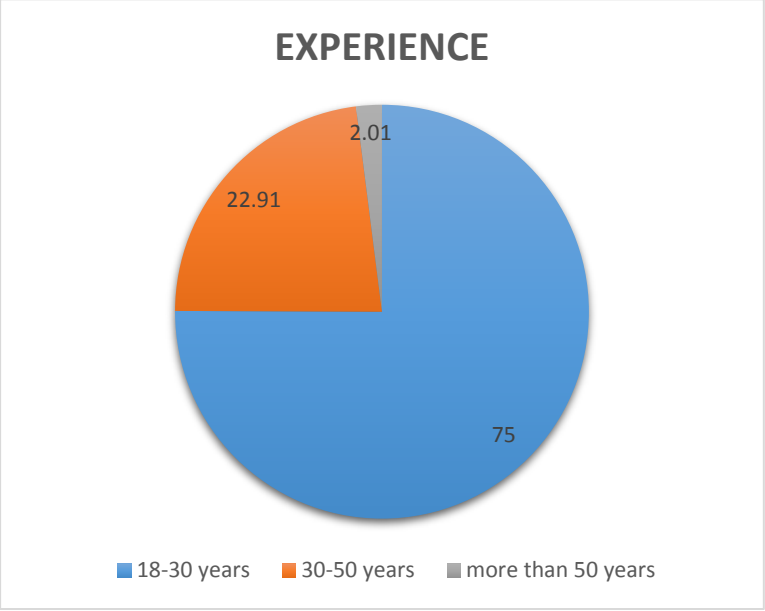

Fig. 4

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5. Time Constraint – one of the major factors due to which accidents are caused. More the time restriction more is the pressure and accident proneness.

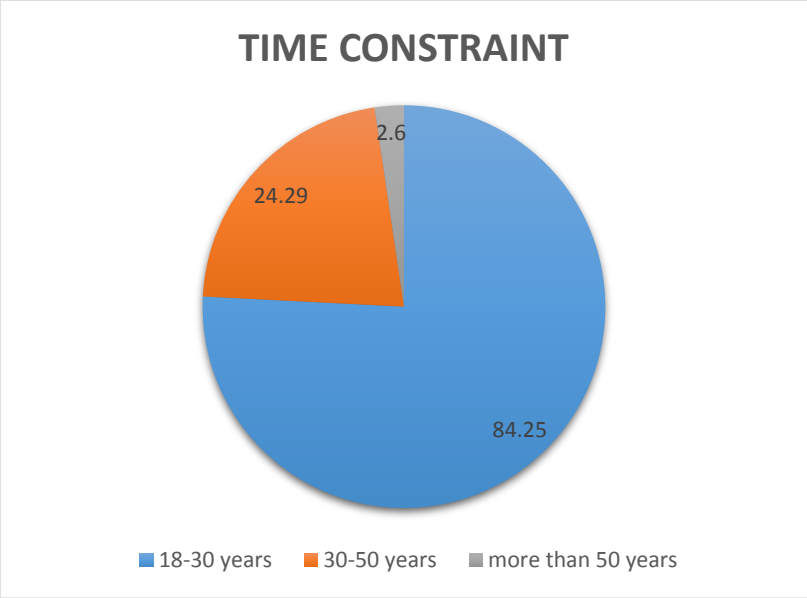

Fig. 5

6. Over speeding – one of the major factors in collision.

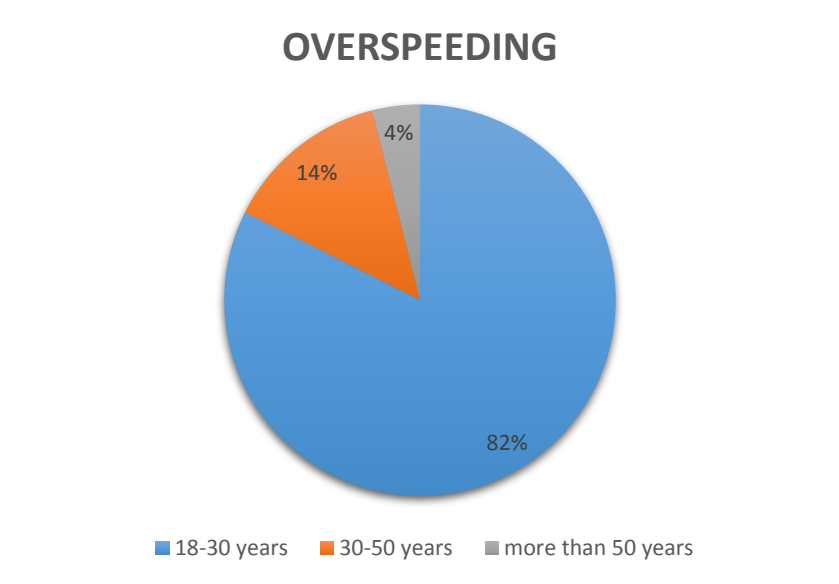

Fig.6

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7. Efficient Rules – the rules and regulations formed by the government if not followed might affect the causing of accidents.

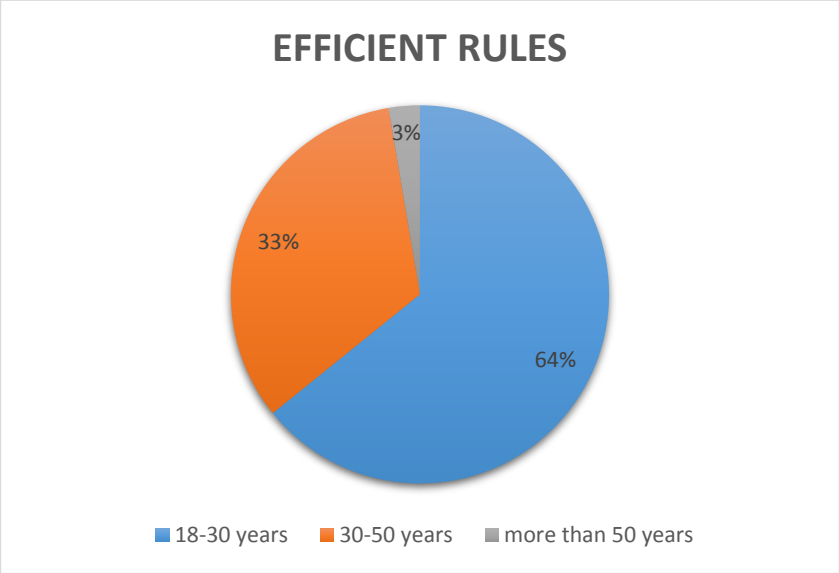

Fig.7

8. Behavioural Aspect - The psychological thinking of the driver as well as the other beliefs such as superstations have a tremendous effect on causing of accidents.

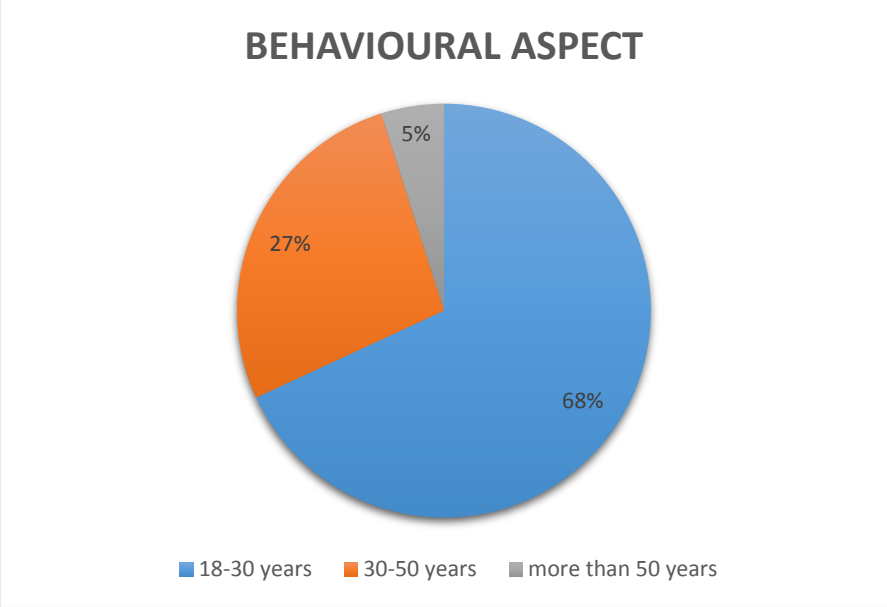

Fig.8

9. Fatigue – usually caused due to continuous driving in drivers. Continuous driving for a period of 18 hours a day will cause fatigue which lead to collisions.

ISSN 1533-9211

DOI 10.17605/OSF.IO/6KW9S

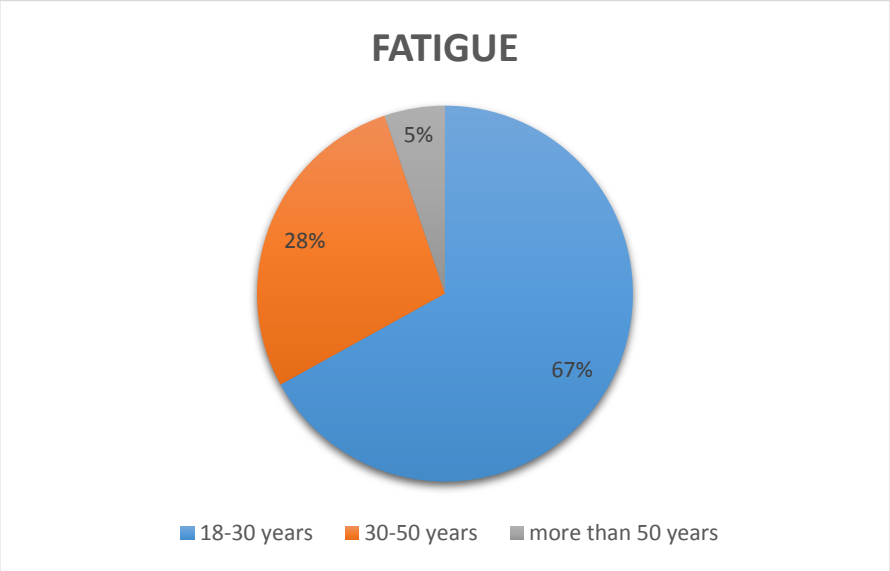

Fig.9

The histograms below provided a comparison between the ages of the drivers and the parameters considered for the behavioural aspects that affect the accidents. The factors affecting the drivers' behaviour differ for different age groups. The considered age groups in this study are listed as 18-30 years, 30-50 years and 50 years & above. The following represents the variation of factors according to different age group.

1. Factor variation for an age group of 18–30-year-old.

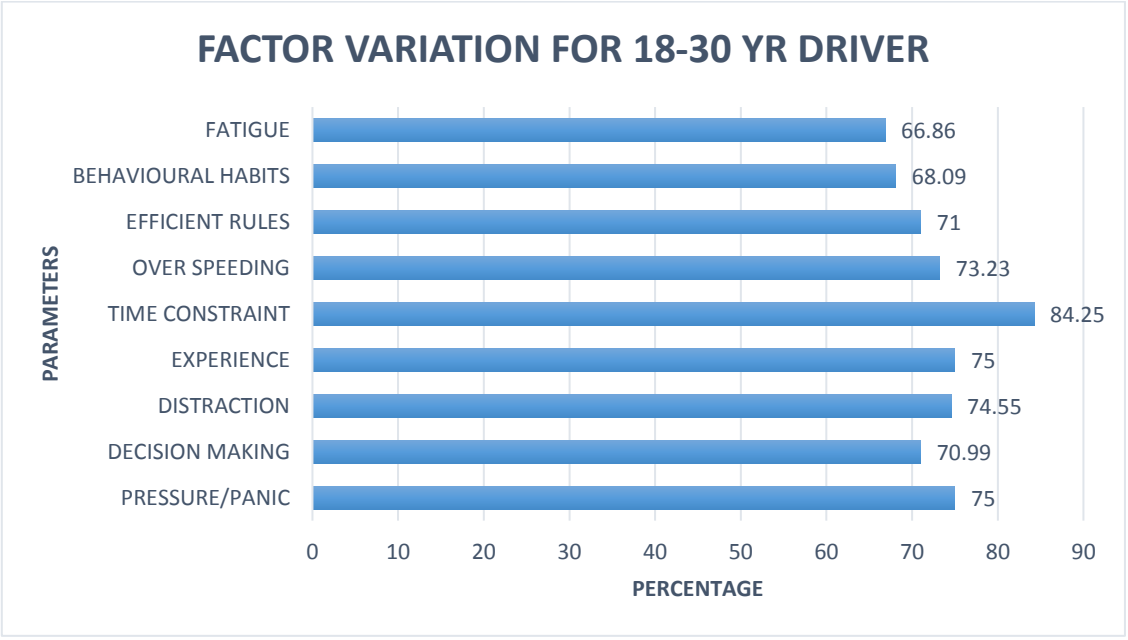

Fig.10

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2. Factor variation for an age group of 30–50-year-old

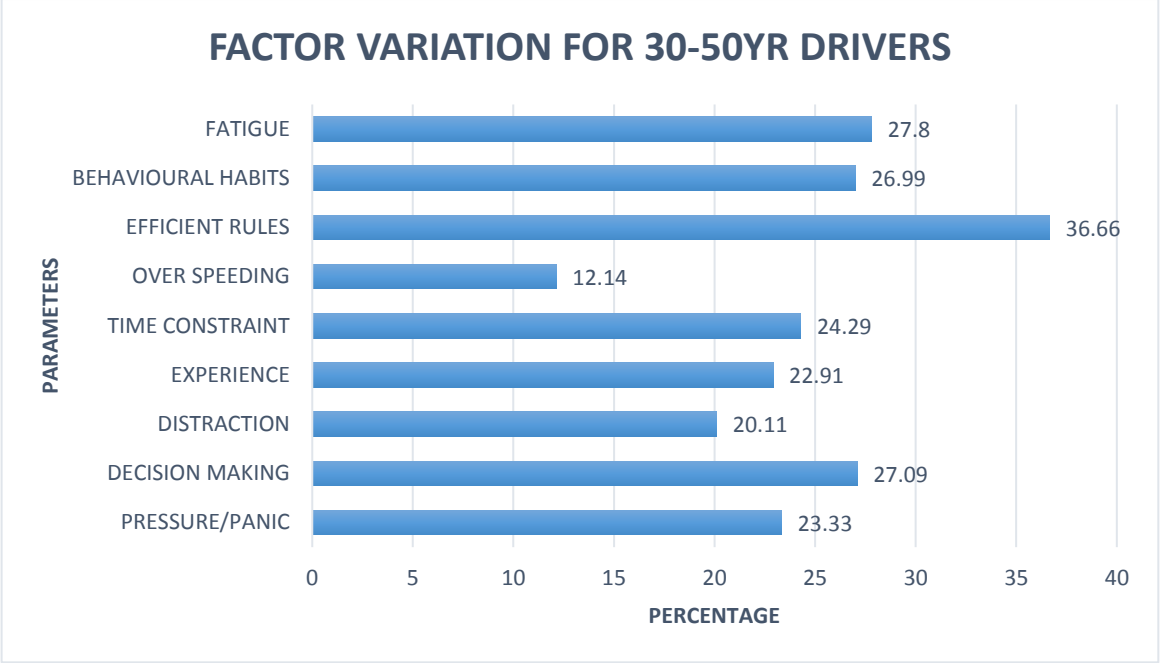

Fig. 11

3. Factor variation for an age group of 50-year-old and above

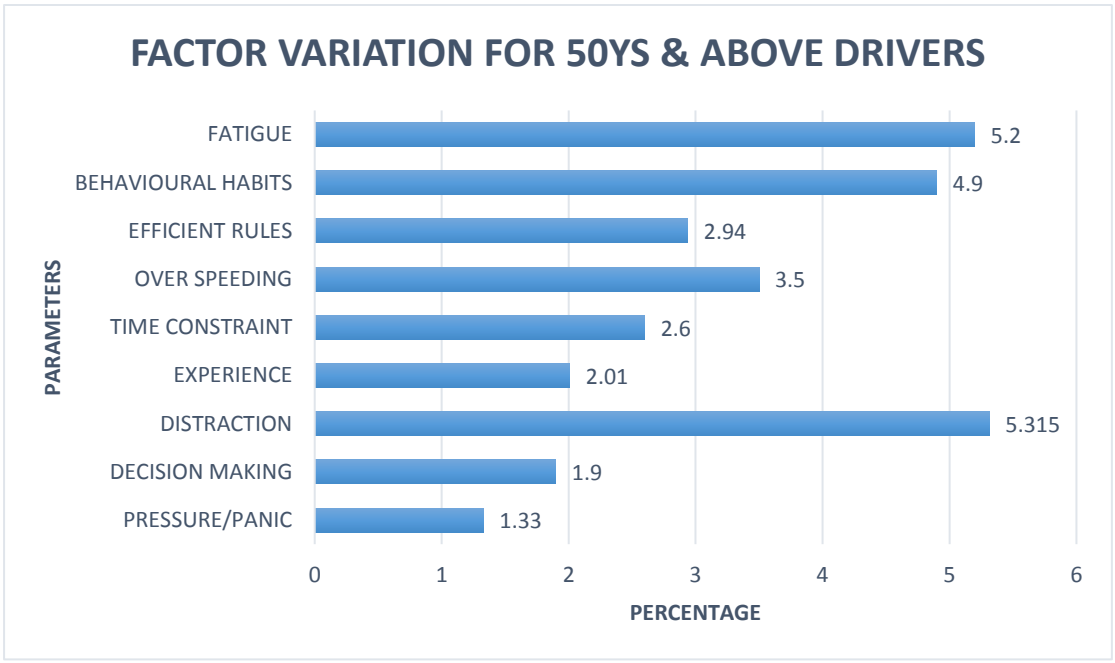

Fig. 12

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DOI 10.17605/OSF.IO/6KW9S

5. CONCLUSIONS

From the data analysis done from the pie charts and the histogram the following can be concluded:

1. In the age group 18–30-year-old, it was found out that time constraint was the major factor affecting followed by over speeding and distraction. This showed that aggression, pressure and panic were mostly found in the age group of young drivers.
2. In the age group of 30–50-year-old, it was found out that rules and regulation was to be made stricter due to which the accidents can be prevented. Implementation of efficient rules and regulation could decrease in the number of accidents caused. Rules followed by fatigue and decision making were the other two important factors in the middle-aged drivers. Fatigue was the major problem that had to be looked upon especially in taxi drivers who do not have any proper shifts.
3. In the age group of 50-year-old and above, it was concluded that fatigue and distraction were the major causes of the accidents.

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