

# Evaluation of Traffic Accidents No. through Variety of Weather Conditions According to Differences of Gender and Ages' Categories of Drivers in Greece

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**Abstract** - The research includes studying of impacts the diversity of weather conditions on the characteristics of drivers in terms of gender and ages' categories of them by assessing No. of traffic accidents which resulted through each type of weather condition during period (2012-2016). The data of research obtained from Hellenic Statistical Authority (ELSTAT), which included No. of traffic accidents in Greece that distributed to 13 types of weather conditions and classified according to gender and ages' categories of drivers who involved in these traffic accidents during period of study. The research comprised of studying the statistical data that collected about traffic accidents and evaluation that differences in their No. if they are affecting by the diversity of weather conditions and differences in gender and age of drivers. In addition, the study included assessment the relationship between the dependent variable, which includes of traffic accidents No. and the other independent variables that consists of weather conditions and drivers' characteristics through appropriate statistical tests. Depending on study of the statistical data and the results which obtained through the analysis, it was found that there is a relationship between the diversity of weather conditions and the differences in No. of traffic accidents during period of study. Also, it got that there is effects on No. differences of traffic accidents which resulted according to different characteristics of drivers during some weather conditions more than the other. In Greece, the study found that most of the traffic accidents happened during the clear sky of weather condition and the male drivers who have age category (18-35) have the bigger No. of accidents during the most of weather conditions especially in clear sky weather. Thus, the study recommended to increase the traffic awareness for all categories of drivers during the variety of weather conditions of your paper [title, text, heads, etc.] in its style sheet.

**Keywords** - Drivers' characteristics, Drivers' Gender, Drivers' Age, Adverse Weather Conditions, Road weather safety, Weather effects, Driver behaviour, Road conditions, Traffic Accidents, Roads in Greece.

## I. INTRODUCTION

The study evaluates the impact of various weather conditions on the different No. of traffic accidents depending on the variety of drivers' characteristics who involved in those accidents. There are many researches which related to assessment the effects of diversity weather conditions in terms of increasing or decreasing of accidents No. according to increase of bad weather condition through driving of vehicles on roads in several areas of the world. Some of researches have concluded that bad weather conditions may increase No. of traffic accidents and some others have concluded which No. of traffic accidents is bigger during good weather conditions.

Adverse weather conditions, such as strong wind, heavy rain or snow, heavy fog and so on, have obvious impacts on roadway traffic operations, especially traffic safety. Also, Among adverse weather conditions, rainy weather may be one of the conditions which cause significant negative impacts on traffic safety. The combined impacts from roadway, vehicle, traffic control, and driver behavior under rainy weather conditions could increase the potential for safety problems and traffic crashes [1].

Driving largely is a visual task, poor visibility conditions such as rain, fog, or snow create several additional demands on the driver and their ability to collect necessary visual information is drastically reduced. The driving task becomes more complex when weather-related conditions of reduced visibility are accompanied by wet surfaces [2]. Bad weather can raise the number of accidents significantly by 20% or more over the base rate [3].

Adverse weather and road conditions, following e.g. rain, snowfall and temperature fluctuations, are a considerable cause of an elevated risk of traffic accidents and compromised traffic flow in northern Europe and northern America [4].

Heavy rain weakens the visibility and wets the road surface, which causes drivers to pay more attention while driving, thus with the decrease of traffic flow the probability of severe accident decreases [5].

Shifting weather patterns due to climate change, such as warmer temperatures, more rain, and less snow, will exacerbate road safety issues. For example, snowfall and rainfall are widely known to reduce visibility and make braking more difficult, and temperatures may influence the mode, frequency, and types of trips [6].

An increase in maximum wind gust causes an increase in the number of crashes, Global radiation and sunshine duration both had a significant negative impact on road safety [7].

Weather related crashes refer to crashes that occur during adverse weather conditions. Rainfall represents one of the most critical weather condition variables in traffic safety. Similarly, rain related crashes are those that occur during rainy conditions [8].

Weather related crashes are those that occur in the presence of rain, sleet, snow, fog, wet pavement, snowy/slushy pavement, and/or icy pavement. Twenty-four percent of all crashes are weather related [9]. Weather conditions are considered to be a factor that affects the number of road accidents and casualties significantly, with different effects according to the type of road.

Moreover, as the weather also affects mobility, it is to be expected that the effects of weather on the number of injury accidents and casualties are partly due to the changes in mobility occurring at the same time. Rainfall leads to a decrease of road accidents in the Athens urban area [10].

According to results of the research in Athens is found that contrary to much previous research, increases in rainfall reduce the total number of accidents and fatalities as well as the pedestrian accidents and fatalities, a finding that may be attributed to the safety offset hypothesis resulting from more cautious and less speedy driver behaviour. Similarly, temperature increase was found to lead to increased accidents [11].

This study will examine whether there is an impacts and relationship between the different characteristics of drivers in terms of gender and ages categories with various of weather conditions on different No. of traffic accidents.

## II. HYPOTHESES OF STUDY

The main proposed hypothesizes of study as following:

1. There is not influence of weather condition variation on differences of traffic accidents No. that involved of drivers.
2. The No. of traffic accidents, which are resulting through adverse weather conditions are more than the accidents that are occurring during good weather conditions.
3. There is not association between weather conditions and genders of drivers for influencing on different of traffic accidents No..
4. There is not relationship between weather conditions and age categories of drivers for influencing on different of traffic accidents No..

## III. METHODOLOGY OF STUDY

The study consists of main steps as the following:

1. Collection the required statistical data from ELSTAT for traffic accidents No. according to variety of weather conditions and drivers information who involved in accidents.
2. Analysis of data according to suitable statistical tests for each part by using SPSS software.
3. Showing the results which got by data analysis and discussion of them.
4. Viewing the conclusions depending on results that got from the study.
5. Showing the recommendations to enhancement of drivers for contribution in satisfying of road safety.

## IV. DATA COLLECTION

The study depended on statistical data, which got from ELSTAT and they included traffic accidents No. according to weather conditions at accidents occurred and classified to age and gender groups of drivers during period (2012–2016). In addition, there are very few missing of traffic accidents information consideration to details in tables of data that received from ELSTAT and these missed information are not effecting on the analysis process.

## V. ANALYSIS OF DATA

The stage of data analyzing included several of statistical tests for each type of data by using SPSS software. The study through the analysis process are depended on two types of variables which consisted of dependent variables which are included traffic accidents No. and independent variables which are included the weather conditions, gender and ages of drivers who involved in the accidents. The research is containing of four parts for data analysis as the following:

1. Examination the influence of weather conditions variation on differences of total traffic accidents No. that involved of drivers during period (2012 – 2016):

- Description Analysis:

The data that got from ELSTAT are included No. of traffic accidents through variable weather conditions at accidents occurrence. The descriptive analysis is clarification that there are differences in traffic accidents No. depending on variety of weather conditions and different characteristics of drivers during the period of study (2012-2016) as shown in the statistical Table 1 and Figure 1.

Table 1: Statistical Description of Traffic Accidents No. According to Variation of Weather Conditions

Weather Conditions	No. of Traffic Accidents				
	Year				
	2012	2013	2014	2015	2016
Clear sky	11,316	11,146	10,650	10,455	10,181
Strong wind	34	28	20	22	28
Frost	124	61	46	103	103
Fog / mist	28	12	26	16	12
Drizzle	451	423	468	379	362
Rain	350	309	389	335	281
Tempest	10	7	4	2	4
Storm	10	4	11	11	4
Hail	1	4	2	1	1
Snow	21	4	5	21	14
Smoke	1	3	3	3	1
Dust	0	1	1	2	2
Other	52	55	44	44	78
Total	12,398	12,057	11,669	11,394	11,071

Consideration to values in Table 1 and as shown in the Figure 1; the clear sky of weather condition has the bigger No. of traffic accidents comparison to other weather conditions and the year of 2012 had the most amount of accidents during the period of study.

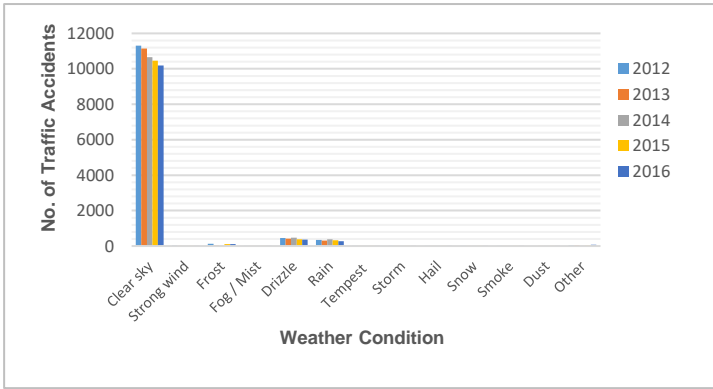


Figure 1: Indication of Traffic Accidents No. Through Different Weather Conditions during period (2012-2016)

This branch of analysis includes testing the significance of relationship between traffic accidents No. which involved of drivers and weather conditions. The hypothesis that assumed as the following:

$H_0$  = There are not relationship between traffic accidents No. which involved of drivers and different weather conditions at accidents occurrence.

$H_1$  = There are relationship between traffic accidents No. which involved of drivers and different weather conditions at accidents occurrence.

For interpretation of the relationship between total traffic accidents and weather conditions used the statistical test "One Way ANOVA".

Table 2: Descriptive for Data Analysis

Weather Condition	No. of Traffic Accidents No.	Mean	Std. Deviation	Std. Error
Clear sky	53748	1945.59	1054.942	4.55
Strong wind	132	5.94	3.457	0.301
Frost	437	20.25	12.568	0.601
Fog / Mist	94	4.85	2.462	0.254
Drizzle	2083	79.94	40.438	0.886
Rain	1664	62.47	31.349	0.768
Tempest	27	1.74	1.059	0.204
Storm	40	2.8	1.488	0.235
Hail	9	1	0	0
Snow	65	4.11	2.705	0.335
Smoke	11	1.55	0.522	0.157
Dust	6	1	0	0
Other	273	12.28	6.604	0.4
Total	58589	1789.69	1136.202	4.694

Table 3: Results of ANOVA Test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.58E+10	12	1.32E+09	1290.437	0
Within Groups	5.98E+10	58576	1021242.304		
Total	7.56E+10	58588			

Consideration to the results in Table 2 and Table 3 of analysis; the values of calculated (df = 12), (F= 1290.437) and the statistical significant at level (p = 0.00 < 0.05). So that, we rejected the hypothesis ( $H_0$ ) and accepted the hypothesis ( $H_1$ ).

Then there is relationship between different of total traffic accidents and variation of weather conditions; also, there are significant between them at level (p < 0.05).

2. Studying of association level between weather conditions and genders for effecting on traffic accidents No. during period (2012 – 2016):

- Description Analysis:

The data that collected from ELSTAT for traffic accidents No through variable weather conditions at accidents occurrence divided according gender of drivers who caused those accidents during the period of study (2012-2016) as shown in the Table 4 and Figure 2.

Table 4: Traffic Accidents No. According to Variation of Weather Conditions Divided According to Gender of Drivers

Variables	Weather Condition													Total	
	Clear sky	Strong wind	Frost	Fog / Mist	Drizzle	Rain	Tempest	Storm	Hail	Snow	Smoke	Dust	Other		
Male	2012	9434	26	102	26	379	290	9	9	1	18	1	0	43	10338
	2013	9125	22	50	11	344	251	4	3	2	4	3	1	49	
	2014	8647	17	39	21	394	325	3	10	1	3	3	1	43	
	2015	8561	18	90	13	331	276	1	10	1	16	1	2	40	
	2016	8332	23	86	11	292	242	3	2	0	11	1	1	68	
	Total	44099	106	367	82	1740	1384	20	34	5	52	9	5	243	
Female	2012	1882	8	22	2	72	60	1	1	0	3	0	0	9	2060
	2013	2021	6	11	1	79	58	3	1	2	0	0	0	6	
	2014	2003	3	7	5	74	64	1	1	1	2	0	0	1	
	2015	1894	4	13	3	48	59	1	1	0	5	2	0	4	
	2016	1849	5	17	1	70	39	1	2	1	3	0	1	10	
	Total	9649	26	70	12	343	280	7	6	4	13	2	1	30	

Consideration to statistical data in Table 4 and as shown in Figure 2; the gender drivers has the bigger No. of traffic accidents at clear sky of weather condition comparison to others conditions during period of study.

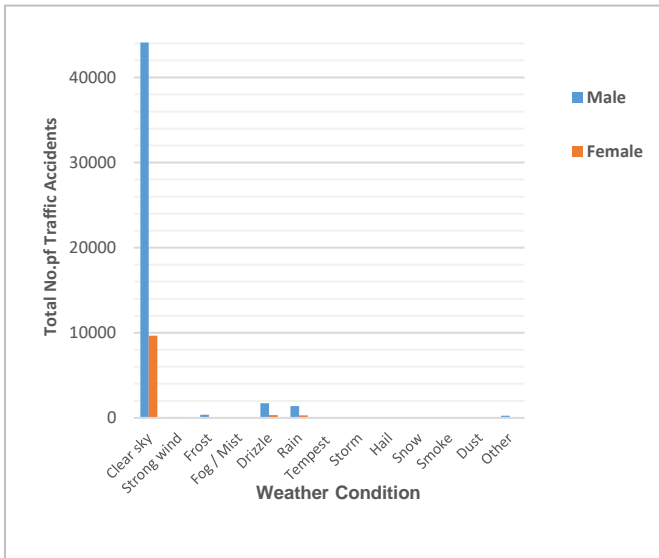


Figure 2: Indication of Total Traffic Accidents No. Through Different Weather Conditions according to Gender of Drivers during period (2012-2016)

This type of analysis includes testing the significance of association between variation of weather conditions and genders of drivers for influencing on different traffic accidents No.. The hypothesis that assumed as the following:

$H_0$  = There are not association between variation weather conditions and genders of drivers for influencing on different traffic accidents No. .

$H_1$  = There are association between variation weather conditions and genders of drivers for influencing on different traffic accidents No. .

For interpretation, the association between them used the statistical test "Univariate Analysis of Variance".

Table 5: Univariate Analysis of Variance Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.79E+10	25	1.52E+09	2356.471	0
Intercept	3271990.34	1	3271990.34	5.082	0.024
Weather Condition	4.57E+09	12	3.81E+08	591.215	0
Gender	1136089.6	1	1136089.6	1.765	0.184
Weather Condition * Gender	1.61E+09	12	1.34E+08	207.787	0
Error	3.77E+10	58563	643835.914		
Total	2.63E+11	58589			
Corrected Total	7.56E+10	58588			

Depending on the values in Table 5 of analysis; the value of (df-Gender \* Weather Condition = 12), (F- Gender \* Weather Condition = 207.787) and the value of significance ( $p= 0.000 < 0.05$ ). So that, we reject the hypothesis ( $H_0$ ) and accept the hypothesis ( $H_1$ ). Then there is association between variations of Weather conditions and gender of drivers in influencing on

different of traffic accidents No. and there is significant at level ( $p < 0.05$ ).

3. Studying of association level between weather conditions and age categories for effecting on traffic accidents No. during period (2012 – 2016):

- Description Analysis:

The data that collected from ELSTAT for traffic accidents No through variable weather conditions at accidents occurrence divided according to six age categories of drivers who involved of those accidents during the period of study (2012-2016) as shown in the in Table 6 and Figure 3.

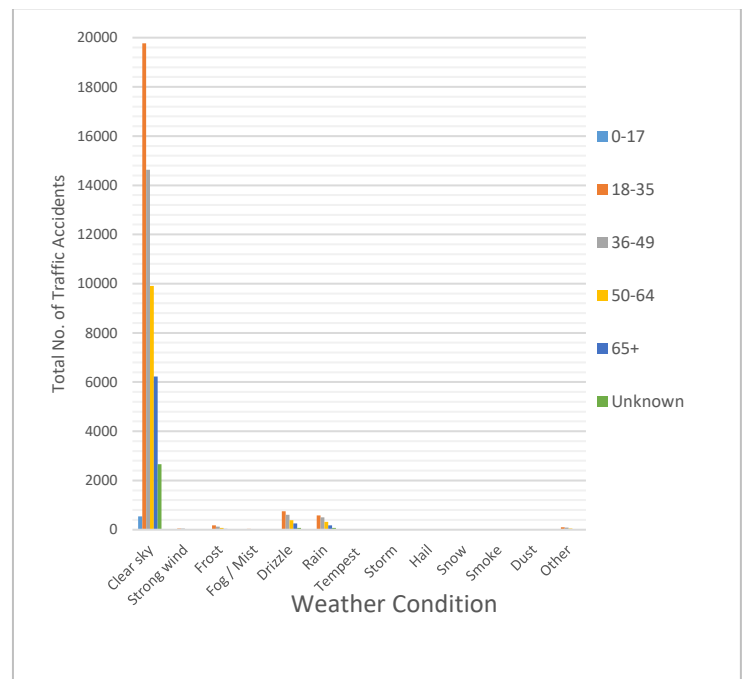


Figure 3: Indication of Total Traffic Accidents No. Through Different Weather Conditions according to Age Categories of Drivers during period (2012-2016)

According to the statistical data in Table 6 and as shown in Figure 3; the age category (18–35) of drivers has the bigger No. of traffic accidents in clear sky of weather condition comparison to others conditions during (2012 – 2016).

This type of analysis includes testing the significance of association level between variation of weather conditions and age categories of drivers for influencing on different traffic accidents No.. The hypothesis that assumed as the following:

$H_0$  = There are not association between variation weather conditions and age categories of drivers for influencing on different traffic accidents No..

Table 6: Traffic Accidents No. According to Variation of Weather Conditions Divided According to Age Categories of Drivers

Year	Age	Weather Condition											Total						
		Clear sky	Strong wind	Frost	Fog / Mist	Drizzle	Rain	Tempest	Storm	Hail	Snow	Smoke		Dust	Other				
2012	-17	133	0	3	1	5	2	0	0	0	0	0	0	0	0	0	0	0	144
	18-35	4442	12	49	10	128	130	1	0	4	0	0	0	0	0	0	0	24	4840
	36-49	3008	15	34	9	91	98	5	1	4	0	0	0	0	0	0	0	15	3324
	50-64	1877	5	23	5	64	64	2	2	0	0	0	0	0	0	0	0	11	2082
	65+	1236	1	9	3	48	37	2	2	1	0	1	3	8	0	0	0	0	1340
	Un known	620	1	6	0	19	19	0	0	1	0	0	1	0	0	0	0	0	668
Total	11316	34	124	28	451	350	10	10	1	0	21	1	0	0	0	0	0	12398	
2013	-17	140	7	3	0	3	2	1	0	0	0	0	0	0	0	0	0	150	
	18-35	4150	7	27	3	151	123	3	1	0	3	0	0	0	0	0	0	16	4487
	36-49	3045	9	15	4	123	94	2	2	1	2	0	0	0	0	0	0	19	3318
	50-64	2056	5	9	4	75	57	1	1	0	1	2	0	0	0	0	0	13	2221
	65+	1225	6	6	0	61	28	0	0	0	0	0	0	0	0	0	0	3	1329
	Un known	530	0	1	1	10	5	0	0	0	0	1	0	0	0	0	0	4	532
Total	11146	28	61	12	423	309	7	4	4	4	4	3	0	0	0	0	0	55	12057
2014	-17	85	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	90	
	18-35	3949	7	19	0	174	120	1	1	3	1	0	0	0	0	0	0	12	4299
	36-49	2894	10	14	8	144	130	2	2	1	3	1	0	0	0	0	0	14	3222
	50-64	1999	0	8	4	81	72	1	1	2	0	0	0	0	0	0	0	9	2176
	65+	1184	1	5	3	46	42	0	0	5	0	2	0	0	0	0	0	5	1294
	Un known	539	2	0	0	21	22	0	0	0	0	0	0	0	0	0	0	4	588
Total	10650	20	46	26	468	389	4	11	2	5	5	3	0	0	0	0	0	44	11669
2015	-17	100	0	1	0	2	3	0	0	0	1	0	0	0	0	0	0	1	109
	18-35	3717	6	44	8	138	116	1	1	4	10	0	0	0	0	0	0	15	4036
	36-49	2877	8	25	3	108	104	1	1	4	6	2	0	0	0	0	0	15	3154
	50-64	1913	4	21	1	64	54	0	0	4	1	0	0	0	0	0	0	5	2067
	65+	1297	3	2	2	56	43	0	0	2	1	0	1	0	0	0	0	3	1413
	Un known	551	1	10	1	11	15	0	0	0	1	2	1	0	0	0	0	5	595
Total	10455	22	103	16	379	335	2	11	1	21	3	0	0	0	0	0	0	44	11394
2016	-17	89	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	94
	18-35	3515	15	41	3	124	91	1	1	2	7	0	0	0	0	0	0	27	3828
	36-49	2808	3	33	3	110	76	1	1	0	4	1	0	0	0	0	0	18	3055
	50-64	2063	7	18	5	72	71	2	2	1	0	0	0	0	0	0	0	15	2258
	65+	1290	6	6	0	48	29	0	0	1	0	0	0	0	0	0	0	10	1387
	Un known	416	2	5	0	13	13	0	0	0	0	0	0	0	0	0	0	6	449
Total	11011	28	103	12	362	281	4	4	1	14	1	0	0	0	0	0	0	78	11071

H<sub>1</sub> = There are association between variation weather conditions and age categories of drivers for influencing on different traffic accidents No..

For interpretation, the association between them used the statistical test "Univariate Analysis of Variance".

Table 7: Univariate Analysis of Variance Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4.584E10	67	6.842E8	1344.068	0.000
Intercept	1910737.892	1	1910737.892	3.753	0.053
Weather Condition	1.422E9	12	1.185E8	232.814	0.000
Age	2738009.562	5	547601.912	1.076	0.371
Weather Condition * Age	2.198E9	50	4.396E7	86.361	0.000
Error	2.979E10	58521	509070.987		
Total	2.633E11	58589			
Corrected Total	7.563E10	58588			

Depending on the values in Table 7 of analysis; the value of (df-Weather Condition\*Age= 50) (F-Weather Condition \* Age= 86.361) and the value of significance (p = 0.000 < 0.05). So that, we rejected the hypothesis (H<sub>0</sub>) and accepted the hypothesis (H<sub>1</sub>). Then there is association between weather conditions and age categories of drivers in influencing on different of traffic accidents No. and there is significant at level (p < 0.05).

#### 4. Analysis of Model

The model comprise of equation which identification No. of traffic accidents, which are resulting in Greece through variety of weather conditions and according to some characteristics of drivers. This branch of study considered the dependent variables which were No. of traffic accidents and the independent variables that were age categories and gender of drivers during period (2012 – 2016).

The equation model resulted by Log Linear Regression Analysis and it considered female of gender variables, (36-49) of age categories variables of drivers and Strong wind of weather condition the references in the analysis as showing in the following:

$$\log(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n \quad (1)$$

$$\log(\text{No. of Traffic Accidents}) = \beta_0 + \beta_1 \text{Gender1 (Male)} + \beta_2 \text{Age Category (1)} + \beta_3 \text{Age Category (2)} + \beta_4 \text{Age Category (4)} + \beta_5 \text{Age Category (5)} + \beta_6 \text{Age Category (6)} + \beta_7 \text{W.C.}^* (1) + \beta_8 \text{W.C.} (3) + \beta_9 \text{W.C.} (4) + \beta_{10} \text{W.C.} (5) + \beta_{11} \text{W.C.} (6) + \beta_{12}$$

$$W.C. (7) + \beta_{13} W.C. (8) + \beta_{14} W.C. (9) + \beta_{15} W.C. (10) + \beta_{16} W.C. (11) + \beta_{17} W.C. (12) + \beta_{18} W.C. (13) \quad (2)$$

\* W.C. is abbreviation for Weather Condition.

Consideration to the calculated values, which produced in the following Table 8; the equation model of traffic accidents is resulted.

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.994 <sup>a</sup>	0.988	0.988	0.14786

a. Predictors: (Constant), Gender1, Age1, Age2, Age4, Age5, Age6, W.C.1, W.C.3,....., W.C.13

As shown in Table 8; R value is (0.994) which indicates a high degree of correlation between the dependent variable of total No. of traffic accidents and the independent variables. In addition, the value of R<sup>2</sup> indicates that almost (98.8%) of the total No. of traffic accidents variability is explained by the independent variables.

Table 9: ANOVA<sup>b</sup>

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	102115.363	18	5673.076	259504.207	0.000
Residual	1280.411	58570	0.022		
Total	103395.774	58588			

b. Dependent Variable: log (Total No. of Traffic Accidents)

Table 8 and Table 9 indicated that the regression model predicts the dependent variable significantly according the hypothesis

$$H_0: R^2 = 0$$

$$H_1: R^2 \neq 0$$

The calculated value is ( $p=0.00 < 0.05$ ); Then the study rejected the null hypothesis ( $H_0$ ) and accepted the hypothesis  $H_1$ . Thus, there is a relation between the dependent variables that were No. of traffic accidents and independents variables which were gender, age categories of drivers and weather conditions.

Table 10 of coefficients which resulted providing the required values and information predict total No. of traffic accident from independent variables, as well as determine whether independent variables contributes statistically significantly to the model (by looking at the "Sig." column).

Table 10: Coefficients <sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
(Constant)		0.49	0.013		37.84	0.000		
Gender1	Male	1.488	0.002	0.429	927.245	0.000	0.989	1.011
Age1	-17	-3.205-	0.006	-0.240-	-515.372-	0.000	0.973	1.028
Age2	18-35	0.289	0.002	0.105	187.363	0.000	0.674	1.483
Age4	50-64	-0.399-	0.002	-0.116-	-216.535-	0.000	0.732	1.367
Age5	65+	-0.837-	0.002	-0.201-	-388.593-	0.000	0.788	1.268
Age6	Unknown	-1.681-	0.003	-0.272-	-558.444-	0.000	0.889	1.124
W.C. 1	Clear sky	5.81	0.013	1.204	450.897	0.000	0.03	33.729
W.C. 3	Frost	1.137	0.015	0.074	77.445	0.000	0.234	4.279
W.C. 4	Fog / mist	-0.195-	0.02	-0.006-	-9.750-	0.000	0.585	1.71
W.C. 5	Drizzle	2.58	0.013	0.36	194.372	0.000	0.062	16.185
W.C. 6	Rain	2.364	0.013	0.296	176.835	0.000	0.076	13.22
W.C. 7	Tempest	-0.988-	0.031	-0.016-	-31.628-	0.000	0.831	1.204
W.C. 8	Storm	-0.698-	0.027	-0.014-	-26.163-	0.000	0.768	1.302
W.C. 9	Hail	-1.308-	0.051	-0.012-	-25.687-	0.000	0.936	1.068
W.C. 10	Snow	-0.392-	0.022	-0.010-	-17.508-	0.000	0.671	1.491
W.C. 11	Smoke	-1.078-	0.046	-0.011-	-23.239-	0.000	0.923	1.083
W.C. 12	Dust	-1.688-	0.062	-0.013-	-27.343-	0.000	0.957	1.045
W.C. 13	Other	0.684	0.016	0.035	43.644	0.000	0.327	3.054

a. Dependent Variable: log (Total No. of Traffic Accidents)

According to values in Table 10; the log regression equation of this model as the following:

$$\log(\text{No. of Traffic Accidents}) = (0.490) + (1.488) \text{ Gender1 (Male)} - (3.205) \text{ Age Category (1)} + (0.289) \text{ Age Category (2)} - (0.399) \text{ Age Category (4)} - (0.837) \text{ Age Category (5)} - (1.681) \text{ Age Category (6)} + (5.810) \text{ W.C. (1)} + (1.137) \text{ W.C. (3)} - (0.195) \text{ W.C. (4)} + (2.580) \text{ W.C. (5)} + (2.364) \text{ W.C. (6)} - (0.988) \text{ W.C. (7)} - (0.698) \text{ W.C. (8)} - (1.308) \text{ W.C. (9)} - (0.392) \text{ W.C. (10)} - (1.078) \text{ W.C. (11)} - (1.688) \text{ W.C. (12)} + (0.684) \text{ W.C. (13)} (3)$$

- The value of (1.488) that resulted indicating for the total traffic accidents No., which resulted by male drivers that in average is bigger than value of total No. of traffic accident which resulted by female drivers.
- The value of (3.205), which resulted indicating that the total No. of traffic accident for drivers who are in age category (1) of (0-17), in average is less than the total No. of traffic accidents of the drivers who are in age category (3) of (36-49).
- The value of (0.289), which resulted indicating that the total No. of traffic accident for drivers who are in age category (2) of (18-35), in average is bigger than the total No. of traffic accidents of the drivers who are in age category (3) of (36-49).

- The value of (0.399), which resulted indicating that the total No. of traffic accident for drivers who are in age category (4) of (18-35), in average is less than the total No. of traffic accidents of the drivers who are in age category (3) of (36-49).
- The value of (0.837), which resulted indicating that the total No. of traffic accident for drivers who are in age category (5) of (18-35), in average is less than the total No. of traffic accidents of the drivers who are in age category (3) of (36-49).
- The value of (1.681), which resulted indicating that the total No. of traffic accident for drivers who are in age category (6) of (unknown), in average is less than the total No. of traffic accidents of the drivers who are in age category (3) of (36-49).
- The value of (5.810), which resulted are indicating about No. of traffic accidents which occurred in weather condition 1 (Clear sky), in average is bigger than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (1.137), which resulted are indicating about No. of traffic accidents which occurred in weather condition 3 (Frost), in average is bigger than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (0.195), which resulted are indicating about No. of traffic accidents which occurred in weather condition 4 (Fog / mist), in average is less than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (2.580), which resulted are indicating about No. of traffic accidents which occurred in weather condition 5 (Drizzle), in average is bigger than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (2.364), which resulted are indicating about No. of traffic accidents which occurred in weather condition 6 (Rain), in average is bigger than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (0.988), which resulted are indicating about No. of traffic accidents which occurred in weather condition 7 (Tempest), in average is less than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (0.698), which resulted are indicating about No. of traffic accidents which occurred in weather condition 8 (Storm), in average is less than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (1.308), which resulted are indicating about No. of traffic accidents which occurred in weather condition 9 (Hail), in average is less than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (0.392), which resulted are indicating about No. of traffic accidents which occurred in weather condition 10 (Snow), in average is less than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (1.078), which resulted are indicating about No. of traffic accidents which occurred in weather condition 11 (Smoke), in average is less than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (1.688), which resulted are indicating about No. of traffic accidents which occurred in weather condition 12 (Dust), in average is less than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).
- The value of (0.684), which resulted are indicating about No. of traffic accidents which occurred in weather condition 13 (other), in average is bigger than the value of total traffic accidents No. which occurred in weather condition 2 (Strong wind).

## VI. CONCLUSIONS

Based on the data that collected and the results of the analysis which observed; there are main conclusions and facts that obtained as the following:

1. The differences in the weather conditions at occurrence of traffic accidents lead to be differences of traffic accidents No.. In addition, during clear sky of weather condition, the drivers are more negatives impact on road safety comparison to other conditions depended on No. of traffic accidents.
2. There is association between the gender of drivers and the variety of weather conditions which lead to be differences in No. of traffic accidents. However, male drivers are caused of traffic accidents in clear sky of weather condition.
3. There is relationship between the diversity of weather conditions and age categories of drivers which is resulting to be differences in No. of traffic accidents. Also, the age category (18-35) of drivers are more caused to traffic accidents in the clear sky of weather condition.
4. The weather condition of clear sky in Greece urging the drivers to do more traffic accidents comparison to other weather condition. Approximately at a rate (51% -68%) along a year, the weather is clear sky in most Greek cities, and this is providing to be bigger No. of traffic accidents during good weather conditions.

5. The existence of bad weather conditions during driving of vehicles such as poor vision and glides may increase the attention and caution of drivers; Also, improving their commitment to traffic regulations. Thus, it result to decrease No. of traffic accidents.

#### VII. RECOMMENDATION

Depended on the results and conclusions which obtained by the study; There are some recommendations that are contribution in preventing of traffic accidents occurring and encouraging the drivers for commitment to traffic instructions through driving; some of the recommendations as the following:

1. Continuing of traffic awareness to all drivers' categories and development the means of various types of visual and audio announcements.
2. Explain the risk of non-compliance of traffic safety instructions that required on the roads by drivers and the results of traffic accidents that may lead to death, injury or at least cause damage to vehicles and economic losses.
3. Development the means of traffic monitoring for drivers by using the modern intelligent systems.
4. Conduct a field study to identify the reasons why young drivers of male and female are consider more likely to cause the traffic accidents comparison to other categories of drivers. In addition, studying the reasons that make the male gender have the bigger No. of traffic accidents comparison to female gender.
5. Applying the means of laws to deter violations to drivers for decreasing the reasons, which lead to occurrence of traffic accidents.
6. Urge the drivers to observe the necessary precautions and advices during driving in different weather conditions.
7. Raising the awareness of drivers to increase their attention during bad weather when the vision is not clear, such as rain, fog, dew, etc.

#### VIII. ACKNOWLEDGMENT

We would like to thank the Division of Transportation and Project Management at Aristotle University of Thessaloniki for availability all the necessary supports and facilities to conduct the study and publishing through them. In addition, we are very grateful to ELSTAT for providing us the various statistical data, which required for doing the research.

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