Short-term monitoring of road accident trends in Israel

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1. Introduction

Road accident trends are under the permanent focus of road safety authorities. These trends are subject to long-term changes and temporal fluctuations. Thus, in current road safety work the typical questions are: do the changes recently observed in accident/fatality numbers indicate a significant increase/decrease? If significant changes in accident trends occurred, which safety areas were involved? Assuming the current trends, will the national safety targets be reached? Answers to such questions have essential practical implications and provide a basis for carrying out necessary changes in road safety activities of various bodies involved. Moreover, for the monitoring of accident trends it is useful to have decision-support tools enabling to judge monthly changes in road accident figures, similarly to the mechanism of control charts in industry.

The review of available practices indicates that most typical forms of road safety monitoring are visual inspections of year-to-year or year-to-a base year changes in accident/injury numbers, whereas the question of significance of these changes is frequently left untreated. Moreover, the application of control charts for monitoring of the processes is not common in road safety, where relatively few examples can be found in the literature, e.g. Guria and Mara (2000), Pierchala and Surti (1999).

Last years, these questions were systematically treated in Israel, where the changes in the annual fatality numbers are monitored using statistical tools. In this paper we present the analysis method and statistical tools which were developed and applied for monitoring the short-term national accident trends in Israel. The tools were originally elaborated for the analysis of changes in fatalities and serious injuries in 2001-2002, and were further improved when the changes in fatalities and injuries in 2005-2006 were considered in comparison with previous years; results of these analyses were presented in Gitelman, Hakkert, Doveh (2007). Recently, the tools were applied to an examination of fatalities in 2007, which were considered versus previous years, 2002-2006. Results of this study are presented and discussed in this paper[1].

2. Method

2.1. General

The research questions raised by the study are:

a. Change in trend: did the accident trends in the last year change significantly as opposed to the previous years?
b. Change in numbers: did the fatality numbers in the last year change significantly as opposed to the previous years?
c. Control chart: whether the processes in 2007 remained within the boundaries of statistical quality control, where the boundaries are estimated using the previous years' data?

The analysis focussed on fatalities and considered both the total numbers for the whole country and their subsets according to representative safety sub-areas, which might be useful for an understanding of changes and further planning of safety interventions. In total, the analysis considered 13 data series which are:

[1] Currently, an analysis of the 2008 fatalities is being carried out.

1. total fatalities
2. fatalities on rural roads
3. fatalities on urban roads
4. fatalities in accidents with young drivers (at least one of the drivers involved in the accident was of age17-21)
5. fatalities in accidents with professional drivers (at least one of the vehicles involved in the accident was a truck over 4 ton)
6. fatalities in accidents with powered two-wheelers (at least one of the vehicles involved in the accident was a motorcycle)
7. pedestrian fatalities on urban roads
8. pedestrian fatalities on rural roads
9. pedestrian fatalities involving minorities (the Arab population)
10. fatalities in single-vehicle accidents on rural roads
11. fatalities in head-on accidents on rural roads
12. fatalities in accidents at rural junctions (not including pedestrians)
13. fatalities in accidents at urban junctions (not including pedestrians)

Yearly numbers of fatalities, in each one of the series considered, for the period 2002-2007, are presented in Table 1. Monthly time-series were analysed, where the 2007 fatalities were compared with the previous years, 2002-2006. Each series has 72 values, where month "61" corresponds to 1/2007 - the beginning of the "after" period. For each series, the same steps of analysis were applied.

2.2. Analysis techniques

The analysis was based on fitting explanatory models to the monthly numbers of fatalities in the "before" (2002-2006) and "after" (2007) periods. We applied a quasi-Poisson regression (Poisson with dispersion), with time as a linear[2] (or piecewise linear) explanatory variable, monthly effect and the number of days per month as an offset variable. Generalized Additive Models (GAM) with smooth term of time were used to fit quasi-Poisson models (see Hastie & Tibshirani, 1990; Wood, 2006), where the monthly effect and the offset were used as in linear model. Besides, to account for the effect of war in the summer of 2006 as one of possible confounders for the decreasing fatality trends, a war-indicator was included in the model (the indicator had "1" for the war months, July-August of 2006, and "0" for other months).

Exploring the smooth term of time from the GAM model, changes in trend were examined in the "before" period (2002-2006). Once the "breaking point" in the regression line was found to be significant, e.g. in month 30 for series 13, it was kept in the model fitted. The model fitted to each series was a linear function (or a piecewise linear function like the one for series 13) which estimated the logarithm of the expected daily rates of fatalities, for each month. The GAM function of the MGCV package of R (Wood, 2006) was used in the exploration stage and GENMOD procedure of SAS was applied for fitting the final models.

Besides, for each model, goodness of fit was verified by examining the deviance residuals. The auto-correlation of the deviance residuals was examined, which demonstrated a normality of the residuals along with insignificant or marginally significant auto-correlations, proving an adequacy both for using the GENMOD models and for using the residuals in the control charts.

The research questions were examined as detailed below.

a. Change in trend - the trend (slope of the regression line) in the "after" period is compared with the trend in the "before" period. For this, one model was fitted for the whole period, 2002-2007, with all the components as described above and, in addition, a possibility for a different trend in 2007. The latter was indicated by means of a "breaking point" for the trend at the end of year 2006 (variable time60 which measures a difference between the 2007 trend and the 2002-2006 trend), significance of which was examined. A negative value of variable time60 would indicate a decreasing change in trend in the "after" as opposed to the "before" period, a positive value - an increasing change in the trend.

[2] For each series, two types of models were originally examined: with a linear (or piecewise linear) time component and with a smoothing time component. Examinations of fitting revealed that the first model was equivalent to the second one, for all the series considered, and therefore, a more parsimonious model, with a linear time component, was selected for further analysis.

b. Change in numbers - the average monthly numbers of fatalities in the "after" period is compared with the same value in the "before" period. At this step, different models were simultaneously fitted to the "before" and "after" periods. Then, the comparison was performed as follows:

If $\hat{\alpha}_i + \hat{\beta}_i t + M_t$ estimates the logarithm of expected daily fatalities for month t in year i in the "before" period, and if $\hat{\alpha}_j + \hat{\beta}_j t + M_{t^*}$ estimates similar values for month t* in year j in the "after" period, then

$$\hat{D}^*_{ji} = \frac{1}{12}\left[\sum_{t^*}(\hat{\alpha}_j + \hat{\beta}_j t + M_{t^*}) - \sum_{t}(\hat{\alpha}_i + \hat{\beta}_i t + M_t)\right]$$

estimates the difference between the averages of years i and j (for each year a sum of twelve months is performed), where: $\hat{\alpha}_i, \hat{\beta}_i$ are estimated model coefficients (intercepts and time coefficients); Mt and Mt* are estimated monthly effects of the models.

A result like $\hat{D}^*_{ji} > 0$ indicates that more events occurred in year j than in year i or, in other words, that the "after" period was less safe, with higher fatality numbers than the "before" period. A transformation to the original scale of fatality numbers: $\exp(\hat{D}^*_{ji})$ - provides an estimate of a related geometric-average risk in year j in comparison with year i, for which the 95% confidence interval (CI) is estimated. When the CI lower limit is higher than 1, then a worsening (higher fatality rates) is identified in the "after" period in comparison with the "before" period; when the CI upper limit is lower than 1, then an improvement (lower fatality rates) is identified in the "after" period in comparison with the "before". When the CI includes 1, no significant change is found.

c. Control chart - the control chart (CC) is a graphical and analytical tool for deciding whether a process is in a state of statistical control. It provides the expected value of a measured performance variable, i.e. its mean value and confidence interval, for any time unit. Using a CC, the points reflecting actual process performance, are compared with the expected values. Several types of points' performances, as they appear on the CC, can serve as indicators of deviation from the "normal" process, i.e. warn on changes in the risk level of the process controlled. Based on Guria and Mara (2000), types of such events were defined as follows:

Type1 - a point which is outside the boundaries of the confidence interval;
Type2 - five consequent points on the same side of the average-value line, inside the boundaries;
Type3 - four consequent increasing or decreasing points, inside the boundaries.

All these events were monitored in the current study.

The control charts were fitted to the series of deviance residuals of fatality numbers, where the deviance residual is defined as the square root of the contribution of the i-th observation to the deviance, with the sign of the raw residual. For this, a model was fitted to the monthly data of 2002-2006, with all the components as explained above and, then, for each monthly value in 2002-2007, the residuals were estimated according to the difference between the actual transformed values[3] and the predicted by model values. The CC mean line and the boundaries were assigned for monthly figures of 2007 based on the values observed in 2002-2006.

The CC mean line and the boundaries were calculated using the Shewhart procedure (the Irchart option) of SAS. The level of correlation between the consequent values of the same series was examined, for all series considered, and found not significant. Hence, according to Wheeler (1991), the CC boundaries were calculated as for independent measurements.

3. Data

The data were arranged in the form of monthly time series, with 72 values in each, where N=1 corresponds to 1/2002 (the beginning of "before" period), N=61 - to 1/2007 (the beginning of "after" period).

Figure 1 shows a graphical presentation of the time series: continuous vertical lines represent monthly fatality numbers - raw data, without corrections according to the number of days per month and other effects. A broken vertical line (between months 60 to 61) delimits the "before" (2002-2006) and "after" (2007) periods. Besides, for each series, three horizontal lines are presented: (1) a continuous blue line which demonstrates a linear time fitting for the "before" period; (2) a dashed red line which demonstrates an over-time smoothing for the "before" period; (3) a continuous black line which represents a simple smoothing of all observations, in the "before" and "after" periods. (The first two lines represent the models which were fitted to the data as described in Sec.2.2).

[3] a log-transformation, accounting for the number of days per months and monthly effects

It can be seen from Fig. 1 that in 2007 a decreasing trend continued in the main series of all fatalities, fatalities on rural and urban roads as well as in the specific series of fatalities in accidents with young drivers, in pedestrian accidents on urban roads, rural roads and in the Arab population, and in head-on collisions on rural roads. On the other hand, in 2007, a decreasing trend slowed down in fatalities in accidents with professional drivers and an increasing trend appeared in fatalities at urban junctions. Besides, for the series of motorcycle fatalities, fatalities in single-vehicle accidents and fatalities in accidents at rural junctions, based on the smoothing lines none over-time trend can be indicated in 2007 similar to the "before" period.
These initial findings were further examined by the statistical analyses.

4. Results of statistical analyses

Table 2 summarizes the results of analyses of changes in trends - slopes of the regression lines - in the "after" as opposed to the "before" period. For each series, three values are presented: slope of the regression line in the "before" period, change of trend at the end of 2006 (variable time60) and slope of the regression line in 2007. The variable time60 represents a difference of slopes in the "after" as opposed to the "before" period, i.e. reflects the magnitude of change between the two periods. The significance level of each value is indicated.

It can be seen from Table 2 that:
- in the majority of series such as total fatalities, fatalities on rural and urban roads, fatalities in accidents with young drivers, pedestrian fatalities on urban roads, rural roads and in the Arab population, and fatalities in head-on accidents on rural roads, a positive change was observed, i.e. a decreasing trend indicated in the "before" period strengthened in 2007 (although, the trends in 2007 were mostly not significant);
- in two series: fatalities in accidents with professional drivers and in single-vehicle accidents on rural roads - a negative change was observed, i.e. a decreasing trend indicated in the "before" period became an increasing one in 2007 (although, not significant);
- in three other series: fatalities in motorcycle accidents, fatalities at rural and urban junctions, a positive change can be indicated, i.e. an increasing trend observed in the "before" period became a decreasing one in 2007 (although, not significant);
- higher decreasing trends, as opposed to other series, were observed in 2007 for fatalities in accidents with young drivers, pedestrian fatalities on rural roads and fatalities in accidents at rural junctions.

Table 3 summarizes the results of analyses of changes in fatality numbers in 2007 as opposed to the "before" period, which compared the average monthly numbers of fatalities in both periods. For each series, two values are presented: an average of the "after"-"before" ratio of monthly fatality numbers (over twelve months) and its confidence interval. It can be seen that:
- in the cases of total fatalities, fatalities on rural and urban roads, fatalities in accidents with young drivers, pedestrian fatalities on rural roads and fatalities in head-on accidents on rural roads, a significant reduction was observed in the fatality numbers in 2007 as opposed to the previous years;
- in addition, non-significant reductions in fatality numbers in 2007 versus previous years were found for fatalities in accidents with professional drivers, fatalities in motorcycle accidents, pedestrian fatalities on urban roads and in the Arab population, and fatalities in accidents at rural junctions;
- at the same time, an increase (not significant) was observed in 2007 as opposed to the previous years in the numbers of fatalities in accidents at urban junctions and in single-vehicle accidents on rural roads.

Figure 2 shows examples of the control charts (CC) developed in the study, for monitoring the fatality numbers in 2007. The CC provides the expected values of measured performance variable, i.e. its mean value and confidence interval, for each time unit, where the points reflecting actual process performance, are compared with the expected values.

The charts (see Fig.2) are presented for four types of data: total fatalities, fatalities on rural roads, fatalities on urban roads and fatalities in accidents with young drivers. The horizontal lines on these charts are:
$\bar{x}$- the mean line (it is the average of residuals in the "before" period);
UCL - the upper control level, which is estimated as the mean plus three standard deviations (where the standard deviation is the square root of variance of residuals in the "before" period);
LCL - the lower control level, which is estimated as the mean minus three standard deviations;

where the points connected by short lines demonstrate the actual process performance, in each month of 2007. Types of events which indicate a deviation from the "normal" process, and which are, therefore, monitored by the CC were introduced in Sec.2.2.

it can be seen from the CC (see Fig. 2) that:

- in the CC of total fatalities, starting from April 2007, four consequent decreasing points are recognized ("type 3" event) and, in total, eight consequent points below the mean line ("type 2" event) are observed, indicating a strengthening in the decreasing fatality trend. However, in general, the process remained stable in 2007, i.e. within the boundaries reflecting a decreasing trend observed in the previous years;
- in the CC of fatalities on rural roads, a point in March 2007 was over the upper boundary ("type 1" event) but, then, four consequent points below the mean line were observed and later the process stabilized around the mean line, indicating coming back to the decreasing trend observed in the previous years;
- in the series of fatalities on urban roads, a decreasing (non-significant) trend was indicated in the previous years. Over the year 2007, no special events occurred but still some further enhancement of the decreasing trend can be recognized as more points during the year were observed below the mean line;
- in the series of fatalities in accidents with young drivers, a decreasing trend was significant in the previous years. According to the CC, over the year 2007, a number of positive events occurred, e.g. five consequent points below the mean line ("type 2") and a point below the lower control level in April 2007 ("type 1" event), indicating a strengthening in the decreasing trend.

In general, the CC demonstrated wide fluctuations in monthly fatality numbers in many series. However, all the processes in 2007 stayed within the boundaries of statistical control, i.e. within the boundaries of trends observed in the previous years.

5. Conclusions

The study of fatality trends in 2007 revealed that:

- the total number of fatalities reduced significantly in 2007 as opposed to the previous years (on average, by 15%). A decreasing trend in this process began previously and strengthened (not significantly) in 2007;
- similarly, the numbers of fatalities on rural and urban roads reduced significantly in 2007 as opposed to the previous years (on average, by 15% and 14%, respectively), where the decreasing trend of previous years strengthened (not significantly) in 2007; and
- in 2007 versus previous years, significant reductions were observed in the numbers of fatalities in accidents with young drivers, in pedestrian accidents on rural roads and in head-on accidents on rural roads, where in all the processes a decreasing trend of previous years strengthened (not significantly) in 2007.

At the same time, signs of negative changes were observed in:

* fatalities in single-vehicle accidents - the appearance of increasing trend in 2007 and an increase in the number of fatalities in 2007 versus previous years;
* fatalities in accidents with professional drivers - an increasing trend in 2007;
* fatalities in accidents at urban junctions - an increase in the number of fatalities in 2007 as opposed to the previous years.

However, all the negative changes mentioned above were not significant. Moreover, concerning the last two cases some positive findings are also available, e.g. as to accidents with professional drivers, a reduction (not significant) in fatality numbers in 2007 versus previous years was indicated; as to fatalities in accidents at urban junctions, the increasing trend of the previous years has changed to a decreasing trend in 2007.

In other cases: motorcycle fatalities, pedestrian fatalities on urban roads and in the Arab population, fatalities at rural junctions - no essential changes were observed in 2007, i.e. a non-significant reduction was found in the numbers of fatalities accompanied by a non-significant strengthening in the decreasing trend.

In general, the changes in fatalities observed in 2007 were positive and indicated a continuation of decreasing trends of the previous years. Based on the detailed examination of changes observed, more efforts on accident prevention can be recommended in the areas of single-vehicle accidents on rural roads, accidents with professional drivers (trucks over 4 ton) and vehicle collisions at urban junctions.

The study demonstrated the application of a number of statistical tools, which enabled to examine changes both in trends and in the numbers of monthly fatality figures. Besides, control charts were developed for monitoring the monthly fatality numbers. The findings were consistent across different research techniques applied.

The changes in fatalities demonstrated by means of control charts, in general, resembled those identified by other analysis tools. Such a consistency was expected (as the same data and similar basic models were applied), but being observed, definitely strengthened the findings' validity. However, we should note that in comparison with other tools the application of control charts enables both an earlier identification of changes in the process controlled and recognition of "corrected" trends when available. The control charts have a potential of on-line monitoring of accident frequencies that might make them more attractive for application by road safety authorities.

The statistical tools applied by the study provided valid statistical answers concerning the essence and the scope of changes in various types of fatalities. These statistical tools present a firm basis for a systematic short-term monitoring of changes in the numbers of road accident fatalities and injuries.

Finally, the models developed enable to examine the question: will the national safety targets be reached? The Israeli national safety target, adopted by the Prime-Minister and the Minister of Transport and Road Safety, was introduced in 2006 aiming to reduce the total number of fatalities to 350 by year 2010. Using the results of the analysis and assuming a continuation of the current trends, a prognosis for coming years can be provided. The prognosis includes a mean line and a confidence interval, which are compared with the target line - Figure 3. It can be seen from Fig.3 that had the current decreasing trend continued, the national target will be approached, with about 356 fatalities in 2010. However, the confidence interval of the estimate is relatively wide, 310-409, reflecting, among other things, the lack of significance of the decreasing trend at the end of 2007. The "level of confidence" of reaching national safety targets would increase once wide-scale safety interventions were promoted such as automatic speed enforcement, alcohol checks on Friday nights, safety upgrades of single-carriageway roads, traffic calming in city centres, providing forgiving roadsides and so on.

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Table 1 : Yearly numbers of fatalities

Year	Data series												
	1	2	3	4	5	6	7	8	9	10	11	12	13
2002	525	318	207	113	112	45	112	64	55	62	71	43	32
2003	451	260	191	81	75	43	118	45	45	60	46	52	18
2004	480	290	190	81	85	36	121	54	56	68	59	37	16
2005	448	276	172	93	72	47	93	41	42	58	58	59	21
2006	414	226	188	76	66	43	107	32	41	49	48	40	32
2007	398	234	164	62	65	37	91	33	40	66	40	47	21

Figure 1 : Time series of fatalities in 2002-2007.

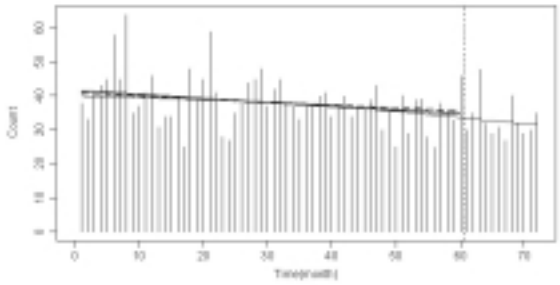
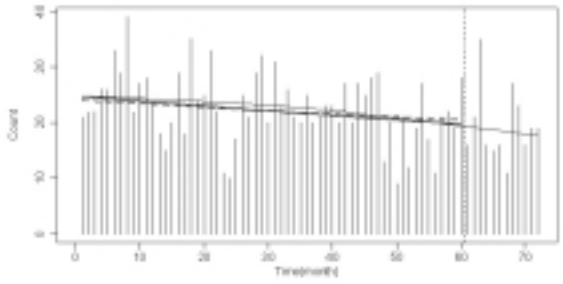
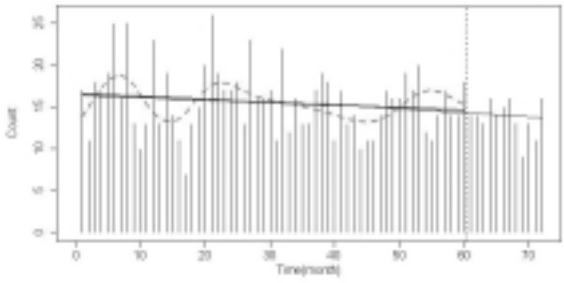
1. total fatalities	S1 
2. fatalities on rural roads	S2 
3. fatalities on urban roads	S3 

Figure 1 : Time series of fatalities in 2002-2007.

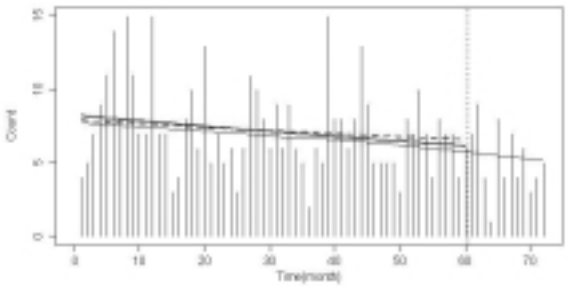
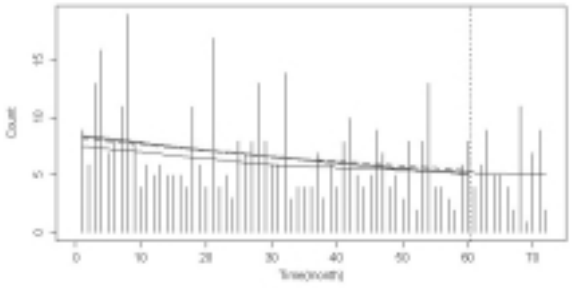
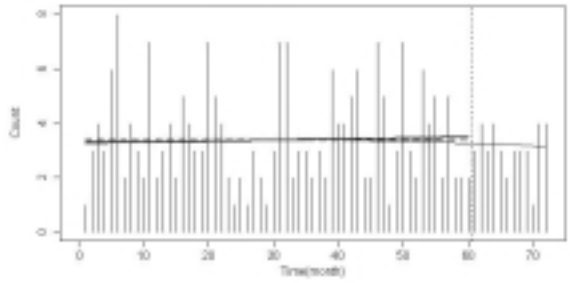
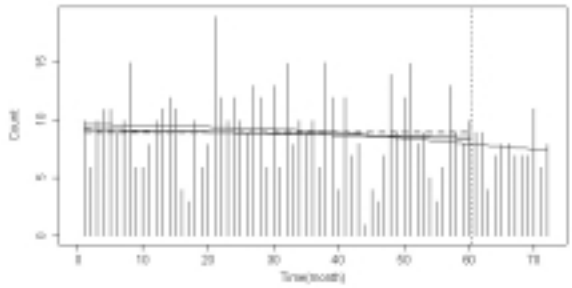
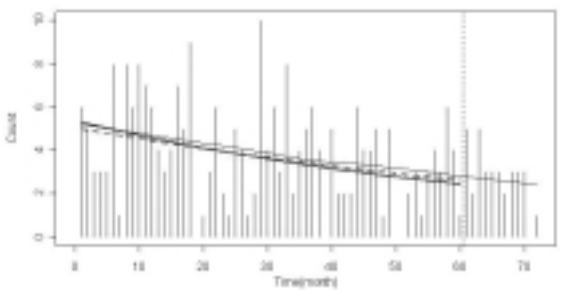
4. fatalities in accidents with young drivers	S4 
5. fatalities in accidents with professional drivers	S5 
6. fatalities in accidents with powered two-wheelers	S6 
7. pedestrian fatalities on urban roads	S7 
8. pedestrian fatalities on rural roads	S8 

Figure 1 : Time series of fatalities in 2002-2007.

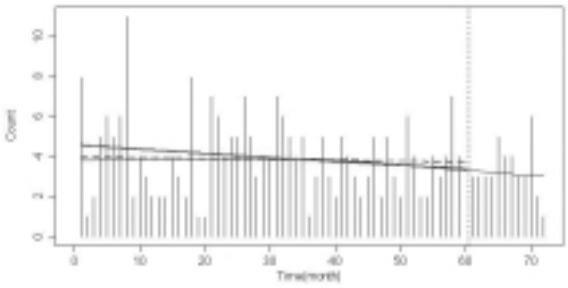
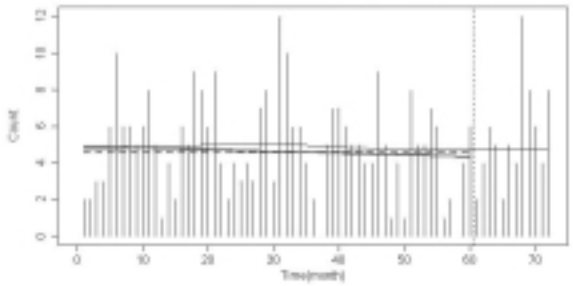
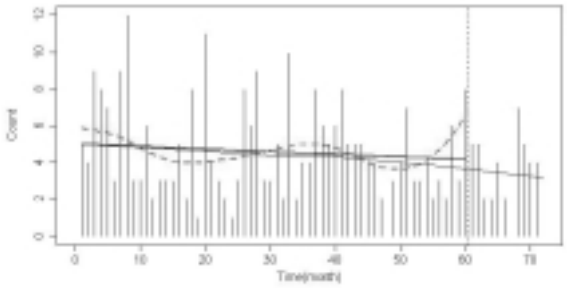
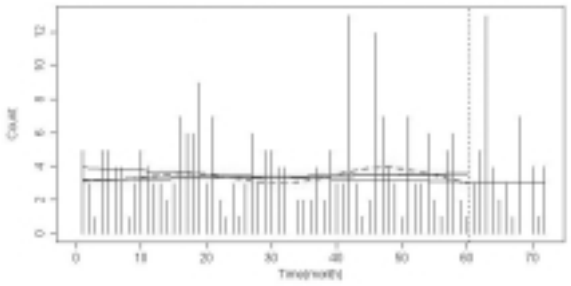
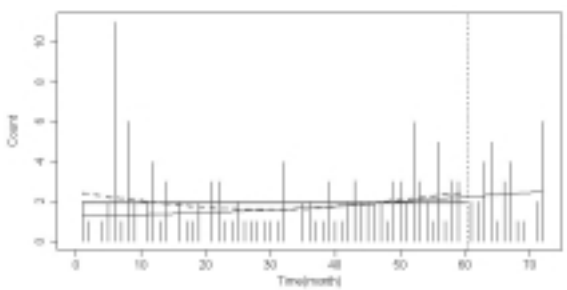
9. pedestrian fatalities in the Arab population	S9 
10. fatalities in single-vehicle accidents on rural roads	S10 
11. fatalities in head-on accidents on rural roads	S11 
12. fatalities in accidents at rural junctions (without pedestrians)	S12 
13. fatalities in accidents at urban junctions (without pedestrians)	S13 

Table 2 : Examination of changes in trends in 2007

Series	Slope of the trend line in the "before" period	Change at the end of 2006 (time60)	Slope of the trend line in 2007	Conclusion : change in 2007 in comparison with previous years
1. total fatalities	-0.0033 sig.5%	-0.0107 n.s.	-0.0140 n.s.	A significant decreasing trend in the "before" period, which strengthened (n.s.) in 2007.
2. fatalities on rural roads	-0.0043 sig.5%	-0.0104 n.s.	-0.0147 n.s.	A significant decreasing trend in the "before" period, which strengthened (n.s.) in 2007.
3. fatalities on urban roads	-0.0018 n.s.	-0.0109 n.s.	-0.0127 n.s.	A decreasing (n.s.) trend in the "before" period, which strengthened (n.s.) in 2007.
4. fatalities in accidents with young drivers	-0.0040 n.s.	-0.0357 n.s.	-0.0398 sig.10%	A decreasing (n.s.) trend in the "before" period, which strengthened and became significant (at 90% level) in 2007.
5. fatalities in accidents with professional drivers	-0.0091 sig.5%	0.0117 n.s.	0.0026 n.s.	A significant decreasing trend in the "before" period, which turned to an increasing trend (n.s.) in 2007.
6. fatalities in accidents with powered two-wheelers	0.0005 n.s.	-0.0223 n.s.	-0.0218 n.s.	A lack of trend in the "before" period turned to a decreasing trend (n.s.) in 2007.
7. pedestrian fatalities on urban roads	-0.0015 n.s.	-0.0119 n.s.	-0.0133 n.s.	A decreasing (n.s.) trend in the "before" period, which strengthened (n.s.) in 2007.
8. pedestrian fatalities on rural roads	-0.0113 sig.5%	-0.0254 n.s.	-0.0367 n.s.	A significant decreasing trend in the "before" period, which strengthened (n.s.) in 2007.
9. pedestrian fatalities in the Arab population	-0.0046 n.s.	-0.0050 n.s.	-0.0095 n.s.	A decreasing (n.s.) trend in the "before" period, which strengthened (n.s.) in 2007.
10. fatalities in single-vehicle accidents	-0.0034 n.s.	0.0338 n.s.	0.0305 n.s.	A significant decreasing trend in the "before" period, which turned to an increasing trend (n.s.) in 2007.
11. fatalities in head-on accidents	-0.0035 n.s.	-0.0250 n.s.	-0.0285 n.s.	A decreasing (n.s.) trend in the "before" period, which strengthened (n.s.) in 2007.
12. fatalities in accidents at rural junctions	0.0019 n.s.	-0.0439 n.s.	-0.0420 n.s.	An increasing (n.s.) trend in the "before" period, which turned to a decreasing trend (n.s.) in 2007.
13. fatalities in accidents at urban unctions	0.0267 sig.5%	-0.0425 n.s.	-0.0158 n.s.	A significant increasing trend at the end of the "before" period turned to a decreasing trend (n.s.) in 2007.

Comments to table 2: "n.s." - not significant; "sig. 5%" - significant at 5% level; "sig.10%" - significant at 10% level.

Table 3 : Examination of changes in fatality numbers in 2007 versus 2002-2006

Series	Average "after"-"before" ratio	95% Confidence interval	Conclusion: change in 2007 in comparison with previous years
1. total fatalities	0.850	0.951- 0.760	A significant reduction
2. fatalities on rural roads	0.845	1.002- 0.712	A non-significant reduction at 95% confidence level; a significant reduction at 90% confidence level
3. fatalities on urban roads	0.859	1.008- 0.733	A non-significant reduction at 95% confidence level; a significant reduction at 90% confidence level
4. fatalities in accidents with young drivers	0.687	0.897- 0.526	A significant reduction
5. fatalities in accidents with professional drivers	0.793	1.112- 0.566	A reduction (not significant)
6. fatalities in accidents with powered two-wheelers	0.856	1.191- 0.615	A reduction (not significant)
7. pedestrian fatalities on urban roads	0.816	0.636-1.045	A reduction (not significant)
8. pedestrian fatalities on rural roads	0.683	1.050- 0.445	A non-significant reduction at 95% confidence level; a significant reduction at 90% confidence level
9. pedestrian fatalities in the Arab population	0.836	1.177- 0.594	A reduction (not significant)
10. fatalities in single-vehicle accidents	1.052	1.418- 0.780	An increase (not significant)
11. fatalities in head-on accidents	0.697	1.044- 0.465	A non-significant reduction at 95% confidence level; a significant reduction at 90% confidence level
12. fatalities in accidents at rural junctions	0.947	1.427- 0.628	A reduction (not significant)
13. fatalities in accidents at urban junctions	1.334	2.107- 0.845	An increase (not significant)

Figure 2 : Examples of control charts for monitoring fatality numbers in 2007.

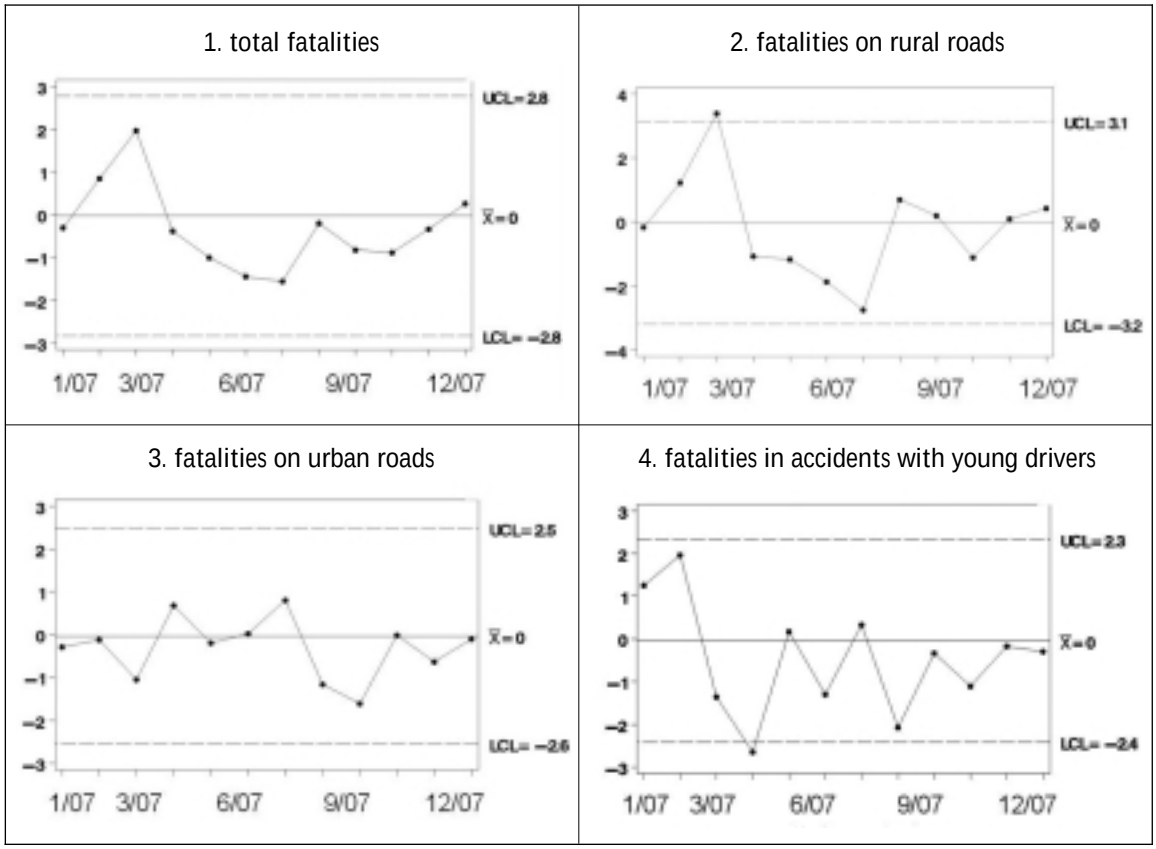


Figure 3 : A prognosis of total fatalities for coming years based on the fatality trends at the end of 2007.