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Dragan Jovanović, PhD¹
E-mail: draganj@uns.ac.rs

Dragan Kukolj, PhD¹
E-mail: dragan.kukolj@rt-rk.uns.ac.rs

Nikola Jorgovanović, PhD¹
E-mail: nikolaj@uns.ac.rs @uns.ac.rs

Darko Stanišić, PhD¹
E-mail: darkos@uns.ac.rs

Boško Matović, PhD¹
E-mail: boskom@uns.ac.rs

¹ Faculty of Technical Sciences, University of Novi Sad, Novi Sad, Serbia

THE SPATIAL DISTRIBUTION OF ROAD ACCIDENTS AND THEIR CONSEQUENCES IN THE AREA OF AP VOJVODINA

Key Words

Road safety;
Road accidents;
Spatial
distribution

Abstract

Determining the spatial distribution of road accidents is an important aspect of working in traffic safety. The paper presents an analysis of the spatial distribution of road accidents and their consequences in the area of AP Vojvodina.

1. INTRODUCTION

The problem of safety in road traffic represents a major challenge at a global level. More than 1.35 million people are killed on the world's roads each year, with low and middle-income countries bearing a disproportionate burden (WHO, 2018). In the development process of European and national road safety programs, it is necessary to work in order to prevent fatalities and injuries on the road. Therefore, decision makers should adapt the traffic system to the requirements and vulnerability of its users. The analysis of the spatial distribution of accidents on the road network provides a unique approach to the observation and road safety monitoring. Monitoring the spatial distribution of accidents is very important for the efficient planning and implementation of appropriate activities so as to reduce the number of accidents (Okabe et al., 2006; Pljakić et al., 2018; Plug et al., 2011).

The paper presents the spatial distribution of road accidents and their consequences in the area of AP Vojvodina.

2. DATASET

This study observes accidents in a then-year period (2008–2017) which included the total number of accidents.

The data regarding the accidents were taken from a database which is authorized by the Road Traffic Safety Agency (RTSA) organized in accordance with the Common Accident Data Set (CADaS) protocol developed by the European Commission. The RTSA database is based on GIS, so that all accidents have coordinates (x,y) of the locations that are precise enough to establish the direction of traveling on major roads.

3. RESULTS

3.1. Road accidents and casualties data

During the analyzed period (2008-2017), it was recorded total 102,887 traffic accidents, of which the total number of fatal accidents was 1,743 (1.7 %). Of the total number of casualties (61,135), 1,953 (3.2 %) were killed and 11,066 (18.1 %) seriously injured. (Table 1.).

Table 1. Road accidents and casualties, AP Vojvodina, 2008-2017.

Accidents		Casualties	
Total	102.887	Total	61.135
with material damage only	60.472	injured	59.182
with casualties	42.415	slight injured	48.116
with injuries	40.672	seriously injured	11.066
with fatalities	1.743	fatalities	1.953

3.2. Spatial distribution per municipalities

Spatial distribution of the casualties by age groups was made according to the municipalities in the territory of AP Vojvodina. By many parameters, municipalities differ significantly, which also affects the number of casualties in their area. The following municipalities can be identified according to the potential for reducing the number of casualties (Figure 2.):

- Novi Sad, as the municipality with the highest potential for reducing casualties. In the municipality of Novi Sad, there were 15,312 casualties recorded, which represents about 25.0 % of all registered casualties in the area of AP Vojvodina.
- Zrenjanin, Subotica and Pancevo, as municipalities with significant potential for reducing casualties. In these municipalities nearly 20.0 % of all registered casualties in the territory of AP Vojvodina.

- Ruma, Sombor, Sremska Mitrovica, Backa Palanka, Indjija, Stara Pazova, Kikinda and Vrbas with low potential for reducing the number of casualties. In these municipalities, about 25.0% of all casualties in the area of AP Vojvodina.
- Other municipalities with very low potential to reduce casualties. In these municipalities, up to 30.0 % of all casualties in the territory of AP Vojvodina.

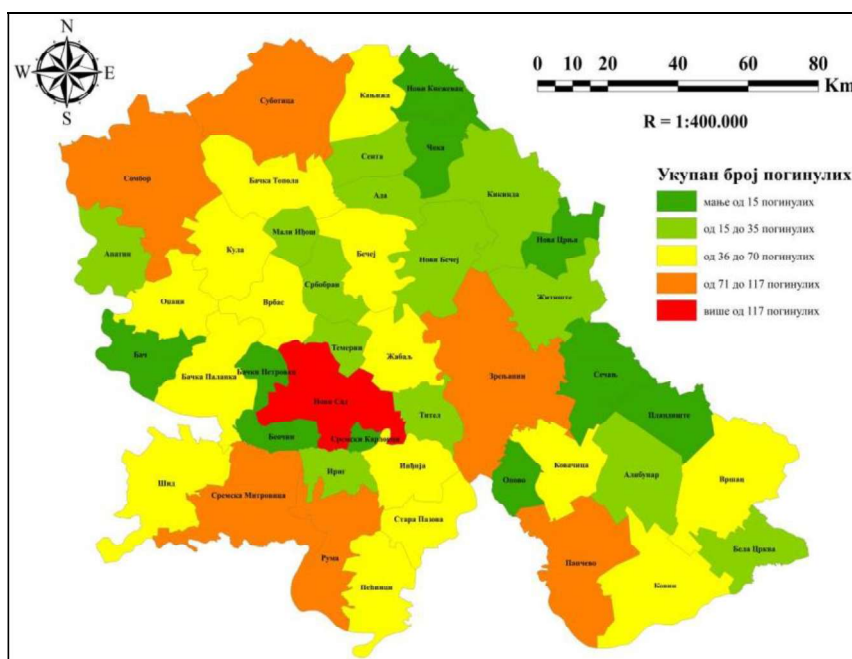


Figure 1. Frequency of total number of fatalities per municipalities, AP Vojvodina, 2008-2017.

The following municipalities can be identified according to the potential for reducing the number of injured drivers (Figure 3.):

- Novi Sad, as the municipality with the greatest potential for reducing the number of injured drivers. In the municipality of Novi Sad, 8,004 casualties drivers were recorded, which is about 22.0 % of all registered casualties drivers in the area of AP Vojvodina.
- Zrenjanin, Subotica, Sombor and Pancevo, as municipalities with significant potential for reducing the number of casualties drivers. In these municipalities, about 24.0 % of all registered casualties drivers in the area of AP Vojvodina.

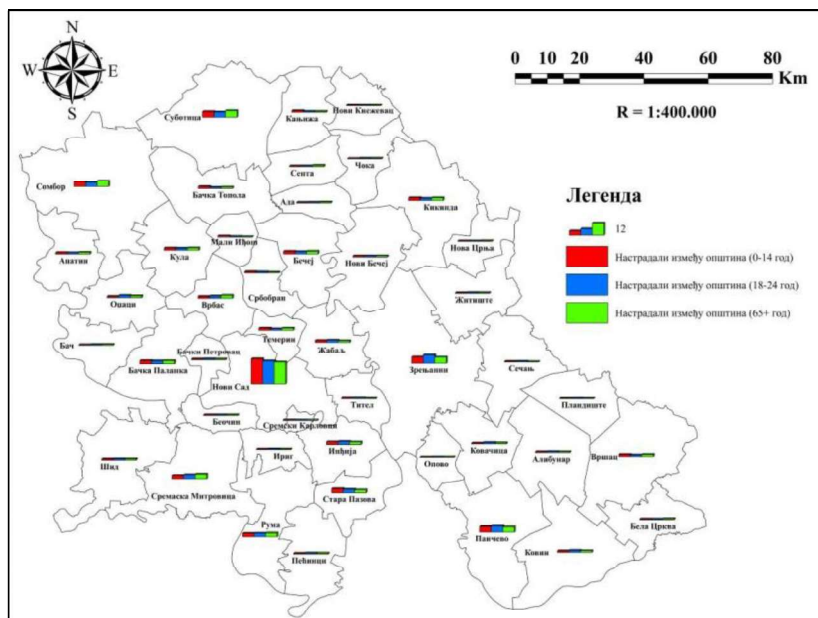


Figure 2. Frequency of casualties by age groups per municipalities, AP Vojvodina, 2008-2017.

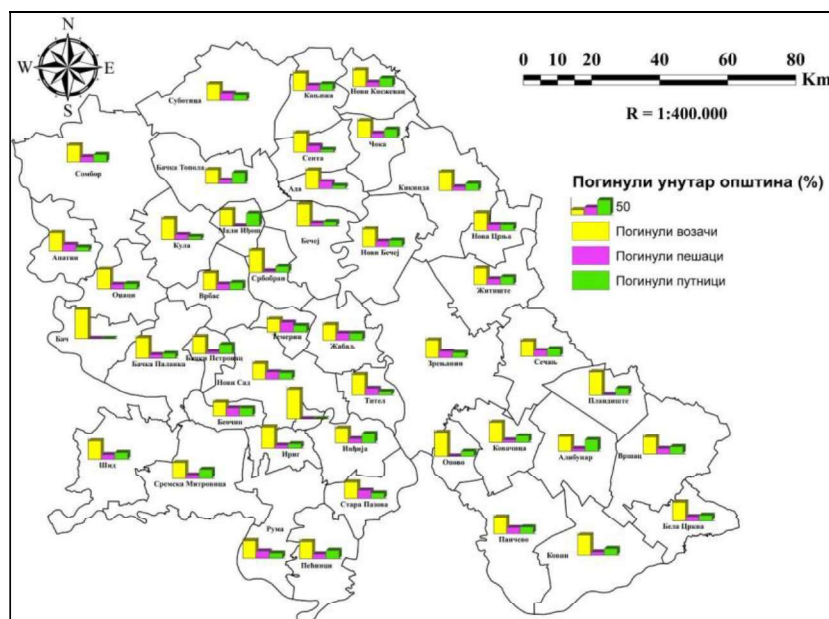


Figure 3. Percentage distribution of fatality drivers, pedestrians and passengers within the municipality, AP Vojvodina, 2008-2017.

In the area of AP Vojvodina, there are 168 intersections on the state road network outside urban areas. Intersections are specific in their characteristics: type, method of regulation, intensity and structure of traffic, technical and operational characteristics of the road, the roadside elements, etc. Depending on the mentioned factors, the spatial distribution of traffic accidents and their consequences also differs.

In the analyzed period (2015-2017), a total of 320 road accidents were recorded at 106 intersections (Figure 5.). Traffic safety analysis was performed based on the EPDO method. With this method, all traffic accidents are reduced to traffic accidents with material damage and the total risk for each individual intersection is calculated on this basis.

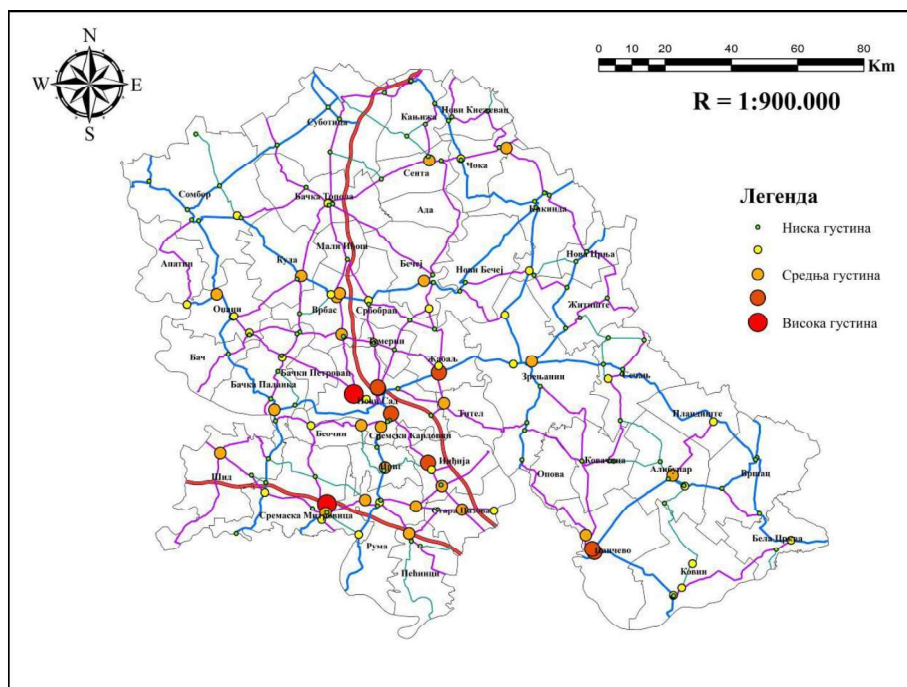


Figure 5. Density of road accidents at intersections, AP Vojvodina, 2008-2017.

4. CONCLUSIONS

Spatial analysis of road accidents is of great importance for understanding the conditions of an accident in order to plan preventive activities in a particular location.

The analysis of road accidents and their consequences in the period from 2008 to 2017 in the area of AP Vojvodina indicates the following conclusions:

- On average, around 7,000 traffic accidents occur annually;
- Between 2008 and 2017, there were 61,135 casualties recorded, 59,182 injured, of which 48,116 were slight injured and 11,066 were seriously injured, and 1,953 were killed;
- Spatial analysis of road accidents indicates that 38,598 accidents were recorded in the territory of Novi Sad municipality, which accounts for almost 40.0% of all recorded traffic accidents in the AP Vojvodina. Nearly 25.0% of traffic accidents occur in the municipalities of Subotica, Zrenjanin, Pancevo, Sombor and Sremska Mitrovica. In the municipalities of Ruma, Becej, Kikinda, Kula, Temerin, Backa Palanka, Indjija, Stara Pazova, Vrbas and Vrsac, about 20.0% of traffic accidents occur and in other municipalities about 15.0% of all recorded traffic accidents occur in the AP Vojvodina;

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