HOW DOES THE VULNERABLE COMMUNITY RELATE TO FIRE SAFETY ISSUES?

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Disaster Risk Reduction Research Centre

EUROPEAN FIRE SAFETY ALLIANCE

EUROPEAN FIRE SAFETY WEEK 2021

UNIVERSITY OF NOVI SAD
FACULTY OF TECHNICAL SCIENCES
Novi Sad, Serbia

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The **University of Novi Sad** is the only state university in the Autonomous Province of Vojvodina, comprising 14 faculties and 3 research & developmental institutes. There are more than 50,000 students, 5,000 teaching and non-teaching staff, as well 300 study programmes at all three academic cycles. It is a comprehensive university covering all major fields of study and research.

Faculty of Technical Sciences (FTS) was established in UNS (1960). It consists of 13 departments, 10 administrative services and 31 research centres in 8 buildings, with over 14,000 students and 1,300 employees. FTS ranks among the largest and most developed faculties in the region.

Disaster Risk Reduction Research Centre was founded in 2008

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Chimney fires

According to official fire statistics, chimney fires account for almost 20% of all fires that occur in family residential buildings every year in the Balkan region. The high temperature from the chimneys may have an influence on fire spreading to the wooden girders.

Chimney fire causes in Serbia in the period 2002-2013

Year *	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Structural defects	45	53	48	81	226	43	30	38	69	52	46	17	748
Fireplace malfunction	295	338	394	368	315	213	247	385	414	603	547	174	4293

* Data from 2002 to 2009 are based on preventive protection inspector's survey, while data from 2010 to 2013 are based on fire rescue units' intervention records

The objective of the study was to gather and analyze data on timber structure fire incidents occurring in family residential buildings in lowland rural settlements in Serbia (2010-2014) and a mountain settlement in Montenegro (2007-2013) in order to determine the extent to which existing data can be used in fire risk assessment.

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This research illustrates how the lack of chimney maintenance and social vulnerability of the settlements (aged rural population with low incomes, living in many cases alone in old houses, in areas with limited access to distance heating systems or piped gas) could influence the fire risk in timber structures in rural lowland and mountain areas.

Torak, Žitište municipality, typical lowland settlement in Vojvodina

The fire statistic data were provided by local Fire fighting brigades (2010-2014) and data on dwellings and population by 2011 Census of Population, Households and Dwellings in the Republic of Serbia, and Montenegro census.

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Žabalj and Žitište are typical lowland settlements in Vojvodina region in Serbia, with family housing and agriculture oriented economy.

Family house made of weak material, Žabalj

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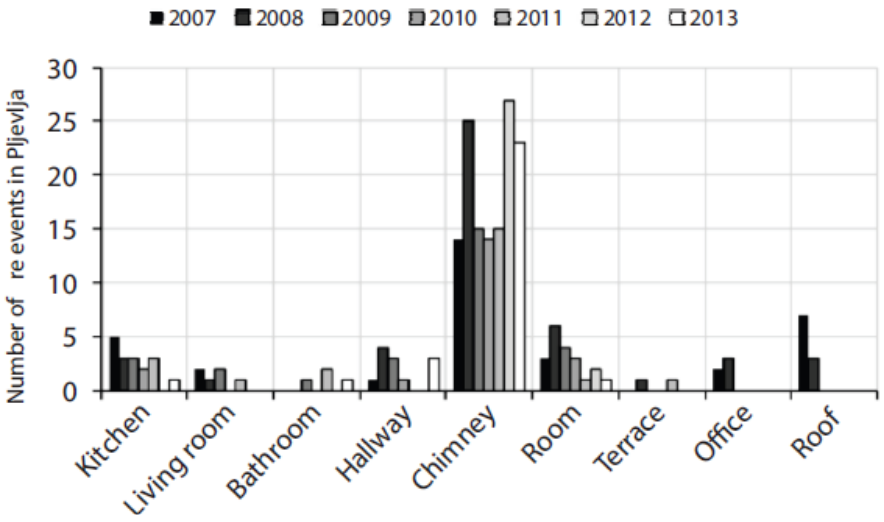
The municipality of Pljevlja is located in the north of the Montenegro area, between Tara and Lim rivers. It is situated in the valley at an altitude of 700 m and is surrounded by low hills. Such geographical position makes the municipality of Pljevlja particularly vulnerable to toxic gasses in the air which consequently increases the risk of casualties in the case of fire events. It is the third largest municipality in the state.



Fire events distribution in Pljevlja municipality, according to place of origin

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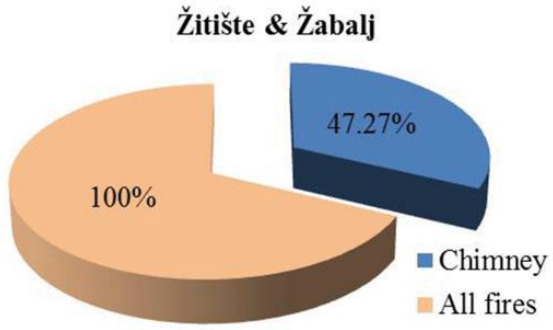
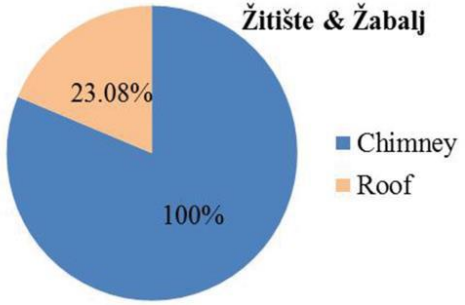
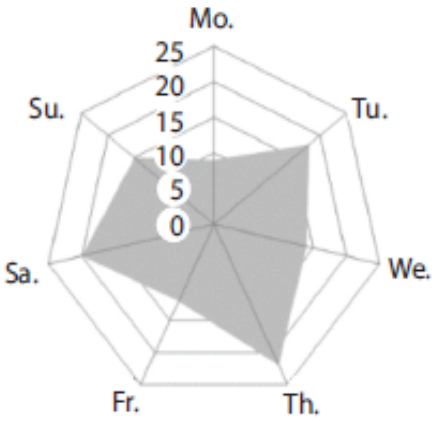
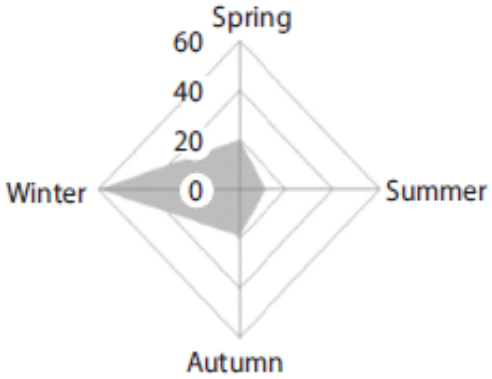


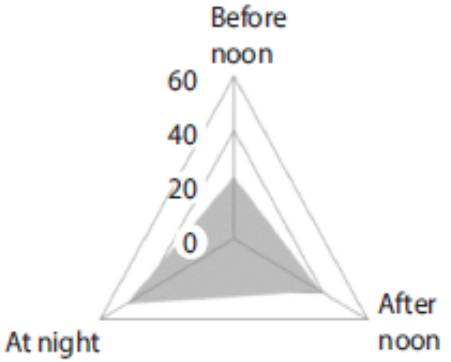
The share of the chimney fires in the total number of fires



The share of the roof fires in the total number of chimney and roof fires







Daily, seasonally and period-of-the-day distribution of total fire incidents in Žabalj and Žitište municipalities, in the period 2010-2014

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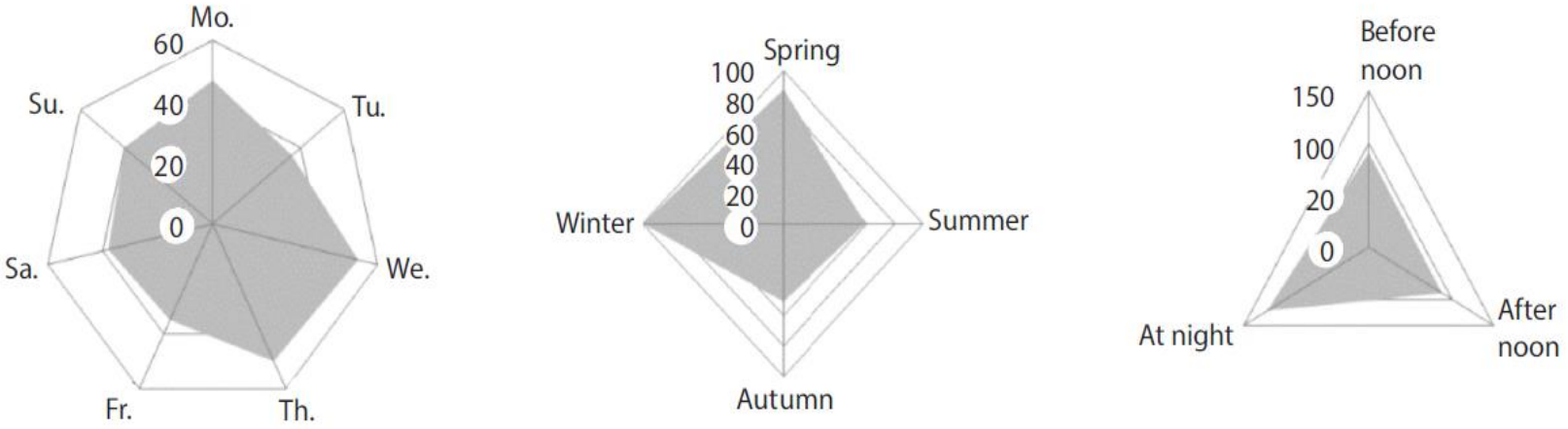
PLJEVLJA, MONTENEGRO

The majority of fires (80%) in residential buildings in Pljevlja broke out in winter, during heating season, on working days, at night or before noon.
There are approximately 15-30 chimney fires per year in Pljevlja, making them the most frequent place of fire occurrence in housing facilities.



Daily, seasonally and period-of-the-day distribution of total fire incidents in residential facilities in Pljevlja, in the period 2007-2013

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Statistical data on the analysed settlements according to the 2011 census

Municipality	Žabalj	Žitište	Pljevlja
Type of settlement	lowland	lowland	mountain
Residents	26134	16841	31060
Occupied dwellings	7354	6138	10627
Temporarily unoccupied or abandoned dwellings	2527	164	
Occupied dwellings older than 25 years	6260	5382	9458
Dwellings with outer walls made of weak material *	444	3725	n/a
Average population age	39.7	43.4	41.8
Average members per households	3.12	2.67	2.92
Percentage of households having one or two members	42	54	n/a

* Outer walls built solely or predominantly of soil cement, adobe, wattle dam, boards, with pitched roof structure and attic floor predominantly made of wood

No fire alarm in any home in analized areas.
Fire brigade needs 15 -30 minutes to come to the fire event place.

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CONCLUSIONS

Roof fires are the predominant type of fires analysed in residential family buildings, most frequently occurring in winter, during heating season, in houses without district heating or piped gas. A large percentage of fires is related to chimneys due to lack of maintenance. In most cases, fire starts in chimneys (inflamed soot and tar layers) and spreads to the timber roof construction in the attic. The risk increases with the age of the house (cracks in the chimney walls) and the lack of maintenance (chimneys are not controlled and cleaned regularly).

Additional risk factors are the age of inhabitants and the distance to a fire-brigade station. The combination of all these factors may cause extensive damage, injuries and even loss of life. Since the analysed fire risks originate primarily from social vulnerability, preventive fire risk measures should contribute to increasing the resilience of local rural communities to fire hazards.

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