

SOCIAL RESILIENCE TO FLOOD DISASTERS: DEMOGRAPHIC, SOCIO-ECONOMIC AND PSYCHOLOGICAL FACTORS OF IMPACT

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Abstract: Starting from the increasingly frequent consequences of floods in local communities in Serbia, this paper aims to examine the level and impact of selected demographic, socio-economic and psychological factors on the level of social resilience to flood disasters. The research was conducted using a provided questionnaire and then collected online for 261 respondents during August 2021. The research results show a statistically significant influence of gender, previous experience, social ties, trust in public institutions and involvement in risk communication processes on the level of social resilience to flooding disasters. In addition, research has found that strengthening social resilience requires strengthening social networking, trust and solidarity among members of the local community. The obtained research results can significantly help all stakeholders formulate strategies, plans, and initiatives to improve social resilience to the consequences of flood disasters and create preconditions for building a safe and sustainable environment.

Keywords: disaster, flood, social resilience, demographic, socio-economic, psychological factors.

1. Introduction

The application of the concept of resilience in disaster management proves to be one of the critical aspects in the interpretation and management of the complexity of the natural environment and social and public infrastructure systems (Koliou *et al.*, 2018). The main difficulty of flood risk management is their rapid occurrence and spatial distribution, which means the short time required for warning and the limited time available to minimise risk (Bodoque *et al.*, 2016). Traditional flood risk management approaches have focused on flood defence to mitigate their consequences. However, many experiences show that structural solutions alone will not solve flood problems (Adedeji, Proverbs, Xiao & Oladokun, 2018; Koliou *et al.*, 2018; O'Neill, Brereton, Shahumyan & Clinch, 2016).

Flood resilience has become a significant focus of flood risk management policy as reflected in a strategy that provides the preconditions for maximum flood mitigation (Adedeji, Proverbs, Xiao & Oladokun, 2018). The emergence of a new paradigm has shifted the focus from a reactive approach to prevention, i.e., resilience building and non-structural measures such as risk assessments, flood warnings, awareness-raising, household readiness, land use planning, and emergency management (O'Neill *et al.* 2016). The EU Floods Directive has incorporated this policy shift by advocating for an approach that includes interdependent measures in flood risk management plans to reduce the likelihood and consequences of floods (Nones, 2015). The way people perceive risk is essential for understanding people's responses to floods and taking appropriate action to improve them (O'Neill, Brereton, Shahumyan & Clinch, 2016). The responsibility for taking protective measures against the consequences of floods is mainly attributed to the government, while the share of citizen participation is tiny.

It is essential to recognise that each individual has a responsibility to strengthen their resilience, thus helping to improve the strength of the community by having a clear perception of the risk, regularly informing and taking protection measures (Soetanto, Mullins & Achour, 2017). Resilience helps society resist, absorb and recover from small and large-scale disorders, i.e. both within local communities and at the level of nations (Koliou *et al.*, 2018). Interest in social resilience to disasters is closely related to the need to determine measures to prevent and mitigate the negative consequences of shocks and disasters in local communities and at the regional and national levels (Saja *et al.*, 2019). Understanding the various factors that determine the perception and behaviour of the population in the context of floods can contribute to the identification of groups with lower perceptions of flood risk, based on which appropriate strategies for improving social resilience to floods can be developed and implemented (Soetanto, Mullins & Achour, 2017). Identifying and devising adequate measures requires gaining insight into how society is resilient and which factors are vital in determining the degree of social resilience. Information on social resilience can help decision-makers in communities at risk of disaster when adopting and implementing preventive measures (Khoja, Schubert & Joerin, 2020). A significant challenge for contemporary research is to formulate a unique standard of social resilience, emphasising uniformity that would allow comparing the

resilience status of two communities to make appropriate decisions about investing in resilience (Soetanto, Mullins & Achour, 2017). This paper reviews the international scientific literature to examine the factors influencing social resilience to floods to identify the essential demographic, socio-economic, psychological and political-cultural resilience characteristics of communities. Identifying and understanding the impact of these factors on strengthening social resilience to the consequences of flood disasters provides clear guidelines through which citizens can most adequately prepare, face and recover from the effects of flood disasters.

2. Literary review

Demographic characteristics

Demographic characteristics of the community, such as gender and age, are recognised in numerous studies as critical influencing factors that determine the population's ability to prepare for, cope with, respond to and recover from the harmful effects of floods (Ahmad & Afzal, 2020; Koks *et al.*, 2015; Salvati *et al.*, 2019; Scherzer *et al.*, 2019; Soetanto, Mullins & Achour, 2017). Demographic factors may help explain why two people living in the same geographic area have different perceptions of flood risk and show other behaviours in flood-related disasters (Soetanto, Mullins & Achour, 2017). Identifying potentially vulnerable groups in terms of gender and age and recognising the circumstances in which people have lost their lives are significant in improving human security and increasing community resilience. Gathering the necessary data on the age and gender structure of the community can be of great help in making recommendations for self-protection actions, planned construction of homes and shelters adapted to target groups, as well as proactive policies that can contribute to reducing the large numbers of people affected by floods (Koks *et al.* 2015).

The gender dimension of flood-related disasters is a critical area of research on social resilience, which can significantly improve social resilience, starting by identifying and strengthening the resilience of gender-vulnerable groups. The catastrophic floods that hit the Republic of Serbia in 2014 raised many important issues of improving social resilience in the event of floods, among which the gender dimension of flood-induced disasters stands out. The results of a survey conducted to examine the gender dimension of disasters in the areas affected by the May 2014 floods in Serbia confirmed that gender is one of the most important predictors in the context of perception, preparedness and response to floods (Cvetković, Roder, Ōcal, Tarolli & Dragičević, 2018). A critical study examining flood risk perception in the Republic of Ireland found a significant correlation between gender differences in the affective component of flood risk perception (McDowell *et al.*, 2020). The findings suggest that gender differences exist and, as such, may affect the risk to human health during and immediately after floods.

Based on the analysis of surveys, it was determined that women showed a lower level of awareness about the potential health risks caused by floods. Also, women tend to take activities that would supply clean drinking water inside the house in case of water contamination, such as boiling water or changing the source of drinking water. In contrast, male respondents expressed a greater propensity for physical or more typical male behaviour, such as using sandbags to prevent contamination before and during floods and treating or chlorinating water before consumption. Based on these findings, the authors suggest that gender-based behaviour can be generally described as internal, i.e. concentrated on taking activities within households to prevent or reduce the consequences of floods that are characteristic of women, and externally focused on taking actions outside the home to avoid consequences. Floods are characteristic of men (McDowell *et al.*, 2020). However, an earlier study examining the impact of flood exposure on gender perspective showed that higher risk perceptions did not result in higher levels of protective behaviour, noting that traditional gender roles predominate among women despite increased risk perceptions. Men are perceived as protectors who are more inclined to take risk-reduction measures (O'Neill *et al.*, 2016).

Studies examining the impact of floods on rural areas in Pakistan have shown a positive link between the sexes of men and the adjustment of flood risk management tools about all adaptation measures (Ahmad & Afzal, 2020). Local traditions and customs in the field of study characterise the ideas of man's dominant role, with men being more capable of manual labour, construction work and taking measures to protect property from women in the event of disasters. Research findings from the Bodin County, Pakistan Flood Case Study point to the need to improve gender disparities in disaster management focusing on women's contribution to building resilience and sustainable development in different post-disaster contexts (Drolet *et al.*, 2015). The study shows that women's work capacity has effectively doubled due to the district's floods. Women have traditionally been the primary caregivers in the flood-affected area, providing food and basic medical care to children and adults. In addition, caring for the family was further hampered after the floods, as it was necessary for them to further participate in the renovation of homes and agricultural land. Women affected by the difficult circumstances called on the government to provide gender-sensitive services and pay more attention to the surviving victims, especially pregnant women and mothers in the shelters it offered.

The Gender Dimension Survey of Natural Disasters, focusing on women's experience in dealing with disasters in the city of Malabon, showed that despite their low socio-economic status, women sought to prepare for disasters

by allocating funds for emergencies and using family and personal packages. Disaster case (Reyes & Lu, 2016). Being at home, women knew more about the needs of their family members, which were especially pronounced during disasters. Disasters have been shown to significantly affect women's work and psychological burden as they take on the role of guardians and become primarily responsible for children, the elderly, and people with disabilities. Analysis of the impact of gender on flood resilience showed that developed countries have higher mortality rates than men. In comparison, less developed countries have higher mortality rates than women, attributed to gender inequalities, different roles in care and limited access to adequate resources. (Salvati *et al.*, 2019). Gender analysis found that the floods killed more men than women in all age categories from 0 to 69, while the elderly female mortality rate was higher than the male mortality rate. Men's higher mortality is explained by men being more numerous than women in outdoor work and activities. Until recently, rescue services consisted entirely of men. Research conducted to examine the impact of floods on health in the gender dimension has shown that the effects of floods on men and women differ significantly (Adedeji *et al.*, 2018). The study shows that women or girls may be at greater risk of mental problems than men or boys after flood exposure. Human resilience can be enhanced by adequately preparing and building the capacity to withstand floods or reduce impacts, taking into account a gender-based approach. Citizen participation in strengthening flood resilience can be improved by providing adequate information within civil protection plans by specifying what to do and what not to do during and after flooding and educating and raising citizens' awareness of hydrological hazards.

The factor of influence that plays a significant role in understanding the perception of risk and resistance of citizens to floods is the age of individuals. Research shows that the older population generally assesses risks more accurately than the younger population. Their risk assessment is closer to the actual level of risk to which they are exposed (Soetanto, Mullins & Achour, 2017). In this context, a higher level of protective behaviour and adequate adaptation to dangers is conditioned by increasing age, i.e. the perception of increased vulnerability to disasters (Koks *et al.*, 2015). Many extreme events show that younger people are more resilient in such situations, i.e. they have a greater predisposition to survive due to better physical fitness, which makes them less likely to be prone to preventive behaviour and measures to become more resilient to extreme events (Ahmad & Afzal, 2020; Scherzer *et al.*, 2019; Soetanto, Mullins & Achour, 2017). The most significant interest in taking protective measures to reduce the risk of disasters is characteristic of those who consider themselves most vulnerable to extreme events. Older people mostly hold such a perception (Soetanto, Mullins & Achour, 2017). The impact of disasters on the elderly population suggests that the resilience of the elderly may be remarkably reduced after disasters due to health problems. Age-related problems, such as attention, memory, cognition, and decision-making disorders, prove significant challenges in the critical stages of risk communication, warning, evacuation, or recovery, when senior citizens may be denied assistance for various reasons (Dzialek *et al.*, 2016). Possible health problems faced by the elderly include limited mobility, cognition, hearing and vision problems, increased vulnerability to infections, and mental well-being (Liddell & Ferreira, 2019). The greater exposure of older people may also be due to financial constraints, lower education, social isolation affecting social support and limited access to information on disasters, health constraints and less motivation to take preventive measures (Dzialek *et al.*, 2016). The findings of previous studies are confirmed by a survey of the impact of floods on the population of Italy, which showed that people over 70 have a disproportionately higher mortality rate than other age groups in the case of floods, with the results interpreted as due to increased concern for their protection during dangerous events (Salvati *et al.*, 2019).

A recent survey of the Flood Resilience Index confirmed that the higher the percentage of children and the elderly in the district, the greater the vulnerability to floods and the lower the strength of the recovery in the community (Chen & Leandro, 2019). The age of the population in a particular area can affect the increased vulnerability to floods in two ways, depending on whether the households are older or younger (Scherzer *et al.*, 2019). Families with small children are characterised by a higher degree of vulnerability during the evacuation. They must allocate additional time and resources to take care of children during the evacuation and care. On the other hand, older people can often have limitations in movement, which can significantly complicate evacuation during floods, further increase efforts and make it more challenging to provide care to others (Ahmad & Afzal, 2020). These difficulties and limitations that characterise older people do not mean that they cannot play an essential role in flood risk management and strengthening the community's resilience. Older people can be important information on flood risk and responses, especially if they have significant life experience in flood-prone areas. A study examining flood mitigation strategies based on age groups showed that households younger than 25 and older than 40 are most vulnerable to floods (Ahmad & Afzal, 2020). The inadequacy of the youth experience and the lack of energy in the elderly population were the main obstacles in adjusting mitigation strategies compared to middle-aged households. Elderly households were characterised by protective measures such as arranging sandbags, building a house with reinforced material and strengthening foundations. In contrast, households with younger members were represented by preparing storage space upstairs and building shelters in front of homes as mitigation measures.

In contrast to the previous research, a study examining the impact of age on risk perception showed a different trend of the effects of ageing on perceived vulnerability, i.e., the feeling of vulnerability was characterised by a

tendency to increase up to 55 years, while respondents older than 55 showed less vulnerability to floods (Adelman & Asiyani, 2015). In this case, the experience proved to be a significant advantage in countering floods. Also, during the mentioned examination of the resistance of rural areas to floods, a positive combination effect of a higher age coefficient on mitigation and adaptation measures were determined. It has been observed that older households prefer elevated ground floors and precautionary savings to households with a younger population. It is essential to point out that the able-bodied population is a crucial category of the population that is more capable of faster evacuation in case of floods than children or the elderly and participation in supporting others during evacuation (Scherzer *et al.*, 2019). Given that the elderly population has a weaker ability to place sandbags to protect their households from rising water quickly, areas, where the majority population is elderly, should be more adequately protected by flood protection infrastructure rather than individual flood mitigation measures. Action before floods Identifying socially vulnerable groups is essential because it can significantly help policymakers develop the most effective mitigation measures in flood-prone areas (Cox *et al.*, 2015).

Socio-economic

Socio-economic status includes various dimensions of social existence, such as wealth or poverty, as well as access to information, knowledge, political representation and power, making it one of the critical indicators of citizens' ability to prepare, respond adequately and recover from disasters (Dzialek *et al.*, 2016). Socio-economic indicators are among the most frequently mentioned indicators in the literature on social resilience (Khoja *et al.*, 2020; Rufat *et al.*, 2015). Social resilience in the context of a disaster is conditioned by the circumstances in which the local community is in the pre-and post-disaster phases and how the community responds to the crisis during the event (Khalili *et al.*, 2015). Therefore, indicators that will represent each phase of a disaster are needed in determining and measuring social resilience. These are most often income, savings and contingencies, employment, car ownership, homeownership and health insurance (Khoja *et al.*, 2020). Employment and income appear to be critical indicators of an individual's and the community's ability to recover from disaster-related damage and losses. In contrast, lower-income individuals are less flexible and adaptable during crises than high-income individuals. Although property ownership increases individual costs resulting from disasters, these costs often do not exceed the total income of wealthier households. Their ability to cope with catastrophe remains relatively high (Rufat *et al.*, 2015).

The size of households and the presence of children in the home are essential family characteristics that affect risk perception. A study conducted in rural China shows that the ability to perceive flood risk decreases with an increasing number of people in the household. In contrast, households with children under 12 show a higher risk perception than those without children at home (Liu, Li, Shen, Xie & Zhang, 2018). The share of dependents is a significant factor that affects the sensitivity of households to the risk of floods, i.e. more dependent children or the elderly in the home increases its sensitivity to the risk of floods, as dependents may require additional care and appropriate food that may not be possible to organise during floods (Shah *et al.*, 2018). In the event of sudden natural disasters such as floods, children are more likely to become victims; as a result of which, families with children should be more motivated to take measures to protect their families. Single-parent households often have limited financial resources that they can set aside for their children's care, negatively affecting flood resilience and recovery (Dzialek, Fiedel, Listwan-Franczak & Franczak, 2016). Households with more than three children show greater preparedness for floods, while families composed only of older ones show significantly lower preparedness for floods (Shah *et al.*, 2018). Children, too, can contribute to strengthening local ties and involving adults in communication and risk education through their schooling, leisure and friendship networks. These reasons indicate the importance of directing special efforts and attention to designing adequate plans and programs for educating children in disaster management to encourage them to contribute to strengthening the social resilience of their local community.

The health and healthy lifestyle of individuals are essential characteristics of community resilience. A health and well-being approach has been applied in many studies to indicate stability (Adelyan & Asiyani, 2016; Rufat *et al.*, 2015; Saja *et al.*, 2018; Qasim *et al.*, 2016). State and local government structures in charge of primary health care are responsible for working with residents in public health education and preventive care to limit exposure to flood-related diseases (Saulnier, Hanson, Mølsted Alvesson & Von Schreeb, 2018). Indicators for measuring equal access to health services are the availability of preventive health measures, physical resources in the health sector, i.e. institutions, human resources in the health sector and access to health services, including primary health care institutions. Access to health facilities is assessed by measures such as the distance to the medical facility and the availability of necessary medicines and beds in hospitals (Saja *et al.*, 2018). Floods hurt physical and mental health, with the most significant impact of floods on health being death by drowning. Approximately one-third of all deaths during flood events occur beyond floodwaters and result from dehydration, stroke, lack of medical supplies, and health problems that are often overlooked before floods (Saulnier *et al.*, 2018). Health problems directly or indirectly related to floods are diarrhoea, acute respiratory infections, skin infections, vector-borne diseases and injuries (Saulnier *et al.*, 2018). Then, malaria, hepatitis, intestinal diseases,

and mental health problems, including depression, stand out as more serious health problems related to floods (Adelyan & Asiyani, 2016). Health problems are also the drivers and consequences of social vulnerability to floods, with unique challenges during and after floods being the evacuation and care of people with low self-help capacity, long-term or chronic patients in need of continuous maintenance, and patients in need of home care (Qasim *et al.*, 2016). The psychological effects of floods are more severe after floods. They have existed for a long time, mainly due to conflicts with insurance companies and homeowners and disruptions to commercial, public, health and municipal services (Rufat *et al.*, 2015). Qasim *et al.* (2016) state that limited mobility, dependence on care and reliance on medications cause particular difficulties during evacuation.

Also, recovery processes are significantly hampered in conditions of disruption of services that are of existential importance for the population with special needs, with a low percentage of people with disabilities proving to be a significant contributing factor to increasing community resilience (Qasim *et al.*, 2016). People with specific needs such as physical or mental disabilities and the elderly, who need special care, often report that no one consults them for disaster management activities (Saja *et al.*, 2018). When it comes to children, parental support is a crucial protective mechanism for improving their resilience, where the search for emotional support is key to building strength in different contexts. Its availability is further strengthened when there are strong community relationships (Graber, Pichon & Carabine, 2015). These relationships, together with social support before, during and after the disaster, create reserves for building the emotional and practical resources necessary for coping that are determined by persistent and ubiquitous stressors that further complicate reactions to physiological stress and psychological response. Public health measures taken are microbiological surveillance of public water supplies and private wells and enhanced surveillance during and after heavy rainfall (Saulnier *et al.*, 2018). It is essential to emphasise the great importance of solving mental health disorders, mostly neglected in populations affected by floods. For affected communities and families displaced by floods, psychosocial services aimed at psychological counselling and care to alleviate possible mental health problems such as depression and despair should be a priority, especially in the post-flood period (Adeljan & Asiyani, 2016).

In addition to providing professional psychological counselling and assistance to flood-prone populations, strong social ties are critical to strengthening mental health and resilience as they significantly prevent post-traumatic stress disorder, anxiety and post-disaster depression (Babcicky & Seebauer, 2017). The availability of projects whose focus is on people with disabilities and their involvement in public events to improve disaster management can help establish equality for people with disabilities (Adelyan & Asiyani, 2016). Prioritising preventive and primary health care and family counselling and support should be encouraged to develop real risk priorities in public. Poor environmental conditions in many communities, characterised by exposed drains and sewers carrying raw sewage and solid waste flowing to roads and houses, are the sources of most flood-related diseases (Adelyan & Asiyani, 2016). An image of the social vulnerability of the area can be an essential tool when conducting campaigns to increase risk awareness and preparedness for floods. In this way, risk information can be adapted to different vulnerable groups, which can be highly effective given that providing flood risk information can significantly contribute to raising risk awareness, especially if this information is adequately tailored to the individual needs of the vulnerable population (Cox *et al.*, 2015).

Education has a highly significant impact on the development of people's perception of environmental hazards, i.e. a notable increase in the level of education of respondents increases the perception of flood risk, and thus the importance of preparedness for such situations, which in turn contributes to increased resilience (Restemeyer *et al.*, 2015). Access to education provides awareness and training necessary for disaster preparedness with measures such as access to adult education and training programs, the level of disparities in secondary education between different social groups, and the ability of schools to continue their role after disasters can be important indicators for assessing access education (Saja, Teo, Goonetilleke, & Ziyath, 2018). Higher levels of education often result in improved living wages, with educated people being shown to understand better and access information on warning and recovery and thus be able to respond better and recover from disorders (Khoja *et al.*, 2020). Examining the impact of education on flood resilience, Shah *et al.* (2018) found that higher levels of education can result in increased property ownership, where flood damage costs are higher for wealthier households in absolute terms. Still, flood damage costs represent a smaller percentage of more affluent households' total income and capital. In contrast, lower education is more likely to coincide with poverty, overpopulation, unemployment, income inequality and marginalisation.

The results of research conducted in Pakistan and the goal of determining the impact of education on the perception of flood risk show that the teaching of respondents has a positive correlation with risk perception, i.e. that higher education contributes to better preparedness and response to flood disasters (Qasim *et al.*, 2015). Although robustness requires a great deal of expertise in technical engineering and planning, adaptability requires expertise in reducing vulnerabilities. At the same time, local knowledge can be essential in identifying appropriate and socially accepted water retention areas. Transformability, in turn, requires creativity to generate new and innovative solutions and openness to new ideas for their actual testing (Restemeyer *et al.*, 2015). Using a risk-focused approach, it was found that a higher level of education of respondents reduces the feeling of vulnerability, i.e., more educated people showed a higher degree of understanding of weather forecasts, thus avoiding hostile

adjustment measures (Adeljan & Asiyani, 2016). A similar pattern was observed in the occupation, with professionals and civil servants showing less vulnerability than traders, artisans, farmers, and the unemployed.

Exciting and vital for building and strengthening community resilience is the concept of lay knowledge, which can be defined as local, informal, traditional or folk knowledge that contains subjective narrative reports and stories created to understand, explain and assign meaning to events in everyday life (McEwen *et al.*, 2017). Traditional knowledge of the environment is understood as cumulative and shared knowledge, practice, and belief passed down through generations through cultural processes of cosmological relationships between living beings and between living beings and their environment (Lazrus, 2015). Guided by this definition and focusing on an extended period as well as a long-standing relationship between the bearers of traditional knowledge about the environment and natural resources, this type of knowledge is an essential tool for researching attitudes about nature and how they manifest through resource management for place and specific cultural practices. Traditional knowledge can be used effectively to educate about hazards and improve responses to warnings. The centuries-old conventional knowledge of tribal groups worldwide has not been widely recognised, preserved and documented but needs to be implemented to formulate effective disaster management strategies (Nakanishi *et al.*, 2018). Local knowledge systems that include moral codes, cosmic explanations, and adaptive characteristics provide insight into social and environmental change (Lazrus, 2017). This type of knowledge is essential in various ecological changes, both in observing the directions and degrees of change that occur at the local level and adapting social responses to disasters that appear suddenly or gradually. The Sendai Framework also emphasises the importance of “traditional, indigenous and local knowledge and practices” used “to complement scientific knowledge in disaster risk assessment” (United Nations Office for Disaster Risk Reduction, 2015, p. 10).

Implementing structured ways of integrating formal, i.e. scientific and traditional knowledge systems organised by centralised authorities would significantly contribute to the development of citizens' resilience to develop sustainable partnerships between stakeholders at different levels within governments and communities (Nakanishi *et al.*, 2018). This would also contribute to determining the respective responsibilities of national, local authorities and the community in the event of natural disasters and their consequences. Focusing on observation and knowledge of changes in the environment means analysing the systems that people develop over time by their views of the world to understand the environment and its role, i.e. structures and processes underlying the idea of the environment (Lazrus, 2017). Among other things, the new and vital part of urban planners is integrating both types of knowledge that would strengthen efforts in the development and planning of civil society to mitigate the consequences of disasters. In addition to educating citizens, essential and fruitful measures in improving preparedness and dealing with floods and confrontation are participation in training courses, adjusting production, changing and adjusting work and evacuation from the affected areas. Training is necessary because they represent another type of education. They can be of particular importance for farmers by providing them with the required skills and knowledge to have the conditions to prepare and protect their agricultural land and livestock from floods (Ha Anh *et al.*, 2018). This type of preparation makes the household more resilient and able to cope with and recover from the negative consequences of floods.

Economic resilience is critical because it increases the financial capacity of individuals and communities in the event of floods, i.e. an economically stable household is characterised by a higher degree of risk preparedness (Qasim *et al.*, 2016). Income and poverty are critical drivers of social vulnerability, primarily because income is closely linked to other forms of capital used as social vulnerability indicators to floods (Rufat *et al.*, 2015). These indicators include access to education, wealth and type of employment, overcrowding, non-household or car ownership, and unemployment. Education is an example of combining income with other forms of capital, where higher levels of education can lead to better-paid jobs and higher incomes (Shah *et al.*, 2018). Higher income means that people can afford to take preventive measures such as repairing houses buying food and water and purchasing better and more resilient equipment. At the same time, low-income families have limited financial capacity to prepare for floods (Ha Anh *et al.*, 2018). Employment is an essential factor that can condition the vulnerability of households to disaster risks. More employed household members are a prerequisite that the family will have more significant opportunities to invest in the necessary flood adaptation measures (Shah *et al.*, 2018). Households with multiple sources of income show more excellent resistance to floods since they have a more remarkable ability to afford solid construction material, which increases households' adaptive capacity, i.e. strengthening resilience and reducing vulnerability to flooding consequences (Moghdas *et al.*, 2019).

Poor and marginalised populations live in highly exposed areas with fewer employment opportunities. They are also less protected by formal institutions, such as those that provide disaster mitigation and recovery assistance (Rufat *et al.*, 2015). In addition to the poor and marginalised facing lower costs of economic damage, the relative impact of adverse flood events is generally higher for low-income groups, as preparedness and mitigation activities, as well as evacuation capacity, require access to often missing economic and social resources (Shah *et al.*, 2018). Research conducted in Malawi shows that poor people are more likely to be exposed to floods than non-poor, emphasising that the quality of the property is essential to reduce the excessive vulnerability of the poor compared to the rest of the population (Qasim *et al.*, 2016). As a solution, they propose the implementation of

construction norms and the construction of high-quality buildings for poor people. It is essential to protect them with instruments of social protection. In Hungary and Georgia, increasing bias towards property vulnerabilities has slightly increased resilience. What characterises these countries is relatively low inequalities and a very high level of protection provided by the social protection system to the poor (Hallegatte *et al.*, 2016). Interviews conducted as part of a survey of citizens' resilience to floods in Bangladesh reveal that middle-income families have suffered the most from the disaster caused by the floods in the region (Kamal *et al.*, 2018). The main reason why middle-income families have proven to be the most vulnerable is their unwillingness to accept help and resources, unlike poor, marginalised people who did not hesitate to work as wage earners or get help from the government and NGOs. Most middle- and low-income families preferred to take loans from local businesses or microfinance institutions. Higher-income households were more inclined to protect their households. On the other hand, lower-income households were not equipped with adequate security measures, which led to more significant damage to homes and loss of property. The Tehran Flood Resilience Survey indicates that areas with a high level of equality in education, a high percentage of the independent population, access to public recreational facilities, high employment rates, commercial facilities and infrastructure, and access to emergency services and medical care are characterised by high levels of flood resistance (Moghdas *et al.*, 2019).

Research conducted to examine resilient factors across Asia has shown that about 60% of people in rural communities experience income loss after floods. More than 75% of urban communities do not lose income after severe floods (Laurien *et al.*, 2019). Spatial grouping of different socially vulnerable groups can help mitigate and adopt measures tailored to the specific needs within the affected neighbourhood (Cox *et al.*, 2015). In addition to the fact that there is a higher frequency of floods in rural communities in the sample, it is assumed that this finding is conditioned by the nature of existence in rural communities that depend on location and lack of different living resources. In rural communities, households depend on the agricultural sector, i.e. their agricultural land, usually located near the community (Laurien *et al.*, 2019). These circumstances indicate a high probability that if the community is affected by the flood, the sources of their livelihood will also be affected. In contrast, when it comes to urban environments, people are more likely to stay away from the necessary sources of livelihood. If floods hit their livelihoods, they have far more opportunities for alternatives (Laurien *et al.*, 2019). A household's ability to face and respond to a disaster largely determines the household's socio-economic status before the disaster. Thus, for example, a neighbourhood consisting mainly of an affluent population can be stimulated to implement measures for individual households, such as protecting the house from floods. At the same time, more considerable government assistance can be directed to poor neighbourhoods (Koks *et al.*, 2015). Low-income households may be able to provide other resources for flood risk management activities, such as volunteering time needed to provide evacuation assistance or emergency preparations, such as establishing temporary flood protection.

The housing characteristics of flooded areas significantly affect the flood experience, readiness and well-being of citizens. Examination of social vulnerability in flood conditions to develop flood risk management strategies found that most settlements characterised by high social exposure have a large share of tenants compared to the percentage of private homeowners (Koks *et al.*, 2015). The study showed that homeowners apply significantly more preparatory measures than tenants and tend to be better covered by insurance than tenants. In contrast, tenants have little incentive to invest in initial efforts as most benefits will go to the property owner. And partly because I can expect relocation. Owners are also less likely to invest in properties where they do not live alone. In areas where livestock is an essential factor in ensuring food security in the household, any loss of livestock can have severe consequences for the daily caloric intake of household members, which further increases its sensitivity to flooding hazards (Shah *et al.*, 2018). As part of a survey conducted in England to determine citizens' preparedness to protect property from floods, more than half of respondents who own property in England said they would consider supplementary insurance schemes to cover their potential flood losses (Lo & Chan, 2017). Approximately the same percentage reported a reduction in the share of vulnerable assets such as housing in the floodplain and cars to avoid flood damage. Also, over half of the respondents would move their valuables to a safe place outside the city if they could and if they knew that huge flood water was coming to their local area. Slightly less than half of the respondents would consider relocating if flood risks increase and seek funding for reconstruction if the property was severely affected. About one-third would adjust their homes to reduce flood vulnerability, and about a quarter was willing to seek alternative sources of income to mitigate the potential impact of unexpected events on livelihoods. This research indicates that individuals are more likely to adopt resilient strategies if faced with higher social expectations and if they are more closely connected to the community. Homeowners, especially those not required to insure against floods, must trust the local government to deal with climate risks and understand the importance of purchasing flood insurance (Atreya, Ferreira & Michel-Kerjan, 2015). For this reason, local governments must inform residents about their real flood risks (Shao *et al.*, 2017).

The interest in flood insurance stems from the need to find an effective way to compensate those who have suffered losses and manage the financial risk of possible losses (Surminski & Eldridge, 2017). Hudson *et al.* (Hudson, Botzen & Aerts, 2019) explain that insurance, in its most basic form, is a mechanism where risks or part of the risk are transferred from one side of the insured to the other side insurer in exchange for payment. Reducing uncertainty is one of the most important mechanisms that drive economic systems. Without insurance, many

activities and processes would be considered too risky and would not be undertaken. Those affected by the loss would not be able to recover. Households decide to buy insurance, except in situations where they are obliged to purchase insurance, only if the subjective expected profitability of insurance is higher than the anticipated profitability of non-insurance and if the premium is affordable (Hudson, Botzen & Aerts, 2019). Also, in addition to this primary function, insurance can encourage risk reduction, promote adaptation activities and address the primary physical risks that determine the impact of floods. This could potentially link both aspects through the private sector, with insurance as a market mechanism, relieving the burden on public budgets (Surminski & Eldridge, 2017).

Using mitigation measures as a prerequisite for a household to receive a discount on a flood insurance premium can encourage a household to take mitigation measures if it did not do so initially. The stronger the risk-based premiums, the stronger this incentive will be. If in some market structures and areas, the flood insurance premium is too low, and thus the discount on the premium for undertaking risk mitigation measures, this may have undesirable consequences on the incentive to change the behaviour of policyholders (Hudson, Botzen & Aerts, 2019). This situation can occur in areas with a low risk of floods, and taking measures to mitigate the risk of floods is not cost-effective. The indirect interdependence between household risk mitigation measures and government flood protection standards is also essential. The government significantly impacts flood insurance premiums and the assumed value of avoided flood damage through flood protection measures. For example, flood risk is low in areas where high standards of flood protection are applied, resulting in lower premiums and lower interest in reducing household risk in terms of avoided flood damage or premium discounts compared to areas with low protection standards. from floods (Hudson, Botzen & Aerts, 2019). Insurance is considered inaccessible when the premium is higher than the disposable household income above the poverty line (Hudson, Botzen, Feyen & Aerts, 2016). However, risk-based premiums mean that high premiums can occur in high-risk areas when risk-based premiums are in place. Residents do not take risk mitigation measures, which means that these premiums cannot be affordable or economically acceptable. A similar budget constraint is characterised by the application of risk mitigation measures, where this measure is taken only if it is available at the time of purchase given any insurance costs because although a measure may be helpful in the long run, the household is unlikely to apply such a measure when it is currently unavailable (Hudson *et al.*, 2019). A survey to determine individual flood insurance purchase decisions confirmed that homeownership influences voluntary behaviour when buying flood insurance. Residents are more likely to purchase flood insurance than those who rent houses (Shao *et al.*, 2017).

The study also confirmed that the distance from the coast hurts the voluntary decision of individuals to buy flood insurance. People living relatively far from the beach usually feel less sensitive to the effects of floods, which is why they choose not to purchase flood insurance. The results of a survey conducted in Georgia to determine the factors influencing the decision to buy flood insurance confirmed that those who lack confidence in the responsibility of local authorities rarely voluntarily purchase flood insurance, which indicates the importance of building trust between citizens and leaders (Atreya, Ferreira & Michel-Kerjan, 2015). Local policymakers need to find ways to gain citizens' trust to actively encourage them to seek flood protection measures. Higher levels of education have also been shown to be a significant factor in making people more likely to buy flood insurance. The research results are also important, indicating that among all variables related to environmental perception, beliefs in increasing the frequency of floods and the strength of hurricanes have the most stimulating effect on voluntary decisions to purchase flood insurance (Shao *et al.*, 2017). People who are aware that the amount of flooding has increased and that hurricanes have become stronger are more likely to voluntarily buy flood insurance than those not aware of it (Atreya *et al.*, 2015). The link between the perception of increased flooding and the voluntary purchase of flood insurance is immediate. Since hurricane strength is linked to floods due to storm surges, awareness of increased hurricane strength leads to a higher probability of voluntary purchase of flood insurance. Also, empirical findings suggest that flood damage that has occurred in previous years has a positive effect on the commitment to invest in flood insurance (Atreya *et al.*, 2015). An examination of the factors contributing to the decision to purchase flood protection insurance in Florida and Texas confirmed that residents who voluntarily purchased flood insurance, on average, have a significantly higher estimated value of the property they own (Brody, Highfield, Wilson, Lindell & Blessing, 2017). Although the greater distance from the coast does not necessarily mean less risk of flooding, which may keep residents in the lurch. In other words, a greater distance from the beach can create an apparent sense of security. Trust in the local government is another positive factor motivating residents to voluntarily invest in flood insurance (Shao *et al.*, 2017).

3. Methods

The subject of the research includes the examination of influencing factors that determine and improve social resistance to the consequences of disasters caused by floods. The increased frequency and intensity of floods, as well as the increasing exposure of citizens and their property to the consequences of floods, require a more complex approach that involves the involvement of citizens in strengthening preparedness and response to floods,

as a result of which the examination of the aforementioned influencing factors is of key importance for the future development of strategies and measures to reduce flood risk. The goal of the conducted research, which arises from the stated subject of research, is a scientific description of the influencing factors that determine social resistance to the consequences of disasters caused by floods, identified within the analysis of the content of the literature devoted to examining social resistance to floods. The explicative goal of the research refers to the identification and understanding of social resilience to floods by the identified influencing factors. Based on the analysis of the content of the collected international literature for research purposes, an online survey questionnaire was formulated following the subject and objectives of the research to determine the conditions and ways of improving social resistance to the consequences of disasters caused by floods.

3.1. Instrument

The questions were designed in three units with clearly indicated research expectations and types of answers that were mainly based on the choice of answers on a Likert scale to determine the degree of agreement with the given statements on a scale from 1 - absolute disagreement to 5 - absolute agreement. The first group of questions consists of general questions related to the demographic and socio-economic characteristics of the respondents. The second group of questions consists of questions examining the degree of agreement of respondents with given statements related to the perception of risk, social cohesion, trust in public institutions and the involvement of citizens in the preparation of planning documents and communication about risk. The third group of questions refers to the examination of the possibility of improving social resilience to floods.

3.2. Sample

The sample included a total of 261 respondents in the area of Belgrade, of which the majority were under the age of 25 (43.3%). Also, the sample included 50 respondents (19.2%) aged 26 to 35 years, 34 respondents (13%) aged 36 to 45 years, 45 respondents (17.2%) aged 46 to 55 years and 19 respondents (7.3%) aged over 55 years. Following the proportional representation of the sexes in the Republic of Serbia, the sample consisted to the greatest extent of members of the female population (70.9%), while male respondents were represented by a total of 29.1% in the research sample. Regarding the level of education obtained, it was determined that the largest number of respondents (38.3%) had secondary education, while the smallest number of respondents had completed doctoral academic studies (1.1%) and elementary school (1.5%). In addition, 29 respondents (11.1%) reported having completed higher education, 85 respondents (32.6%) had basic academic studies, and 40 respondents (15.3%) indicated master's academic studies. The answers to the question about the respondents' current marital status indicate that 81 respondents (31%) are not in a relationship, 61 respondents (23.4%) are in a relationship, 11 respondents (4.2%) are engaged, 88 respondents (33.7%) is married, 12 respondents (4.6%) are divorced, while 8 respondents (3.1%) belong to the widow/widow category. More than half of the respondents included in the sample (55.6%) answered the question about their current employment status that they were employed, while 116 respondents (44.4%) were unemployed. Examining the amount of average monthly income that respondents earn shows that 78 respondents (29.9%) earn incomes up to 25,000 dinars, 74 respondents (28.4%) up to 50,000 dinars, 75 respondents (28.7%) up to 80,000 dinars, while the incomes of 34 respondents (13%) reach over 100,000 dinars monthly. When asked whether they are the owners of the house/apartment they live in, 88 respondents (33.7%) answered yes, while 173 respondents (66.3%) answered negatively.

3.3. Analysis of data

After the completion of the electronic survey, the results of the surveys were entered into a database, reviewed and analyzed to identify and eliminate potential errors. This was followed by the use of descriptive statistical analysis to further analyze the data. Furthermore, the relationships between the selected independent and dependent variables that are the subject of our research were examined using the Chi-square test, T-test and ANOVA.

4. Results

On a Likert scale from 1 to 5 (1 - I am absolutely not familiar; 5 - I am absolutely familiar) respondents rated their views on the degree of familiarity with the flood phenomenon. According to the findings, 5 respondents (1.9%) were absolutely not familiar with the phenomenon of flooding, 14 respondents (5.4%) were significantly

unfamiliar, 37 respondents (14.2%) were moderately familiar, 60 respondents (23%) are familiar to a significant extent, while 145 respondents (55.6%) believe that they are absolutely familiar with the phenomenon of floods.

The transfer of experiences and knowledge about floods at the level of the local community, family, friends and colleagues plays a significant role in the overall level of awareness, knowledge and preparedness at all levels of society's functioning. Consequently, the respondents were asked whether family members, friends and colleagues passed on experiences and knowledge about floods to them, to which they answered with grades from 1 to 5 on a Likert scale (1 - they absolutely did not pass on experiences and knowledge to me; 5 - to an absolute extent, they transferred experiences and knowledge to me). On that occasion, 16 respondents (6.1%) pointed out that their knowledge and experiences about floods were absolutely not passed on to them by family members, friends and colleagues, and 37 respondents (14.2%) said that they were not passed on to a significant extent, 53 respondents (20.3%) that they were transmitted to them to an average extent, 56 respondents (21.5%) that they were transmitted to them to a significant extent, while the largest number of respondents (37.5%) believe that their friends, family and colleagues absolutely transferred experiences and knowledge about floods.

To the question, "Is the risk of flooding a significant cause of fear for the residents of your local community?", respondents answered by expressing their views on a Likert scale from 1 to 5 (1 - absolutely not a significant cause; 5 - absolutely a significant cause), when the following was determined: 42 respondents (16.1%) believe that the risk of floods is absolutely not a significant cause of fear, 60 respondents (23%) believe that the risk of floods is not a significant cause of fear, 71 respondents (27, 2%) that the risk is a moderate cause of fear, 37 respondents (14.2%) that the risk is a significant cause of fear, while 51 respondents (19.5%) point out that the risk of flooding is an absolutely significant cause of fear among the residents of their local community.

When it comes to the degree of vulnerability of households to the risk of flooding, the findings indicate that 91 respondents (34.9%) believe that their household is absolutely not threatened by flood risks and 84 respondents (32.2%) that it is not threatened to a significant extent. On the other hand, 60 respondents (23%) point out that their household is moderately threatened, 15 respondents (5.7%) that it is significantly threatened, while 11 respondents (4.2%) point out that their household is threatened by the risk of floods evaluates with the highest score on the scale, i.e. absolute endangerment. Bearing in mind that the success of all other stages of flood risk management largely depends on the implementation of preventive measures, respondents were asked to rate to what extent on a Likert scale from 1 to 5 (1 - they do not undertake to an absolute extent; 5 - they undertake to an absolute extent) residents of their local community take preventive flood protection measures, including training and seminars on dealing with floods, flood insurance, having personal protective equipment, tools, supplies of food, water, medicine, etc. According to the findings, the largest number of respondents believe that residents of the local community absolutely (38.3%) and to a significant extent (32.6%) do not take preventive measures against floods. Also, 48 respondents (18.4%) believe that residents take protective measures to an average extent, 20 respondents (7.7%) believe that they take protective measures to a significant extent, while only 8 respondents (3.1%) estimate that the taking of preventive flood protection measures by the residents of the local community is carried out to an absolute extent.

Although the Law on Disaster Risk Reduction and Emergency Management and other relevant laws and by-laws regulate a wide range of rights and obligations of residents in the event of emergencies caused by various natural hazards, including floods, researching public awareness about them is of great importance for achieving adequate and effective response, as well as recovery after a disaster. Based on that, the respondents were asked to what extent the residents of their local community are aware of their rights and obligations in the mentioned circumstances. According to the results, the largest number of respondents believe that knowledge of rights and duties in emergencies caused by floods is absolutely (30.3%) or significantly (34.9%) non-existent. On the other hand, 59 respondents (22.6%) believe that residents are moderately familiar with their rights and obligations, 25 respondents (9.6%) believe that they are significantly familiar, while 7 respondents (2.7%) point out that the residents of their local community are fully aware of their rights and obligations in case of emergencies caused by floods.

Examining the views of the respondents on the degree to which the residents of their local community are ready to leave their homes and evacuate to the facilities designated by the competent headquarters for emergencies for the reception of the population in case of emergencies caused by floods produced the following results: 43 respondents (16.5%) believes that the population is absolutely not ready, 54 respondents (20.7%) that they are not ready to a significant extent, 84 respondents (32.2%) that the population's readiness is at a medium level, 47 respondents (18%) that the readiness is on a higher level, while 33 respondents (12.6%) expressed their opinion and assessment about the absolute readiness of the residents of their local community to leave their homes and evacuate to reception facilities in case of disasters caused by floods.

As the participation of informal actors in protection and rescue is often a valuable resource in the system of disaster risk reduction and management in emergencies, the willingness of the residents of the local community to participate in the activities of protection and rescue of the vulnerable population was examined, which the respondents rated on a Likert scale from 1 to 5 (1 – to an absolute extent they would not be ready to participate; 5 – to an absolute extent they would be ready to participate). On that occasion, it was determined that 14 respondents (5.4%) believed that residents would not be absolutely ready to undertake the mentioned activities, 17 respondents (6.5%) that they would not be ready to a significant extent and 78 respondents (29.9%) to show a willingness to participate in a medium measure. On the contrary, a significant number of respondents pointed out that the residents of their local community would be significantly (36%) and absolutely (22.2%) ready to participate in the activities of protection and rescue of the vulnerable population in case of emergencies caused by floods.

There is a legal obligation for the owners and users of facilities and premises in public use, as well as private facilities suitable for accommodation, regarding the temporary accommodation of citizens by order of the competent headquarters. In addition, the law stipulates that if it is not possible to take care of the vulnerable in the previously mentioned way, the care is carried out in tent settlements. Based on that, the respondents were asked to rate the readiness of the residents of their local community to provide shelter and help to the vulnerable in case of emergencies caused by floods. Respondents mostly pointed out that the residents of their local community are moderately (33.3%) and significantly (32.6%) ready to provide shelter and help to the vulnerable. In addition, 8 respondents (3.1%) believe that residents are absolutely not ready to provide assistance and shelter, 33 respondents (12.6%) believe that they are significantly unprepared, while 48 respondents (18.4%) share an attitude about the absolute readiness of the inhabitants to provide shelter and help to the vulnerable in case of emergency situations caused by floods.

When asked to what extent trust in neighbours and strong social ties can contribute to the strengthening of social capital, and thus the social resistance of the local community to floods, 5 respondents (1.9%) answered that they absolutely cannot contribute, 7 respondents (2.7%) that they cannot contribute to a significant extent, 46 respondents (17.6%) that they can contribute to a medium extent, 72 respondents (27.6%) that they can contribute to a significant extent, while the largest number, i.e. more than half of the respondents (50.2%) pointed out that trust in neighbours and strong social ties can absolutely contribute to the strengthening of social capital, and thus the social resistance of their local community to floods. The trust of the residents of the local community in the services responsible for dealing with emergency situations (emergency headquarters, police, fire and rescue unit, civil protection unit, emergency medical aid service, Red Cross) was assessed by the respondents as follows: the largest number of respondents believe that residents moderately (35.2%) and to a significant extent (25.3%) have confidence in competent services; then, 16 respondents (6.1%) believe that there is absolutely no trust, 53 respondents (20.3%) that there is no trust to a significant extent, while, in contrast, 34 respondents (13%) answered that into an absolute extent there is trust in the competent emergency response services among the residents of their local community.

This was followed by an assessment of the capacities and means possessed by the competent local administration services for dealing with emergency situations caused by floods. According to the results, 41 respondents (15.7%) believe that the capacities and means of the competent services are absolutely insufficient, 72 respondents (27.6%) that they are significantly insufficient, 95 respondents (36.4%) that they are moderately sufficient, 39 respondents (14.9%) that they are sufficient to a significant extent, while 14 respondents (5.4%) assessed the absolute sufficiency of the current capacities and means of the competent services of their local administration for dealing with emergency situations caused by floods. Despite the established duties of competent authorities and services for dealing with emergencies in terms of regular and timely notification and informing residents about flood risks, measures taken and possible consequences, 56 respondents (21.5%) believe that informing residents of their local community about the risk from floods through the media is absolutely not carried out regularly and promptly, 65 respondents (24.9%) believe that it is not carried out regularly and on time to a significant extent, while 66 respondents (25.3%) believe that it is carried out regularly and to a medium extent and timely. On the contrary, 46 respondents (17.6%) point out that the competent authorities and services provide regular and timely information through the media to a significant extent, while 28 respondents (10.7%) believe that the competent authorities absolutely provide regular and timely information to the residents their local communities about flood risks through the media.

Bearing in mind that risk communication, as an important element of the disaster risk management process, increasingly includes a two-way approach to communication instead of the former ruling paradigm "from top to bottom", i.e. a one-way process of communication from the authorities to citizens, the respondents were asked to rate the degree of involvement of the residents of their local communities in flood risk communication and

development of flood risk reduction strategies. On that occasion, the largest number of respondents pointed out that residents were absolutely (28.7%) and to a significant extent (28.7%) not involved in risk communication and development of flood risk reduction strategies. On the other hand, 64 respondents (24.5%) believe that residents are moderately involved in risk communication and strategy development, 32 respondents (12.3%) believe that they are significantly involved, while 15 respondents (5.7%) expressed their opinion on the absolute involvement of the inhabitants of their local community in the aforementioned flood risk reduction activities.

The introduction of mandatory education and training of citizens to deal with emergencies caused by floods has long been the subject of domestic and foreign literature, as well as relevant laws and strategies in the field of emergency management. However, in practice there is no consistent and timely application of the regulations, so the aforementioned goal has not yet been realized. Therefore, the respondents were asked to assess to what extent the introduction of mandatory education and training of citizens to deal with emergencies caused by floods would contribute to strengthening the social resilience of their local community. According to the findings, the largest number of respondents (51%) believe that the introduction of mandatory education and training would absolutely contribute to strengthening social resilience, while the smallest number of respondents (1.5%) believe that it would absolutely not contribute. In addition, 12 respondents (4.6%) stated that they would not contribute to a significant extent, 41 respondents (15.7%) that they would contribute to a moderate extent, while 71 respondents (27.2%) point out that the introduction of compulsory education would and training of citizens to deal with emergencies caused by floods significantly contributed to the strengthening of the social resilience of their local community. Concerning the stated statement, "The participation of residents in protection and rescue activities in case of emergencies caused by floods would significantly contribute to strengthening the social resistance of your local community to floods", respondents rated their views on a Likert scale from 1 to 5 (1 - in absolute measure would not significantly contribute; 5 - in absolute measure would significantly contribute), where more than half of respondents (55.9%) gave the highest rating on the scale, thereby expressing the opinion that the participation of residents in absolute measure would significantly contribute to strengthening social resilience. In addition, 4 respondents (1.5%) believe that participation in absolute terms would not significantly contribute to strengthening social resilience, 7 respondents (2.7%) that it would not significantly contribute, 37 respondents (14.2%) that would moderately contribute, while 67 respondents (25.7%) state that the participation of residents in protection and rescue activities in case of emergencies caused by floods would significantly contribute to strengthening the social resilience of their local community to floods.

The claim was then made that the involvement of citizens in flood risk monitoring would significantly contribute to strengthening the social resilience of the local community to floods, and respondents were asked to rate their attitudes about it. On that occasion, 3 respondents (1.1%) pointed out that the inclusion of citizens in the mentioned activities would absolutely not contribute to strengthening social resilience, 14 respondents (5.4%) that it would not significantly contribute, and 38 respondents (14.6%) that it would contribute to a medium extent, 63 respondents (24.1%) that it would contribute to a significant extent, while 143 respondents (54.8%) share the opinion that the involvement of citizens in flood risk monitoring would significantly contribute to an absolute extent strengthening the social resilience of their local community to floods.

To the question to what extent the involvement of residents in the implementation of reconstruction measures and activities and assistance after floods would significantly contribute to strengthening the social resilience of their local community, the respondents answered as follows: 4 respondents (1.5%) believe that the involvement of residents absolutely does not would significantly contribute to strengthening social resilience, 8 respondents (3.1%) believe that it would not significantly contribute to a greater extent, 33 respondents (12.6%) believe that it would contribute to a medium extent, 58 respondents (22.2%) believe to a significant extent, while the largest number, i.e. 158 respondents (60.5%) share the belief that the involvement of residents in the implementation of measures and activities of reconstruction and assistance after the floods would significantly contribute to the strengthening of the social resilience of their local community. The results of examining respondents' views on the claim that citizens' participation in debates and the development of disaster risk reduction strategies would significantly contribute to strengthening the social resilience of their local community indicate that more than half, i.e. 139 (53.3%), of the respondents believe that the implementation of the mentioned activities would in absolute terms significantly contributed to the strengthening of social resilience. In contrast, the smallest number of respondents (2.3%) believe that it would not contribute significantly in absolute terms. In addition, it was determined that 15 respondents (5.7%) believed that the participation of citizens would not significantly contribute to the strengthening of social resilience, 37 respondents (14.2%) believed that it would contribute to a medium extent, while 64 respondents (24.5%) pointed out that the participation of citizens in debates and the development of strategies for disaster risk reduction would significantly contribute to strengthening the social resilience of their local community.

Regarding the assessment of attitudes about the degree of contribution of the initiation of initiatives and the inclusion of citizens in the work and activities of local groups of citizens, humanitarian organizations and volunteer organizations for assisting in emergencies to the development of knowledge, experiences and the exchange of information relevant to reducing the risk of floods, it was determined that the respondents to the greatest extent (65.5%) believe that the mentioned activities would in absolute terms significantly contribute to the development of knowledge, experiences and the exchange of information significant for reducing the risk of floods. Also, 3 respondents (1.1%) pointed out that in absolute terms it would not significantly contribute, 9 respondents (3.4%) that it would not significantly contribute to a greater extent, 30 respondents (11.5%) that in the middle significantly contributed to the measure, while 48 respondents (18.4%) believe that the initiation of initiatives and the involvement of citizens in the work and activities of local groups of citizens, humanitarian organizations and volunteer organizations to assist in emergencies would significantly contribute to the development of knowledge, experiences and exchange of information relevant to flood risk reduction. After descriptive statistical analyses, we proceeded to examine the mean values between gender and social resilience to the consequences of flood disasters. Judging by the obtained results, no statistically significant relationship was established between gender and social resistance to the consequences of flood disasters (Table 1).

Table 1. Results of the T-test between gender and social resilience to the consequences of flood-induced disasters.

	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Social resilience	-0.95	259	.340	-.079	.082	-.242	.083

After the T-test, we examined the correlation between the age of the respondents and social resistance to the consequences of floods. About the results, we determined that there is a statistically significant correlation $p = 0.000$. The results show that there is a positive correlation that indicates that with the increase in the age of the respondents, the assessment of the level of resistance to the consequences of floods also increases (Table 2).

Table 2. Results of the correlation analysis of age and social resistance to the consequences of floods.

		Age
Social resilience to the consequences of floods	Pearson Correlation	0.221**
	Sig. (2-tailed)	0.000
	N	260

In addition to the correlation analyses, the results of the One-factor Analysis of Variance show that there is no statistically significant relationship between the respondents' education and social resilience to flooding disasters. Unambiguously, the results indicate that there is no statistically significant difference between respondents with completed primary, secondary, higher school, college and master's academic studies.

5. Discussion

Starting from the analysis of the content and collected scientific research, this paper examines the demographic, socio-economic, psychological and political-cultural impact factors to identify key impact factors that determine social resilience to floods. An online survey questionnaire was selected as the instrument used to collect the necessary data for the research needs. Examining the correlation between the age of the respondents and social resistance to the consequences of floods, it was found that there is a statistically significant correlation which indicates that with the increase in the age of the respondents, the assessment of the level of resistance to floods increases. These results coincide with the results of research in which a positive combinational effect of a higher age coefficient on mitigation and adaptation measures were found (Adelcan & Asiyani, 2015).

The influence of an important factor can also explain these results: the experience of the elderly population, which in this context has an essential advantage in strengthening flood resistance. Examination of the mean values between gender and social resilience to the consequences of flood-induced disasters did not establish a statistically significant relationship between gender and the observed dependent variable. The results of a one-factor analysis of variance show that there is no statistically significant association between respondents' education and social resilience to flooding disasters. Unequivocally, the results indicate that there is no statistically significant

difference between respondents with completed primary, secondary, higher education, college and master's academic studies. Contrary to these findings, numerous studies have shown that a higher level of education among respondents increases the perception of flood risk, contributing to increased social resilience (Restemeyer *et al.*, 2015; Saja *et al.*, 2018; Qasim *et al.*, 2015). Also, the results of the research indicate that monthly income, employment and ownership of an apartment/house do not have a significant impact on the level of resilience of the local community, which is contrary to research confirming that economically stable households with multiple sources of income and ownership of housing take preventive and adaptive flood protection measures, and thus show more excellent resistance to floods (Moghdas *et al.*, 2019; Shah *et al.*, 2018; Rufat *et al.*, 2015). Such research results can be explained by the lack of adequate formal and informal education programs, the implementation of mandatory on-the-job training and risk assessments that would encourage citizens to develop an awareness of the importance of strengthening flood resistance.

This conclusion is confirmed by the results of surveys that show that the most significant number of respondents believe that the local community residents, in absolute terms (38.3%), do not take preventive measures to protect against floods. Furthermore, the analysis of the obtained data showed that there is a mutual condition of lack of experience with floods and social resilience of the local community, given that the most significant percentage (87.9%) had no experience with floods, with the most significant percentage of respondents in absolute terms, 38.3% do not take preventive flood protection measures. These results are consistent with numerous studies showing that experience is critical in building and strengthening social resilience (Seebauer & Babicky, 2020; Soentato *et al.*, 2017; Thistlethwaite, Henstra, Brown & Scott, 2018). Examining the impact of social ties and trust in fellow citizens on strengthening social resilience to floods, it was found that more than half of respondents (50.2%) believe that trust in neighbours and strong social ties can contribute to strengthening social capital, and thus social the resilience of their local community to floods. The same results have been confirmed in numerous studies on the impact of social capital on strengthening social resilience to floods (Babicky & Seebauer, 2017; Lo & Chan, 2017).

The results of the survey of the trust of local community residents in the services responsible for dealing with emergencies show that the most significant number of respondents believe that residents in secondary (35.2%) and to a significant extent (25.3%) trust the competent services, with a substantial number The examiner stated that he was significantly and ready to participate in the activities of protection and rescue of the population endangered by the flood. These results are compatible with a survey conducted in China, which confirms that the trust of residents in public institutions determines their willingness to participate in disaster management (Peng, Tan, Lin & Xu, 2019). More than half of the respondents (55.9%) gave the highest score on the scale, expressing the view that the participation of residents in flood protection and rescue activities in absolute terms would significantly contribute to strengthening social resilience, as confirmed by numerous studies. Studied the impact of co-production on strengthening social resilience to floods (Lo & Chan, 2017; O'Grady *et al.*, 2019). Also, 60.5% of respondents believe that the engagement of residents in the implementation of measures and activities of reconstruction and assistance after the floods in absolute terms would significantly contribute to strengthening the social resilience of their local community.

These results are confirmed by Mes *et al.* (2016a), that co-production as a public service represents the avoidance and reduction of flood damage at the societal level through private and public measures. Examining the importance of citizen participation in public debates and developing strategies to reduce the risk of disasters showed that more than half, or 53.3%, of respondents, believe that implementing these activities would significantly strengthen social resilience to floods. Accordingly, research examining the impact of citizen participation in risk communication has confirmed that effective co-production is conditioned by open communication channels with authorities and all stakeholders in flood risk management. This can best disseminate knowledge across the community (De Boer *et al.*, 2015; Morris, McNamara & Belcher, 2019).

6. Conclusion

The characteristics of floods affecting states and local communities worldwide require the joint efforts of both the competent state authorities and local communities in dealing with and responding to flood risk. It is necessary to develop civic awareness, knowledge, skills and resources that will create the preconditions for building social resilience, one of the critical aspects of disaster risk management facing modern society. Local communities resistant to the consequences of flood disasters need to cooperate with emergency services, local authorities and other relevant organisations before, during and after emergencies. Resilient communities participate in decision-making related to emergency management, show interest in their environment, and act proactively to strengthen community resilience to flood disasters (Ntontis, Drury, Amlôt, Rubin & Williams, 2019). Statistical analysis of

the survey of social resistance to floods within the local communities of the Republic of Serbia showed that age, experience, education, social ties, and trust in public institutions are key influencing factors that determine the level of social resilience to floods. The results indicate that it is necessary to introduce programs and training for dealing with emergencies caused by gender, both within all levels of education and among employees in all sectors.

The goal of introducing the mentioned programs and training is to raise awareness about the risk and thus the resilience of local communities to the consequences of floods. According to McClymont *et al.* (2020), the so-called social resilience education is a crucial aspect of flood risk reduction in a flood risk environment that identifies the knowledge, skills, values and preparedness needed to manage flood risk and improve social resilience to floods effectively. Respondents also confirmed that strengthening social resilience requires strengthening social networking, trust and solidarity among members of the local community. These aspects of social resilience can be encouraged through various initiatives and associations of citizens whose activities would assist in emergencies, significantly contributing to the development of knowledge, experience and exchange of information necessary for reducing flood risks. Accumulation of social capital through community participation through reliable networks can provide the required external factors that will influence individual decision-making, increasing the motivation of residents to prepare for the adverse effects of climate change (Lo & Chan, 2017).

The survey of respondents found that their participation in monitoring and communication on risk can significantly strengthen citizens' trust in decision-makers and services responsible for dealing with emergencies. Communication networks in the form of public debates, media, personal interactions with other people, and the very types of social ties enable the creation of social capital through which awareness and knowledge necessary to develop an appropriate level of risk perception can be formed (Lechowska, 2018). The research results indicate that the subject of research is an inexhaustible source of foundation for future research aimed at examining the factors that determine social resilience to the consequences of floods. The obtained results can significantly help local authorities, citizens' associations, and stakeholders in formulating strategies, plans, and initiatives that will improve social resilience to the consequences of floods and create preconditions for building a safe and sustainable environment. An obvious limitation of the research is the insufficient number of respondents in the broader area of the Republic of Serbia, which would provide a complete picture of the current level of social resilience to the consequences of floods and the interdependence of the examined factors.

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