

EVACUATION OF VULNERABLE GUIDELINES

Emergency evacuation of the population can't be viewed only in specific terms of the planned zone for evacuation but also due to the fact that among people who need to be evacuated are members of vulnerable groups that require additional care and different approach why it is necessary: to define vulnerable groups and their specific needs during an evacuation, collect as accurate data on the size and spatial distribution of vulnerable groups and their needs especially in urban areas and identify any obstacles to the successful evacuation of such persons with consideration in area limitations. Locating vulnerable groups after the evacuation order is not practical and slows down the procedure which can lead to further endangerment to the citizens and operational forces. The aim of this paper is to detect the needs and ways of collecting the necessary data for successfully locating and implementing timely evacuation of population's vulnerable groups in urban areas.

When it comes to the spatial distribution of the population, evacuation [\[1\]](#) vulnerable groups more difficult to implement in urban centers because of the concentration, ie the number of people who need to evacuate and because of ignorance of the real situation on the ground due to mutual alienation of the population that is more widespread in urban areas (eg. A lack of knowledge about the number of the elderly and disabled persons as well as persons with special needs who need to be evacuated). In smaller communities, it is easier to get information about the location of people who need help during an evacuation than when it comes to a densely populated area. In smaller communities, it is easier to get information about who has not yet been evacuated, who has disappeared, etc. than the situation when a building or city district is evacuated. [\[2\]](#).

Although there are different definitions of vulnerable groups, for the purpose of evacuation problems defined by E due to the independence of action in crisis situations and the ability to understand and independent execution of instructions associated with the very process of evacuation [\[3\]](#).

As members of vulnerable groups are not left at a disadvantage should be defined on with on was that fall into the category of wounds jivih group during the evacuation, what are their species needs, what additional resources are needed in planning the rescue of these groups and on

how to collect information about them and their needs so that they can be pre-accessible and to use this information could like to go evacuation plans in the urban environments.

DIVISION OF VULNERABLE GROUPS WITH REGARD TO THE CAUSE OF VULNERABILITY

Vulnerable groups are divided into a subgroup that has difficulty understanding instructions (mental problems) and a subgroup that has difficulty moving in space or is completely immobile (physical disability). [4][5].

Protebnost is defined and access to vulnerable groups during the evacuation, because although the same result (impotence), the way reactions of the different [6]. Pursuant to the Act on the Croatian Register of Persons with Disabilities [7] a disabled person is "a person who has a permanent limitation, reduction or loss of the ability to perform a physical activity or mental function appropriate to age, resulting from damage to health".

From this definition it is clear that people with disabilities belong to the account NJIVE groups during the evacuation because success depends on the execution of physical activity (motility) and mental functions in line with needs (ability to make decisions appropriate to the situation and the instructions of the competent). The division of physical and mental impairments can be seen in Table 1. A label that talks about the type of possible overcoming difficulties in the evacuation process by labeling A groups that understand the instructions and complexity of the situation but are not able to evacuate without the help of others who are not able to understand the instructions and understand the complexity of the situation, but are physically mobile and marked with group C who have both physical and mental difficulties, gain insight into the distribution of evacuation needs of persons within a settlement or housing. [8]

Table 1 . Division of physical and mental disabilities according to the Law on the Croatian Register of Persons with Disabilities and categorization of possible prevailing difficulties in the evacuation process

No.	Type of damage	Possible prevailing difficulties in the evacuation process
1 .	Visual impairment	A
2 .	Hearing impairment	A

3 .	Impairment of speech-voice communication	A (sometimes B)
4 .	Damage to the locomotor system	A
5 .	Damage to the central nervous system	B or C
6 .	Peripheral nervous system damage	A
7 .	Damage to other organs and organ systems (respiratory, circulatory, digestive, endocrine, skin and subcutaneous tissue and urogenital)	A (dependence on devices, appliances or procedures)
8 .	Mental difficulties	B
9 .	Autism	B
10 .	Mental disorders	B

SPECIFIC NEEDS OF VULNERABLE GROUPS DURING EVACUATION

Vulnerable groups of the population have different needs during the evacuation process due to different causes of vulnerability[9]. Physical impotence, blindness, hearing impairment , mental difficulties[10] - is experiencing her and spos the aptitude of all these people in crisis sit tion and evaluation are very different , but the threat is the same.

Evacuation is a process that should take place quickly, but vulnerable groups cannot keep up. I nformation is a basic prerequisite qualities tne evacuation , but in certain Ranji in and to the group information can not reach normal nač ways or if they come they can not make t and understood properly. Mobility is the meaning of evacuation, but some people are not mobile due to physical difficulties and architectural solutions, so for them timely evacuation can be achieved only if they have additional help .

PERSONS WITH VISUAL IMPAIRMENT

Visually impaired and blind people are often very independent in performing daily activities in such a way that such people move on well-known routes, sometimes with the help of a white cane , and sometimes with a guide dog. In the event of an emergency, it can be detected either by sound (media, telephone, neighbors) or by sensory (devastating earthquake) and the ability to understand information is usually very good as well as mobility.[11]

PERSONS WITH HEARING IMPAIRMENT AND SPEECH-VOICE COMMUNICATION

People with completely impaired hearing (who are not helped by hearing aids) or deaf people can get information about the need for evacuation via a smartphone screen (ideally, all hearing impaired people in the area where the evacuation is planned will receive an SMS with instructions) , and You can also find out this information via text messages on the TV screen or via notifications on the Internet[\[12\]](#). Establishing communication with people with reading disabilities may be more difficult, but they can most often communicate with the environment in some other way unless they are able to understand the instructions and the meaning of the circumstances that have occurred.

PERSONS WITH DAMAGE TO THE LOCOMOTOR AND PERIPHERAL NERVOUS SYSTEM

The law defines damage to the locomotor and peripheral nervous system as permanent damage due to which a person cannot independently perform age-appropriate activities .[\[13\]](#)

People with these impairments generally understand the messages of the environment , but are unable to function without the help of others due to immobility or poor mobility . During the evacuation process, it is necessary to plan the transport of such persons because they usually cannot be evacuated by standard means of transport. [\[14\]](#)

PERSONS WITH CENTRAL NERVOUS SYSTEM DAMAGE

E vakuacija person with impairment of the central nervous system similar to the evacuation of people with impaired locomotor and peripheral nervous system except that persons belonging to the above category of vulnerable groups are usually not aware of the situation and do not understand that what is happening around them or the situation experienced and not sp of no reaction or response to environmental stimuli, which is an additional difficulty in the event that such persons are not accompanied by a guardian due to absence or injury.[\[15\]](#)

PERSONS WITH DAMAGE TO OTHER ORGANS AND ORGAN SYSTEMS

People with damage to other organs and systems generally understand instructions and information related to the process of evacuation and are often disallowed jno moving , but are unable to sustain life not function without the use of certain in place the device, device or procedure such as dijal behind, probe, gastrostomy , catheter and and others. Of vital importance is the availability of drugs or medical procedures in the event of a major crisis situation . [\[16\]](#)
K and co help with logistics and medi c and varied domains aspect ensure preparedness confirmed eb but to know how many people in a given area CJU depend on these needs and

ensure supplies or planned relocation of such by the person to the appropriate hospitals and people who have not behaved own medicines provide t and necessary l medical care .

PEOPLE WITH MENTAL DIFFICULTIES AND AUTISM

People with mental disabilities and autism[17] belong to a vulnerable group of the population because they do not understand the instructions, the seriousness of the situation and the goal they want to achieve with the evacuation. Certain persons sm entalnim difficulties will follow others , but autistic people will will and need additional animate. Most often, such persons are found together with parents or guardians , but it may happen that such persons will need to be evacuated on their own .[18] It is important to avoid resistance and violent reactions that may occur in the event of an inadequate approach . Since this group has no mobility problems , the only problem may be refusing to evacuate and provide physical resistance.

PERSONS WITH SEVERE MENTAL DISORDERS

During the evacuation process, a mentally unstable person is easily recognized by confusion, loss, unpredictable and irrational reactions, unrelated speech, etc. People with severe mental disorders differ from a person in a state of shock in that they can understand the seriousness of the situation and instructions related to the evacuation process. (mobility) , but these messages can be experienced in a distorted and wrong way with distrustful, paranoid, and eventually violent reactions .[19] Such persons should be kept away from other evacuees so as not to cause unrest and in no way to be evacuated with the rest of the population, but separately (if necessary, use a police vehicle in case of strong aggression, etc.).

OTHER CATEGORIES OF VULNERABLE GROUPS

Other categories of vulnerable groups include individuals who may have certain problems during the evacuation , but do not belong to the previous groups : young children of preschool and primary school age, the elderly , pregnant women with a high degree of pregnancy and people who do not understand Croatian . [20] The pre-school and school children is focused on the way that they explain the concept and purpose evak tion and evaluation, older people accessed encouraging and cheering d and quickly leave the dangerous area and strangers can be explained in a language they understand . The risk position are pregnant women in high level market udnoće, but they are easy to pr e p marked and they should be approached with particular care.

INFORMATION IMPORTANT FOR PLANNING THE EVACUATION OF VULNERABLE GROUPS

Information important for planning the evacuation of vulnerable groups is information that speaks about the spatial distribution of categories of vulnerable groups, the necessary approach given the specificity of categories of vulnerable groups, existing spatial and architectural barriers in space or those that are not the result of an adverse event (eg devastating). earthquakes, etc.).[\[21\]](#)

Therefore, the following information requirements are set for the quality planning of evacuation of vulnerable groups :

- b swarm of vulnerable groups of population by categories of damage and the prevailing difficulties during evacuation (Table 1) - information available in the database of the Croatian Register of Persons with Disabilities
- p rostorni deployment of vulnerable groups of population by categories of damage and the dominant uciha difficulties during evacuation (address, floor, accommodation description of the apartment in the building, the number of apartment a) - Information available after connecting to another database
- possibility of access to the building for disabled people (enabled, enabled in z difficulties, disabled)

This information can be collected based on the connection of existing databases , but also by on-site survey (especially data on access to buildings). Information on the users of home help services for the disabled and infirm can be collected through the Croatian Health Insurance Institute by inspecting the users of these services. There is my ability to create a voluntary registry[\[22\]](#) with the application of the clients, families and caregivers, organizations social services , etc . The aim and purpose of gathering information is to plan in advance the necessary evacuation forces with timely information about apartments in buildings where people belonging to one of the vulnerable groups live, which significantly speeds up the evacuation process . Population approach expressed through the population categories listed in a particular area does not enable individual information of members of vulnerable groups , nor their exact arch ation, while access on an individual basis to facilitate the numerous interventions of emergency services in meeting their additional needs and help and during the evacuation, as well as filled in the gaps in the development of planning documents in civil protection and thus strengthened the system in prevention and preparedness activities .

ESTABLISHMENT OF DATABASE OF DATA

The concept of the database would be realized in such a way that by entering the spatial parameters the number of people in a certain area is displayed. By entering specific addresses, the data would be displayed: how many persons are registered in the Croatian Register of Persons with Disabilities [\[23\]](#) lives in an individual building or at an individual address and to which group they belong according to Table 1.

The register contains, among other things, diagnoses and codes of diseases and other health problems that can be placed in one of ten categories. Each of these categories is assigned a label that speaks to the type of possible prevailing difficulties in the evacuation process. In the mentioned register, the data on the place of residence and stay (place / city, street, house number) of the persons who are in the register are important. This information would be enough will to knowledge framework deployment and on with the ba and it Ihova needs. For the protection of the on bnih data ba zi you would use an authorized person would be to pole exclusively information about the addresses of permanent and temporary residence of such persons, therefore, would not be available information on the name and surname, education, employed by, marital status or with greater those other information available in the register of persons with disabilities, and are not of interest to plan the evacuation of vulnerable groups and encroach on the privacy of those persons. [\[24\]](#)

More detailed mapping and problems of apartment buildings can be elaborated in more detail by linking with data from the land register in which the exact location of each apartment is stated in addition to the ownership. [\[25\]](#) This facilitates the search and locating of persons belonging to vulnerable groups. It is noteworthy that in an application that could be used for planning the evacuation would not be shown nor OIB (the comparable data from two base), nor the names and surnames on with the ba with disabilities, but would show only the following information: type of damage and possible prevailing difficulties during the evacuation or only a sign of the presumed prevailing difficulties (Table 1), a description of the accommodation of the apartment in the building where the person with a disability from the land register is located with a sign indicating a safe (OIB) or presumed location disabled persons (only the coincidence of the surname at the same address) and the category of access to the building (enabled, enabled with difficulties, disabled). The available data after entering a specific address are visible in Table 2.

Table 2 . Example of data available in the application after entering a specific address

Address	Number of persons	Difficulties in evacuation	Description of apartment accommodation	Match (ownership or surname)	Access to the building
Trnsko 1A	2	B	two bedroom apartment on the 2nd floor, right, entrance 1A, 51.32 m ² , which in nature consists of two bedrooms, kitchen, bathroom, toilet and entrance hall	surname	disabled

Data from the land registers are publicly available and can be used to develop applications .[26]

CONCLUSION :

The problem of evacuation of vulnerable groups of the population can be reduced only by timely and quality evacuation planning , and planning cannot be carried out without available quality information. The process of evacuation can be speeded up if it does not know the location of people with special needs a) to its address, on which floor and one apartment) and transport of persons with disabilities can not be well planned if they are provided only general information on the number of members of the trans iv and h sku ?? pina in a particular area. The space must be observed with regard to the ease of evacuation of difficult-to-move or immovable axes of both. Many buildings do not have access for the disabled, so it is necessary to carry them during the evacuation, which requires additional time and additional assistance.

If it is necessary to create a database for the purpose of planning the rescue of vulnerable groups of the population. The creation of a register in the manner of a database would enable greater readiness of emergency services and easier provision of additional assistance during the intervention and operation of civil protection operational forces in major accidents and disasters. The required data already exist in different databases, they need to be collected and linked in such a way that only basic information on the detailed location of persons and the type of possible prevailing difficulties related to the evacuation process is available with regard to the type of damage without other information (name, OI B, time of damage, etc.) .

[1] The shorter the time from the beginning of the evacuation to the onset of the devastating consequences of the adverse event, the more important are the operational preparations for the evacuation process, ie the more important are the plans

defining evacuation corridors, telecommunications means and methods of transmitting necessary information. carrying out the evacuation, the principles of public relations, but also detect existing problems and aggravating circumstances that may further interfere with the evacuation process itself.

[2] The more people in a given area, the more pronounced is the problem of numbers because evacuation corridors are known, and in rural areas, especially smaller scattered settlements, the problem of evacuation direction is more pronounced in relation to the source of threat because there are few people. There can be a lot of evacuation and the evacuation routes themselves can be difficult (passable and neglected macadam roads, etc.) .

[3] National and gender minorities, social cases and socially non-integrated persons, ie all those persons who are able to independently carry out instructions related to the evacuation process, are not considered. Although people have different endurances when it comes to panic reactions, for the evacuation process if it is well guided and directed, it is enough that there is enough information from the rescuer or coordinator at all times and that they are simple, understandable and accessible to the population in the endangered area. in case of misunderstanding the instructions of the authorities or understanding but physical incapacity, the process of evacuation of such persons can be realized only with additional efforts and a special approach that requires the engagement of additional forces and means of transport .

[4] Although there is a combination of physical and mental disability, in this division it is important that such individuals are powerless or completely dependent on others without the help of others (this group also includes small children).

[5] In case of insufficient information or great unreliability during a large number of interventions, individuals may remain trapped in their homes and not be evacuated in time, and inspecting each apartment and space takes a lot of time and is not practical unlike known location of individuals who live in an apartment building and belong to one of the vulnerable groups (easier planning of the necessary personnel, means of transport intended for the transport of the disabled, etc.).

[6] While individuals with various mental problems can be anxious, aggressive and uncomfortable and can disturb public order and peace, so they sometimes have to be subjected to coercion because they do not understand the complexity of the situation or misinterpret and experience the situation, physically disabled and blind and partially sighted people can cooperate well with rescuers, but without the help of others they cannot be evacuated, and an additional aggravating circumstance is often that sometimes disabled people do not have easy access to the buildings in which they live (stairs, too narrow aisle for wheelchairs, etc.). with the help of other but also optimal means of transport, their evacuation from the endangered zone is not possible.

[7] http://narodne-novine.nn.hr/clanci/sluzbeni/2001_07_64_1049.html

[8] According to the specific approach required during rescue, all these types of impairments can be divided according to the cause of the disability or whether it is related to understanding and experiencing reality (mental) or physical disabilities (poor mobility, inability to move limbs, low vision and sl). If the mental dimension is emphasized, care must be taken about the approach to the patient, because he can resist, not cooperate and resist the implementation of the evacuation. Such situations complicate the process itself because the violent person may not want to leave the space or will offer resistance. The positive side of such circumstances is that these people require constant care and are often surrounded by trusted parents, relatives or other caregivers, so it is easier to evacuate such people in cooperation with them. On the other hand, people with limited mobility and partial mobility are most often members of the elderly population, who often live alone and have children in other locations, in other cities or countries. Such persons are most often visited by employees of care and assistance institutions at home (bathing, cleaning, perhaps food delivery) and some of the neighbors and in other situations are left to fend for themselves as they know and can. They often have inadequate aids or do not have them at all in their homes (eg walkers, wheelchairs, etc.) Due to the unfavorable demographic situation, this is a very common case, not only in rural but also in urban areas of cities. So while in the first case the main problem during the evacuation may be resistance, in the second case the problem is mainly inadequate aids or lack of aids (crutches, wheelchairs), architectural barriers (no access for the disabled, so people need to be transported, etc.).

[9] Vulnerable groups by accommodation are divided into persons in institutions and persons in the community. Since the institutions have their own evacuation and rescue plan with related problems, this paper refers to vulnerable people in the community.

[10] Vulnerable groups such as mothers with young children, school-age children, foreigners who do not understand the Croatian language can be very successfully educated and integrated into the security mindset, certain categories of the population do not understand or cannot follow the evacuation process. take special care and concern, especially during the growing threat or at a time when the devastation of the consequences has already occurred.

[11] Visually impaired and blind people will need to be evacuated from the building in the event of a partial or complete collapse, and in other situations people will leave the facility on their own and then be escorted by members of the protection and rescue forces to an evacuation bus or find a person. which will further lead such persons to a safe area. Blind and visually impaired people must be explained the situation in a calm and calm way, and they must never be forcibly dragged and pulled while being guided, but only gently guided.

[12] The ideal situation is for all hearing impaired people in the area where the evacuation is planned to receive an SMS with instructions because if the necessary information is transmitted visually this information is understood, but there is a problem in trying to establish voice communication with people because they can be confused with autistic people or they can be thought of as people who are in a severe state of shock. But people will certainly try to establish communication in sign language and most often it will be enough to show them the direction of the evacuation to understand where it is necessary to go. If the information is transmitted to them correctly, people are completely independent and do not need additional help. Deafblind people share the characteristics of both categories

[13] The first N emogućnosti starting body (walking, moving, manual activity) or requires some orthopedic devices (prostheses, appliances, crutches or wheelchairs, etc.),

2. Impossibility of independent maintenance of personal care (bathing, dressing, wearing or performing physiological needs) or inability to prepare and take food independently,

3. Inability to move the body independently or with the help of orthopedic aids.

[14] Difficulty in evacuation can be the collapse of some exits, the need to evacuate hard-to-reach fire escape, stay in a building with inadequate access for the disabled or stay on higher floors of buildings, which in case of power failure or elevator failures the evacuation process, especially if a person needs to be evacuated from higher floors of a skyscraper.

[15] It is important that rescuers know in advance where people who are completely dependent on the help of others are located, not only in which building but also on which floor and in which apartment, because in that case rescuers and civil protection commissioners can be oriented to check these apartments and possibly provide assistance during the evacuation process in case of need to open the door, hold the wheelchair, etc. with the planning of adequate transportation.

[16] Immediately after the evacuation, the necessary medical conditions should be provided at the place of care or the person should be evacuated to a hospital in a non-endangered area. Although during the evacuation a person will take basic medical supplies with them, it may happen that due to age, panic, speed of events or collapse of the part of the building / premises where the medicines are, they will not take them, vital medicines, devices or devices .

[17] Intellectual impairment is a condition in which inclusion in social life is significantly hindered, and is associated with stopped or incomplete development of intellectual functioning. Autism is a condition in which there is a disorder of emotional stability, intelligence, psychomotor abilities, verbal and social communication.

[18] It is necessary to approach the way in which children are approached, to say that they will connect with their parents, relatives, to go to play, etc.

[19] Crisis and stress are often triggers that trigger abnormal reactions in mentally unstable individuals. An additional problem is encountered during the triage in the area where there are a lot of injured and ambulance crews because some uninjured people will shout and ask for help, while they may be seriously injured and in danger of death.

[20] Preschool and primary school children who are often playful with a lack of understanding of the seriousness of the situation which leaves fewer psychological consequences, while older people with very slow reactions make it difficult or prolong the time needed to evacuate from the endangered zone and foreign nationals who do not understand the language. they realize that something extraordinary is happening (unless they are in a direct area of influence).

[21] While in rural sparsely populated areas it is easier to obtain information about individuals belonging to vulnerable groups because there is always a person in the place who knows all or most of their neighbors, in urban densely populated areas to have such information in advance without a database it is difficult, almost impossible. But it is not enough to know not only how many vulnerable groups we have in which urban settlement (or neighborhood), but also where exactly they are located, on which floor and in which apartment. This is especially important in the case of the evacuation of skyscrapers or settlements with many skyscrapers in which several thousand people live in a very small area. The Commissioner for Civil Protection (social associations, Red Cross) should list and map housing units with easy access for the disabled in each settlement, as well as those buildings without adequate access for the disabled .

[22] The register should be of practical application involving the simple registration of members of vulnerable groups, their specific medical needs and the necessary assistance during evacuation. The data needed to create the database would be collected through a standardized internet questionnaire, telephone number and e-mail address, families and caregivers, social welfare centers, social associations, civil protection commissioners, tenants' representatives, etc. with related data protection issues. This register would enable the mapping of a certain area on an individual basis, as well as the identification of the most vulnerable areas when planning the necessary resources for operational activities.

[23] The problem is that currently the data of the Croatian Register of Persons with Disabilities can be used only as aggregate statistical indicators, and this register contains very valuable information of interest to members of civil protection and other state and city bodies in charge of evacuation.

[24] Using only the stated data on the addresses of persons from the Register does not solve the problem because in apartment buildings it is difficult to know exactly on which floor and in which apartment these persons can be located because only the address is available without a description of the apartment, which is extremely important in emergencies. situations.

[25] By linking the address, OIB and surname from the Register of Persons with Disabilities with a specific address from the land register and comparing the above data with the information contained in the excerpt or owner, along with data on the number of persons with disabilities living in a particular location. information on the accommodation of the apartment (ie a description of the accommodation of the apartment) owned by the said person or someone with the same last name. In case the OIBs and the address from both databases (residence or domicile) in the application used by the civil protection match, the data would be linked in green, and in the case of only a surname match, the data would be marked in red and could indicate to the fact that there may be a person in that apartment who is not related to the person from the register.

[26] In addition, the application can be expanded to collect information on beneficiaries of forms of home help for the elderly through data from the Croatian Health Insurance Institute . It is only possible to use the address, OIB and surname of the person helping the home help service that is retrieved in the background and is not available to users of the civil protection application to avoid a possible problem of conflict with the Personal Data Protection Act and other legal acts, perhaps information could be sent to all persons from the Register of Persons with Disabilities or their guardians with an explanation of what information

is requested and for what purpose, and it would be explained that this information is needed exclusively for better evacuation planning in case of need.