



## A SURVEY OF THE KNOWLEDGE AND PRACTICAL SKILLS FOR PROVIDING FIRST AID IN DISASTER SITUATIONS

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### ABSTRACT

**Introduction:** Over its centuries-old history of development, mankind has often faced the devastating effects of different disasters. They continue to occur in the present, causing human suffering and creating human needs that the survivors cannot cope with without help. **Aim:** To survey the knowledge and skills of people engaged in different branches of the national economy, in the region of Stara Zagora, Bulgaria, with regard to providing first aid in disaster situations. **Methods:** An empirical sociological study was carried out by a direct group inquiry of 322 workers and employees in different branches of the national economy in the region of Stara Zagora. The study was carried out in the period January - December 2016. **Results:** The proper provision of timely and effective first aid calls for awareness of basic practical skills and competences. The prevailing opinion of the respondents is that they lack the skills to perform artificial respiration (52.17%), indirect heart massage (59.01%) and immobilization in case of fracture (53.11%), receptions for temporary hemostasis rule 54.35%, and techniques to apply a bandage - 72.67%. **Conclusion:** First aid skills and competences are of key importance for saving human lives in disaster zones.

**Key words:** disaster, first aid, general training of the population; empirical sociological study.

### INTRODUCTION

Over its centuries-old history of development, mankind has often faced the devastating effects of different natural and man-made disasters. They continue to occur in the present, causing human suffering and creating human needs that the survivors cannot cope with without help.

The first stage of medical care provision in the disaster zone, no matter what kind of disaster it is, is the provision of first aid. Encyclopedia Britannica defines "first aid" as urgent measures, which need to be taken immediately after an accident occurs, not aiming at curing but preventing further complications while using appropriate human and material resources, available at the site of the accident, which provide initial aid to the person who has

suffered a sudden injury or illness until more professional medical care could be provided.

First aid consists of a complex of medical procedures, which are performed immediately at the site of an accident and are essential for saving human lives or preventing possible complications in the process of further treatment of the survivors of a disaster. It has a substantial effect on the overall treatment outcome of injured people or people who have suffered a sudden illness. They have a substantial effect on the overall process of medical treatment (1-3).

The fundamental objective of first aid is to save human lives and to diminish the loss of life or the disability rate among survivors of an incident (4, 5). First aid must be provided as soon as possible, no later than 30 minutes after an accident, or within 5 to 7 minutes in cases of respiratory arrest, disregarding the scale or the type of the disaster. Any increase in the time

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before providing first aid leads to increase in the occurrence of complications among the survivors of an accident. The provision of first care within the first 3 hours of an accident keeps the possible complications within the range of 15%, whereas its delay after the first 3 hours will result in percentage increase up to 70%. This is the reason why first aid is generally provided during rescue operations and throughout the whole area of the disaster zone (6). The overall analysis of the organization of first aid provision in disaster situations shows that the timely first care has a dramatic effect on diminishing the number of human life losses (7).

Self-help and person-to-person aid are the two most common types of first aid available and administered in the disaster zone during the first hour after a disaster occurs. The volume and type of the necessary first aid procedures may vary depending on the specific type of disaster but, in most cases, resuscitation procedures would usually come first in terms of urgent necessity. The immediate disaster zone situation is characterized by most severe, massive medical losses and a great number of combined injuries, therefore, the timely and properly administered first aid is what can determine the favorable outcome for many sufferers, thus saving and protecting many lives.

The present study aimed to survey and analyze the level of competence and practical skills of people engaged in different branches of the national economy, in the region of Stara Zagora, Bulgaria, with regard to providing first aid in disaster situations. The tasks we set ourselves were to survey and analyze the practical skills of workers and employees for giving first aid in disaster situations; to survey and analyze the general competence and the practical skills of workers and employees for performing artificial respiration and indirect heart massage; to survey and analyze the general competence and the practical skills of workers and employees for immobilizing a fractured limb (8).

## **MATERIALS AND METHODS**

**Survey Design.** An empirical sociological study was carried out by a direct group inquiry of 322 industrial workers and administrative employees in different branches of the national economy in the region of Stara Zagora, Bulgaria, as the number of industrial workers prevailed. The workplaces, included in the

study were representative for different sectors of the industry in the region of Stara Zagora. The total number of participants in the survey was 350 people, 322 of whom actually responded to the questions, which means that the response rate was 92%. The study was carried out in the period January - December 2016. The workplaces, included in the study were production factories and companies, operating in different sectors of the industry in the region of Stara Zagora, part of which are classified as belonging to the critical infrastructure of Bulgaria. The people who took part in the survey were employed in the fields of energy production, construction and development, machine building and the production of rubber products and concrete and steel structures.

The data and the results presented in this research report are part of a wider scientific research, which used a standard questionnaire containing 33 questions, referring to seven main areas: socio-demographic and professional characteristics of the respondents; awareness of the riskiest types of potential natural and anthropogenic disasters in the region of Stara Zagora; competence and practical skills related to first aid procedures; awareness of available sources of information related to rescue behaviour and first aid in disaster situations; attitudes and opinions regarding raising their awareness of proper rescue behaviour in disaster situations and giving first aid in the immediate disaster zone, and readiness to participate in workplace action groups or volunteer rescue and first aid units in order to be trained for appropriate actions in disaster situations.

In this research report we have analyzed only the results of this sociological research related to the respondents' first aid awareness and practical skills for giving first aid in a disaster zone.

The questionnaire survey was carried out at a convenient place and time, prearranged with the management of a factory or a company.

The collection of empirical sociological information is guided by the principle of anonymity, voluntary participation and the "do-no-harm" to human beings principle.

**Statistical analysis.** The statistical software SPSS for Windows 19.0 was used to process the survey data. The data analysis was carried out by applying descriptive statistic methods for

aggregating quantitative and qualitative valuables, such as absolute frequencies, relative frequencies and cumulative frequencies. Evaluation methods and hypotheses testing methods,  $\chi^2$  test and Fisher's exact test were used. The critical significance value was  $\alpha = 0,05$ . The relevant null hypothesis is rejected when the P-value is lower than  $\alpha$ .

## RESULTS AND DISCUSSION

First aid skills and competences are essential for saving human lives in disaster situations, especially for the people in the immediate disaster zone. We set ourselves the aim to find out and analyze what the level of self-assessment of the participants in the study was with regards to their theoretical knowledge and practical skills for giving first aid in disaster situations.

Socio-demographic characteristics of the respondents: 322 workers and employees, representing different branches of the national economy in the region of Stara Zagora took part in the survey. The average age of those surveyed was 43.15 years (ranging from 21 to 68 years and SD - 10.018). The minimal age of the participants in the survey was 21 and the maximal age was 68 years. The age-group distribution shows that the largest relative share of 34.47% belongs to people aged 35-44, followed by the age group 45-54, with their relative share of 32.92%. The age group 25-34 had a relative share of 17.7%, whereas for the age group 55-64, it was 11.49%. Seven of the respondents were under 24 years of age, or 2.17%, while the number of respondents older than 65 was 4, which forms 1.24% of all respondents. The gender distribution shows that 213 of all respondents were men (66.1%) while the number of women was 109 or (33.9%), which means that 2/3 of all respondents were male. The level of education distribution shows that the largest group of respondents consisted of those who had completed secondary school, with an average share of 69.3%, followed by those who held a university degree, with 23% and the ones who had a vocational degree, represented 4.0%. 3.7% of the respondents had a lower degree of education, including 10 primary school graduates and 2 uneducated people.

Professional characteristics of the respondents: Information concerning the respondents' period

of employment and position at work was collected. 74.8% of the group researched were engaged in production, whereas 25.2% were administrative employees. The average period of employment in the professional sphere was 16.48 years (ranging from 1 year to 46 years, SD - 10.717). The minimal period of employment was 1 year, while the maximal was 46 years. The distribution in groups shows that the people whose period of employment was 11-25 years had the biggest relative share of 27.3%, followed by those who had worked for the company for 6-10 years, with 23.0%, and those employed for 21-30 years, with 22.0%. The workers and employees whose period of employment was below 5 years formed 16.5%; between 31 and 40 - 10.2% and over 41 years - 0.9%.

Self-assessment of the level of practical first aid skills. The ability to provide timely and effective first aid requires basic competence and essential practical skills, among which are: artificial respiration, indirect heart massage, immobilization of a fractured limb, achieving temporary hemostasis, applying wound bandages (9).

The respondents' self-assessment level of first aid skills have been presented in **Figure 1**. A prevailing majority of the respondents shared the opinion that they lacked pulmonary resuscitation skills (52.17%); indirect cardio stimulation skills (59.01%) and skills to immobilize a broken limb (53.11%). Appropriate techniques for achieving temporary hemostasis were not known to 54.35% of all respondents and 72.67% of them were unaware of ways of applying wound bandages.

A significant majority (86.02%) of the respondents gave a correct answer to the question "Who should give first aid to people affected by a disaster?", which is "Any person present at the site of the disaster." The relative share of the respondents who gave incorrect answers was 13.98%. They either believed that first aid should be given only by medical professionals (9.01%) or that it should be provided by Emergency units, when they arrive at the site of a disaster (4.97%).

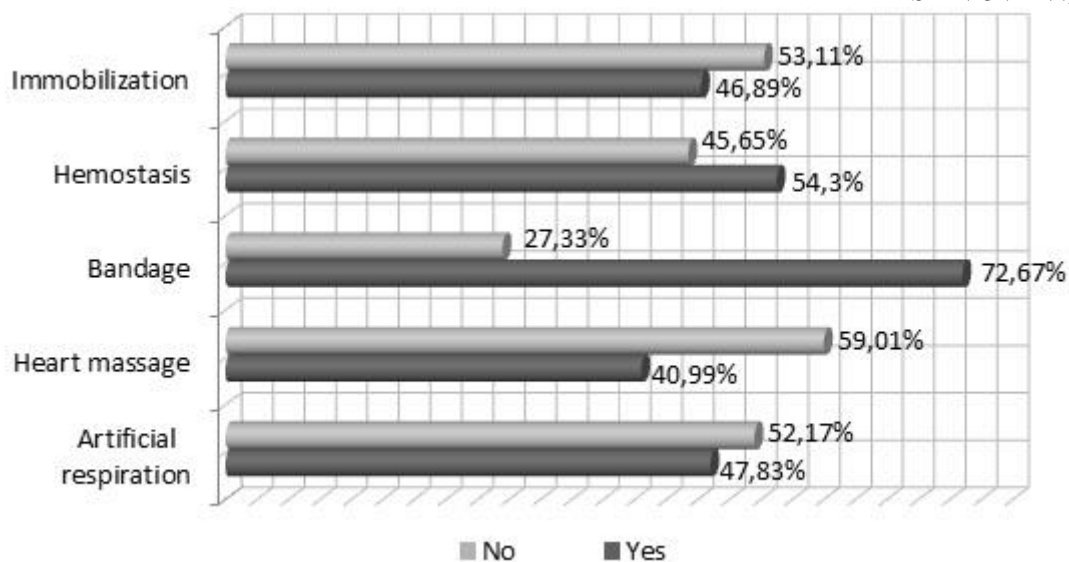


Figure 1. Basic First Aid Skills Assessment

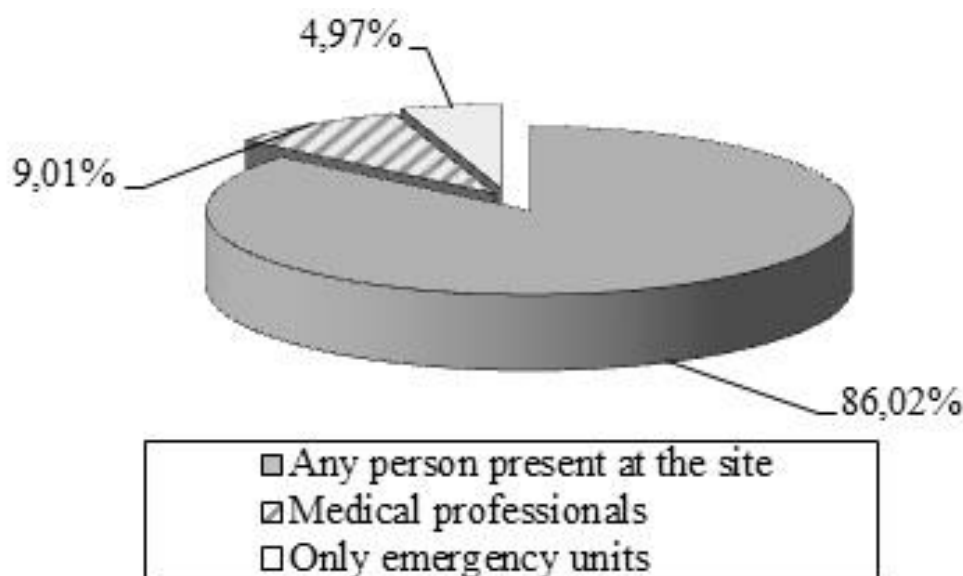
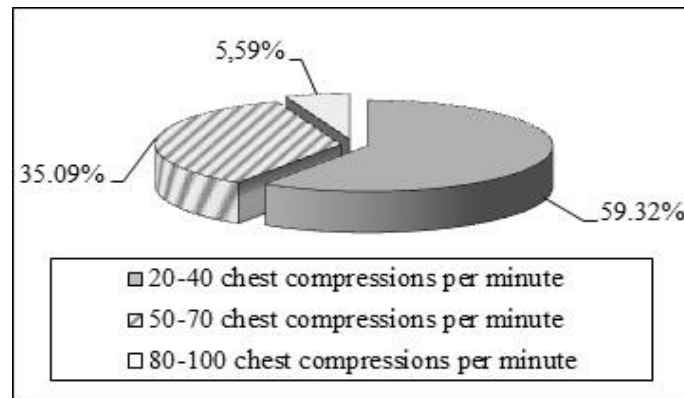


Figure 2. Who is responsible for providing first aid in disaster situations?

Practical skills and competence in performing artificial respiration and indirect heart massage. According to the guidelines for performing cardiopulmonary resuscitation (CPR) of the European Resuscitation Council and the American Heart Association for 2015, any person giving first aid should perform chest compressions in case of resuscitating a person who had suffered a heart arrest (10). Special attention has been placed on the importance of performing effective chest compressions. The aim of effective chest compression is to achieve a depth of each compression of at least 5 cm, and a frequency of 100 compressions per minute; to wait for a full chest expansion after a compression and to keep interruptions of chest compressions to a minimum (11-13). If the person is not breathing, artificial mouth-to-

mouth /mouth-to-mask /mouth-to-nose ventilation should be performed, or bag-mask ventilation at a rate of 12 breaths per minute. The compression/ventilation ratio for combined cardiopulmonary resuscitation, performed by a single rescuer is 15-30/2, while for two rescuers it is 10-15/1 (14, 15).

Our survey results analysis showed that as concerns the frequency of compressions in performing cardio resuscitation, 94.41% of the respondents had given an incorrect answer: 59.32% thought that the number of chest compressions per minute should be 20-40 and 35.09% believed that the number should be 50-70. Only 5.59% of all respondents gave the correct answer that the number of chest compressions per minute should be 80-100.

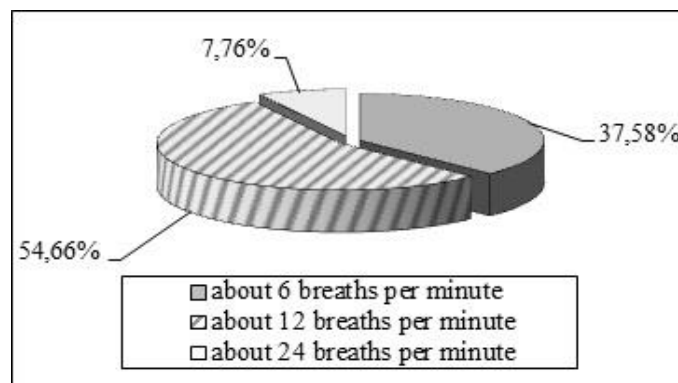


**Figure 3.** Awareness of the necessary frequency of chest compressions in cardio resuscitation

When checking the hypothesis by  $\chi^2$  tests, it turned out that there was a statistically significant dependency between the respondents' self-assessment of how well-prepared they feel about performing indirect cardio resuscitation and their awareness of the necessary frequency of chest compressions ( $P=0.046$ ). A significant discrepancy was revealed, due to the fact that only 7.6% of the respondents who believed that they were well-

prepared to perform cardio resuscitation gave a correct answer, concerning the necessary frequency of chest compressions.

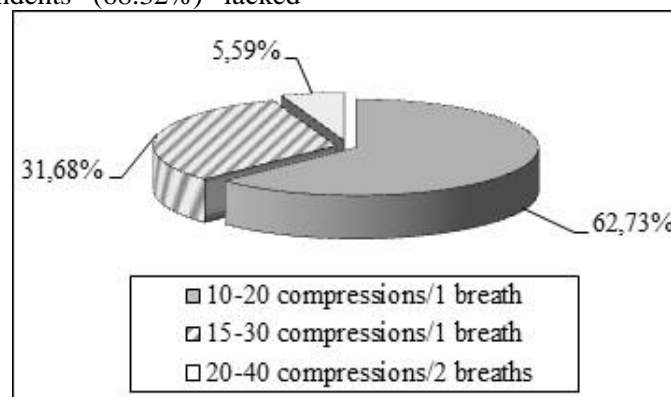
More than half of the respondents gave correct answers concerning the frequency of breaths when performing artificial ventilation – 54.66%. The proportion of respondents who gave incorrect answers was 45.34%.



**Figure 4.** Awareness of the necessary frequency of breaths when performing artificial ventilation

The relative proportion of incorrect answers to the question related to the proper procedure of performing combined cardio-pulmonary resuscitation was very high. More than two-thirds of all respondents (68.32%) lacked

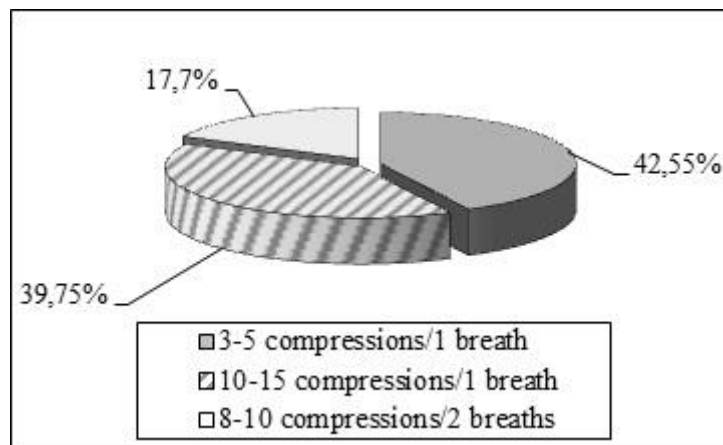
proper awareness concerning the necessary ratio between chest compressions and number of breaths when performing combined CPR by a single rescuer. 31.68% gave correct answers.



**Figure 5.** Awareness of the ratio between chest compressions and the number of breaths in combined CPR, performed by a single rescuer

The results concerning combined CPR, performed by two rescuers were quite similar:

60.25% of the respondents gave incorrect answers, while 39.75% gave correct answers.



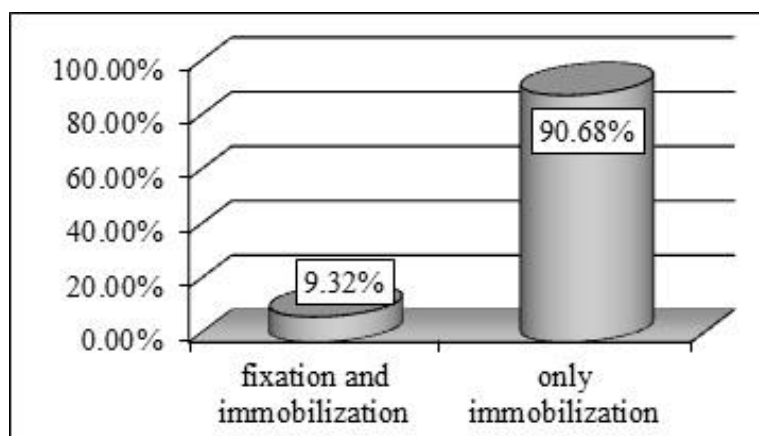
**Figure 6.** Awareness of the ratio between chest compressions and the number of breaths in combined CPR, performed by two rescuers

Awareness and practical skills related to techniques for immobilization of fractured limbs. The ability to immobilize different fractures is an important element of the number of first aid skills people need to have in disaster situations. Immobilization is necessary in cases of limb fractures (internal/external), spinal and pelvis fractures. Immobilization is also necessary in cases of extensive soft tissue injuries and extensive burns. Immobilization decreases painful friction; the risk of blood vessels ruptures, fat embolism and further displacement of broken bones. Fractured limb immobilization can be carried out in two ways: immobilization by using immobilizing devices such as standard splints, triangular cloths or anything at hand; immobilization without using hard immobilizing devices: an upper limb is tied to the chest, bent at a right angle at the elbow; a lower limb that has been injured is tied to the healthy one for support, using different soft bandages. This method of immobilization is not very effective though.

All immobilization performance requirements should be strictly observed: two adjacent joints should be immobilized; only padded devices should be used; good fixation of an injured limb should be achieved without affecting crucial functions.

If the presence of a fracture has been revealed, it is not within the range of first aid to try and fix the fractured bones, it should not be done in any case. When it is a case of an open fracture, with visible ends of broken bones in the wound, sterile pads and dressing should be applied.

Our survey results showed that most of the respondents, 90.68%, were aware that fixation of broken bones should not be attempted when giving first aid, but the fractured limbs should be immobilized as soon as possible. Only 9.32% of the respondents gave wrong answers to that question.



**Figure 7.** Awareness of proper first aid procedures in cases of fractured limbs

## CONCLUSIONS

First aid consists of procedures meant to stabilize vital bodily functions and to prepare an injured person for transportation to a hospital. It is generally provided during the isolation phase or during the rescue phase of a disaster situation, so it is done at the site of an accident or in the epicenter of a disaster zone. The subsequent medical help and treatment will very much depend on how effective the first aid procedures have been. It can also have an effect on decreasing the death rate, on reducing the physical and psychological disabilities among the affected population. Our survey respondents' self-assessment results revealed that there is a need for improvement in both people's general awareness and practical first aid skills by organizing theoretical and practical training seminars with the aim of improving their capacity to provide first aid in disaster situations.

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