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ScienceDirect

Procedia Engineering 211 (2018) 1–7

Procedia Engineering

www.elsevier.com/locate/procedia

2017 8th International Conference on Fire Science and Fire Protection Engineering (on the Development of Performance-based Fire Code)

The effects of global climate change on fire service Human resource view

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Abstract

Introduction: Due to the extreme climatic events caused by global climate change, the number of firefighting interventions is increasing. The increasing of the extremes affects not only the circumstances of the interventions, but also to the interveners themselves and the firefighters. In order to maintain or increase the effectiveness of interventions, it is also appropriate to address the latter's investigation. Methods: The author reviewed the human body's heat-tolerant studies and utilized his many years of practical experience as an intervening firefighter. Results: The author provides an overview of the effects of positive temperature extremes on the human body, with particular regard to factors that significantly influence the work of the firefighters and because of this, their health is at higher risk. The author makes a proposal of reducing the effects of climate change both from the personal and organizational point of view.

Peer-review under responsibility of the organizing committee of ICFSFPE 2017.

Keywords: climate change, firefighter, extreme heat

1. Introduction

Global climate change is not disputed by most of us today, but there are some disagreements over the current pace and future impacts of the past, as compared to the previous ones. A significant part of the researchers attributes the growing phenomenon of weather extremes to climate change. International statistics show a clear increase in the number of disasters, which also means that the bodies and organizations that are responsible for the eradication of these diseases will be increasingly needed in the future. However, extreme phenomena increase not only the number of interventions, but affect also the circumstances. Moreover it has an obvious effect on the interveners and also on their bearing ability. As a result, it is advisable to investigate both the changing intervention conditions and the effects of the interveners. This article focuses on the latter, the author investigates the effects of the firefighters' organization and the possible responses to them.

According to NASA experts, in 2017, hot flashes hit our planet, such as it had not before. Based on previous trends, we have the chance to it, because according to the statistics the period from 1983 to 2012 was the hottest period in the last one and a half thousand years, what causes many negative effects in our safety [1]. Evolution has shaped the heat tolerance of today's people for one and a half million years, but the change of the temperatures of the past thirty years are so fast that adaptation speeds like ones before are simply not enough today. We could only provide technical answers to it, sometimes it is very special [2-3]. So, we tried to improve the situation with the introduction of shading techniques, and also with air conditioning equipment. But our body does not have a new or an emerging answer to bear the temperature records.

Perhaps this is one of the reasons why surveys show that there are temperature limits above which there is a clear rise in the number of deaths. Of course this is also influenced by how rapidly the temperature has changed. On the canicular days, a five-degree increase in temperature can increase deaths by up to 10-15 percent [4]. If you have time to adapt to the heat,

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1877-7058
Peer-review under responsibility of the organizing committee of ICFSFPE 2017
10.1016/j.proeng.2017.12.001

generally fewer deaths, and heat accidents can happen. Heat primarily affects the older people who are isolated and do not use air conditioning and affects very young children as well. It is an interesting lesson that obese people are also more susceptible to cancer, and it is believed that certain medicines may increase the risk of choking. It has also been shown that those who live in the city tend to suffer more from the heat. It is easier to break of the bad air in big cities, because of the stagnant atmospheric conditions that are often characterized by heat, pollutants are enriched and cannot be cleansed from the air. These substances can cause respiratory problems in sensitive areas, such as asthmatics. It is also bad for our health, that the concrete and the asphalt can store a lot of heat during the day, for this reason the temperature cannot decrease at nights either.

The increase of the extreme conditions also affects the interventions of firefighters and it definitely increases it. Furthermore, apart from the weather anomalies, firefighters intervene day by day in events which are considered extreme for the everyday people [5]. Based on fire, working close to it always means extreme heat load, because the interveners need to use protective equipment in order to reach the fire. Of course, the question is right, why should we address the effects of global climate change on firefighters, if the researchers find that the average ambient temperature is only 1-2℃, while the environment of interventions can temporarily increase by more than one order of magnitude. The average temperature increase, which is caused by the climate change, is very important by the reason of the own generated other phenomena. These can be listed below:

- Weather extremes become more common, and extrinsicity clearly leads to an increase of interventions; That is, the workload of the persons responsible for their elimination such as firefighters and the associated physical and psychological burden will increase compared to the previous one, leading to faster "wear and tear" of the staffs.
- The low humidity often associated with higher temperatures and it leads to the faster spread of certain fires. The curbing of which is more concentrated in the same interveners, but assuming the same effort as earlier, it means the use of greater human resources. It means the only increase in the physical and psychic load again, which means that it will lead to faster wear and tear of the staff**.**
- Even though the above are specifically related to the interventions, let us not forget about the fact that the positive temperature extremes are becoming more frequent - even as any other employee - can have an effect on the firemen when they are not to fight a fire, but also be prepared to provide standby at the fire department.

According to the text above, climate change is not an impulsive burden on the firefighters from a specific direction, but rather generates a complex effect on them, which consists of several components, which can reinforce each other's influence even exponentially. It is obvious that each of the effects of the climate change will require a much more detailed examination later, but in this article the author only focuses on the last, that is, the effects on the firefighters that are equally burdened by the average person's organization.

2. The effect of heat on the human body

According to the World Health Organization (WHO), the temperature between 18-24℃ outside is the optimum for the human body. The higher the heat is, the more difficult it is for the body to cool itself. To the judge of the temperature we can't rely on just the thermometer value. The temperature scale observed value is not necessarily shown that how many degrees we will feel, because the humidity significantly influences the so-called apparent temperature, and the subjective heat feeling as well. The effect of the heat on the human body reacts as followings [6]:

- We are constantly evaporating through the poles of our body, so, we lose the amount of fluid that we call sweating when it is visible on our skin surface. Because the evaporation entails heat withdrawal, the body cools down, but during this process it loses fluid.
- Sweat is selected from sweat glands under the skin; It consists mostly of water or dissolved ions. Sweat passes through the pores and sweat lines to the surface of the skin where it begins to vaporize.
- Skin-like hairs trap the air between them, which prevents a heat loss, which prevents heat loss, thus effectively insulating the overheated body. The position of the hairs of the body, the shape of the hairs, is controlled by the underarm skin muscles; if they are leaking, they cannot straighten their hair follicles. When someone is crawling, these muscles tend to diminish the surface of the body, but with the help of the hairs they also slow down the air flowing around the body to protecting it. In a hot wave the hairs are flattened, thus improving air flow around the body, thus increasing heat dissipation.
- The effect of heat the blood vessels expends, the skin becomes red with large amounts of blood near the surface. Arterial vasodilation is a stress-relieving process: the muscles of the artery wall will relax, so blood flow increases in the arteries.

The human body is struggling to maintain its optimum core temperature because the internal organs also have the necessary temperature to function effectively. It is about 36-37℃; the body cools itself at a higher temperature to maintain