Impact Factor (SJIF): 4.714 **E-ISSN: 2583-1615**

International Journal of Research in Academic World

Received: 05/January/2023 **IJRAW:** 2023; 2(2):37-46 **Accepted:** 09/February/2023

An Analysis of Occupational Stress among Fire Fighters, a Review of Literature

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Abstract

Fire fighters experience the worst scenarios that most people have never come across in their lifetime. They are exposed to horrific accidents, destruction of property, hair raising incidents and fires that override their threshold. Their ability to perform effectively is sometimes compromised. Given the complexity of the ever changing trend of natural and manmade disasters, the ever changing security issues world-wide, the vagaries of climate change among others, society depends on the services of the fire fighters who sometimes work long hours with little relief in these situations. Fire fighters working and exposed in those work settings should understand the stress involved and identify and develop effective coping mechanisms.

Keywords: Physiological stress, psychological stress, causes of stress, coping strategies to stress

Introduction

Stress is unavoidable in human life. To a fire fighters, occupational stress is a daily routine due to the nature of their of their work which require them to respond to some unpredictable tragedies such fire, floods, accidents, complex incidents among other things. In the context of Zimbabwe the fire fighters, paramedics and police are the first responders to the scenes. In most as they arrive at the scene fire fighters, paramedics and police remove badly injured and charred bodies from the vehicles, buildings and from the scene. At times, fire fighters have to physically restrain the affected people who would be overwhelmed the catastrophe. Furthermore, the fire fighters have an obligation to comfort the relatives, friends, family and workmates when a child or loved one has died during a catastrophe. Beside, assisting the victims and victims' families to copy with the stress emanating from the loss of injury of family members, they have to learn to cope with their own occupational stress. Fire fighters have to cope with occupational stress emanating from the injury or death of fellow members in the line of duty. Thus the paper seeks to give an analysis of occupational stress among fire fighters as it seem to exert important effects on their physiological, psychological well-being in the execution of their daily duties.

Definition of Key Terms

Stress: According to Ziaei., Yarmohammadi., Izadi laybidi., Nazari and Hashemian (2014) [35] stress is dynamic state whereby people are confronted with an opportunity, obstacle, constraints or demand regarding what one desires and the implication of which is considered to be uncertain, negative, terrifying and important. Stress usually happens a person's physical and emotional abilities fail to match with the demands of the job at hand (Baghianimoghadam. Hatamzadeh, Sharifi., Mehrabbeiki and Ardian, 2015) [2]. It is multi-faceted and may be given different meaning based on the interpretation. It is interpreted based on two major perspectives which are eustress and distress conditions (Selye, 2006) [30]. In the context of fire fighters, eustress is positive stress. In this positive stress (eustress), the fire fighter would have adequate skills, attitudes, knowledge and abilities to cope with their work demands and pressures. On the other hand, distress is negative stress whereby a fire fighter does not have adequate skills, attitudes, knowledge and abilities to cope with external forces and challenges placed on their bodies (Ha., *et al.*, 2008) [9].

Occupational Stress: Is the by-product of complex industrial organization where an individual's abilities are overwhelmed with the demands of the job affecting performance (Santos., Barros and Carolino, 2010) [29]. Occupational stress is

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physically and emotionally harmful especially when the demands of the job do not match or exceed a worker's abilities, available resources or needs. Occupational stress has a tendency of producing some negative effects on to the workers such as high health care costs and increased risk for depression and anxiety (Hoogendoorn., Bongers., De Vet., Ariens., Van Mechelen and Bouter, 2002) [12]. Workers with occupational stress suffer from both physiological stress and psychological stresses in carrying out duties and responsibilities to achieve their key performance indicators (Selye, 2006) [30]. Physiological stress is related to the physical reaction of the body to overwhelming situations. This can be exhibited by the body physically through muscle ache, migraine, lethargic, chest pain, heart palpitation, headaches, abdominal pain, backache, fatigue and sleep disturbance when exposed to several occupational stress triggers in an organisation. Such stressful situations negatively affect the employee's ability to copy with the demands of the job resulting in poor production output, poor quality of work and poor personal health of the employees.

Occupational Stress among Fire Fighters

Fire fighters nature of work is scary. At times it requires the fire fighters to attend to fires in dangerous places in a time-sensitive environments (Burbeck., Coomber., Robinson and Todd, 2019) [5]. In such a situation, if fire fighters delay to arrive at a scene and delay to assemble their firefighting equipment, the outcome can be catastrophic (Ziaei., *et al*., 2014) [35]. Many times fire fighters are required to work in new landscapes where they sometimes take time to locate fire hydrants. At times in such new locations fire fighters face challenges such as non-availability of water or unreliable water sources, confusing fire alarm system information and ineffective communication systems. In some cases fire fighter have difficulties to maneuver their equipment in some buildings exposing life and property to danger.

Firefighting operations is performed any time of the day and in any weather conditions. Many times it is undertaken in unfamiliar environments and it is physically and mentally demanding and exhausting (Santos., *et al*., 2010) [29]. Due to crew variations because of time off, transfers, replacements, death and other emergency responses introduce additional challenges to fire fighters on duty (Ha., *et al*., 2008) [9]. Fire fighters workplaces are many and varied. They range from buildings and scenes of emergency incidents and accidents. Therefore, fire fighters have an unlimited variety of workplaces as emergences can take place anywhere. In such cases the fire fighters may not be familiar with the terrain. Thus, attending to emergencies or disasters with poor knowledge of the surrounding can increase the vulnerability of the fire fighters to occupational stress.

In most cases during fire fighter operations, information about the fire, the locality and the surrounding hazards is usually scarce and limited. This has a bearing in the fire fighters approach to the operation. It can impact negatively to the decision making process of the fire fighters as first responders to emergencies or disasters. During fire brigade emergency operations, information is frequently limited. In emergencies, decisions should be made quickly and precisely despite the unknown factors at an emergency scene such as the incident origin location, what materials are involved or exposed, how long the incident has progressed, what directions the hazard is spreading, where the occupants are located, building construction features, and installed protection systems (Burbeck., *et al*., 2019) [5].

Many times, when fire fighters arrive at the fire scene they often see no exterior indications of fire or smoke. This is common in most in new building that are tightly encapsulated due to modern construction techniques, stricter energy codes, and environmental features (Saijo., Ueno and Hashimoto, 2007) [28]. Even though the smoke and fire maybe showing from the exterior, little is immediately known about the occupants or interior conditions. Emergency scenes are often chaotic and information given to the fire fighters is frequently limited, erroneous or conflicting.

Although the fire fighters are trained and mandated to take action quickly as they receive information about an emergency to save lives and properties that would be exposed to danger, conditions may change during the time it takes fire fighters to set up their equipment to attack the fire (Santos., *et al*., 2010) [29]. Therefore, the fire fighters' ability to adapt, improvise and foresee fire progresses are key skills for successful fire fighters operations and improve resilience.

Sometimes the challenges experienced by fire fighters are a result of the unusual structure of the buildings such as high-rises, underground structures and complex buildings (Burbeck., *et al*., 2002) [38]. Building with such unusual structures often times are not accessible with ladders. This makes accessibility of the limited compromising the firefighting and rescue operations increasing the vulnerability of the fire fighters and the occupants. This is due to the fact that fire fighters would be having limited exit and escape routes. In such cases, there is need for the mobilization of operational resources, training in physical endurance, and dependence on elevators are required. Furthermore there is need for a backup crew that would be doing some ancillary duties behinds the scenes such as air bottle exchange and replenishment operation. Support is needed for basic tasks such as setting up a hose line or rescuing a trapped victim (Burbeck *et al*., 2002) [38].

Fire fighters who have been exposed to stress suffer from physical health problems, psychological stress and emotional challenges such as anxiety and relationship dysfunction. This concurs with the study by Ha., Kim., Seo., Kim., Ryu and Kim (2008) [9] which tend to suggest that security work is one of the most demanding and stressful work after that of the fire fighters. A fire fighters' psychological reaction to civilian catastrophes is equated to those seen in wartime (Ziaei., *et al*., 2014) [35]. An example of this was the sudden death of more than 89 students in a Nyanga bus disaster in 1991, death of 50 people in a Bolt Cutter and Smart Express buses in 2018, death of 45 people and injuries to 24 people in 2017 and a Drifontein turn off bus accident which claimed 31 deaths and 43 serious injuries in Zimbabwe (Outpost, 2020) [39]. Observers to these scenes equated the reaction of both the public and fire fighters to those recorded during World War I (Nyahunda,2017) [40].

An empirical study on cancer cases among emergency workers in the United States of America has immensely contributed to the understanding of the vulnerability among firefighting personnel after these attacks (North *et al*., 2018) [41]. The study revealed that thirteen years after the Twin Towers (September 11, 2001) terrorist attack in the USA the death toll from the attacks continues to grow as thousands of emergency workers contract cancer (Prince, 2014) [26]. Figures showed that more than 2,500 police officers, firefighters, ambulance staff and sanitation workers reported they had cancer in 2014-twice as many as said they had the disease 12 months earlier before the Twin Towers (September 11,2001) attack (Fabio and Ta, 2014) [8]. The Fire Department of New

York (FDNY) documented 863 firefighters and ambulance workers with cancers certified as relating to their work on 11September 2001 (Hodous and Pizatella, 2004) [11].

Even before these infamous attacks, Santos., *et al*., (2010) [29] recognized that stress has a negative impact on an individual's ability to function. Physical and psychological life stressors compound the occurrence of major illnesses, including cancer, diabetes, leukemia, and myocardial infarctions. In addition, psychological distress was prevalent among individuals who have experienced a traumatic life event (Ha., *et al*., 2008) [9].

A number of researchers have examined the possible relationship between stress and cognitive functioning among emergency services personnel (Saijo., *et al*., 2007) [28]. These researchers described the symptoms among emergency care workers as ranging from depression and a lack of cognitive functioning to second-guessing judgment on an emergency scene (Baghianimoghadam., *et al*., 2015) [2]. They also found that emergency personnel have recurring nightmares, flashbacks, and loss of appetite after responding to traumatic incidents. Other researchers have observed that emergency services personnel such as firefighting personnel are also exposed to stressful situations, traumatic incidents (70%) and environmental extremes, such as heat, cold wind, and noise, all of which require adaptive measures (84%) (Ha., *et al*., 2008) [9]. Working under adverse conditions may increase the vulnerability to stress among firefighting personnel. For example, the Nyanga bus disaster in Zimbabwe was described as a pile of wreckages was a mass casualty event that caused extreme stress and psychological distress among the fire fighters who responded to the scene as they were retrieving the bodies.

Many researchers studied stress for many years (Monareh., Akbar and Ali, 2018) [18]. Selye (2006) [30] concentrated his study on the effects of stressors and distressors on firefighters and ambulance personnel. The study revealed that most firefighting personnel had anxiety, pessimism, intrusive and adverse psychological reactions, depending on the duration of exposure to a traumatic incident. Some of the factors that seem to exacerbate stress of the fife fighters include among other things: the size of a fire being fought, the amount of time fighting a fire and being witness to causalities during one's line of duty (Ha., *et al*., 2008) [9]. Furthermore, firefighters may be at risk of suffering from acute stress disorder leading to posttraumatic stress disorder (PTSD) after being involved in a disaster or a traumatic incident (Hoogendoorn., *et al*., 2002) [12]. A study by Monareh., Akbar and Ali (2018) [18] revealed that firefighting personnel may exhibit psychiatric symptoms such as hopelessness, nervousness, loss of appetite, lack of sleep, and constant worry or fear, after witnessing or experiencing a traumatic event. Recurrent of such symptoms can lead to a significant increase in psychiatric problems which may require professional intervention. Therefore, this tend to suggest that fire fighters are exposed to work related stress and daily routine life stressors as they try to balance their work in life-saving efforts with the needs and demands of family life. Painfully, even though they face stress every day, and every situation is complex, little is known about how they cope.

An empirical study on fire fighters in Zimbabwe revealed that these personnel sometimes work in tense, deadly and horrific environments beyond imagination of mankind. Such a working environment exacerbate occupational stress among fire fighters. Surprisingly world-wide most organizations paid little attention to how fire fighters cope with work related stress. Furthermore, organizations have paid little attention to the effects of stress on the ability of fire fighters personnel to function optimally (Burbeck., *et al*., 2019) [5]. Some fire fighters suffer from fatigue, injuries resulting in lack of medical attention during a fire. Sometimes fire fighters are exposed to some over speeding and inappropriate driving contact, work long hours, interrupted sleep, a lack of time to eat meal and sometimes take long time away from home and family (Selye, 2006) [30]. In situations, fire fighters are exposed to psychological stress as the demands of the job out stretches the fire fighters' ability (Santos., *et al*., 2010) [29]. This is so because firefighters does not have a predetermined call of duty, but rather their time at work is determined by the outbreak of fire which can take place anytime.

In a survey conducted in South Africa by Burbeck., *et al*., (2019) [5] some fire fighters reported stress symptoms like: depression, anxiety, cardiovascular diseases, digestive disorders and post combat stress. The survey also indicated that in 60% of road traffic accidents that took place in South Africa between 2016-2018 fire fighters were summoned to either assist to retrieve the dead bodies or rescue the survivors (Burbeck., *et al*., 2019) [5]. This exposed the fire fighters to different work related stress. However, the study did not explain how fire fighters cope with different occupational stresses.

Zimbabwe has been exposed to different incidents that require the attention of fire fighters such as veld fires, road traffic accidents and some emergency rescue operations (Muchinguri, 2016) [21]. In Zimbabwe, although fire fighters work in similar conditions to that of South Africa and USA little has been studied on the vulnerability on the different forms of occupational stress and coping mechanisms with the view of improving their resilience when a disaster thrust (Burbeck., *et al*., 2019) [5]. Little has been studied on how the fire brigade may improve their efficiency, effectiveness and increase resilience in the face of emergencies and disasters.

Theories Underpinning Occupational Stress among Fire Brigade Officers

The paper adopted the engineering approach, physiological approach and psychological approach to in understanding vulnerability to occupational stress as it seeks to create resilience among fire fighters.

Engineering Approach

The engineering approach to occupational stress assumes that stress should viewed as a stimulus characteristic of the person's environment, that should be seen in terms of the load or level of demand placed on the individual, or some aversive (threatening) or noxious element of that environment (Ha., *et al*., 2008) [9]. This approach treats vulnerability to occupational stress as a property of the work environment, and usually as an objectively measurable aspect of that environment. According to the engineering approach, stress produces a straining reaction which although often reversible can, on occasions, prove to be irreversible and damaging. The concept of a stress threshold grows out of this way of thinking and individual differences in this threshold accounts for differences in stress resistance and vulnerability (Burbeck., *et al*., 2019) [5].

Physiological Approach

The physiological approach to the definition and study of stress received its initial impetus from the work of Selye in 2006 [30]. He defined stress as a state manifested by a specific

syndrome which consists of all the non-specific changes within the biologic system that occur when challenged by aversive or noxious stimuli. Physiological approach to stress treats stress as a generalized and nonspecific physiological response syndrome. This is so because for many years, the stress response has been largely conceived in terms of the activation of two neuroendocrine systems, the anterior pituitary-adrenal cortical system and the sympathetic-adrenal medullary system (Monareh., Akbar and Ali, 2018) [18]. Selye (2006) [30] argued that the physiological response is triphasic in nature involving an initial alarm stage (sympathetic-adrenal medullary activation) followed by a stage of resistance (adrenal cortical activation) giving way, under some circumstances, to a final stage of exhaustion (terminal reactivation of the sympathetic adrenal medullary system). Repeated, intense or prolonged elicitation of this physiological response, it is suggested that it increases the wear and tear on the body, and contributes to what is called the diseases of adaptation (Selye, 2006) [30].

Psychological Approach

The third approach to the study of occupational stress is the psychological approach. This approach looks at stress from in terms of the dynamic interaction between the person and their work environment (Saijo., Ueno and Hashimoto, 2007) [28]. When studied, it is either inferred from the existence of problematic person-environment interactions or measured in terms of the cognitive processes and emotional reactions which underpin those interactions as illustrated in figure.1. overleaf.

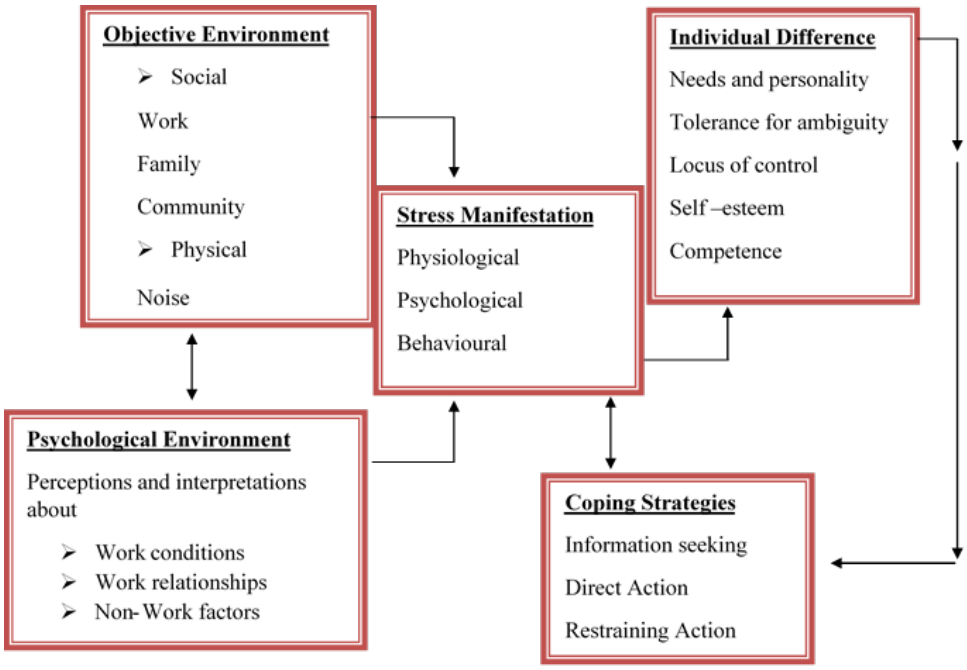


Fig 1: Transaction and interaction between the environment and the person (Source: Tosi *et al*., 2010).

Manifestation of Occupational Stress among Fire Fighters

Occupational stress reactions is classified as psychological, behavioral or physiological (Ziaei., *et al*., 2014) [35]. In psychological forms, occupational stress can manifest in forms of anxiety states and depression. However, in the less serious situations, one's exposure to occupational stress may exhibit itself in through tension, irritability, boredom and job satisfaction (Baghianimoghadam., *et al*., 2015) [2]. Studies by Burbeck., *et al*., (2019) [5] revealed that the feeling of frustration, tension and psychological fatigue were reminders of the burden of responsibility emergency workers should carry.

Saijo., *et al*., (2010) [42] observation that frustration was a reminder of the burden of responsibility of the workers concurs with the survey that was carried out in San Francisco at five public health institutions by Lieter in 2009. The survey revealed that caregivers begun to depersonalize their recipients, treating them as if they were objects rather than people after the public service offered them 5% salary increase against their 35% salary increase proposal. Ha., *et al*., (2008) [9] observed that the once caring professional, medical and paramedical staffs were emotionally calloused seemingly from the working environment they were exposed to.

Hoogendoorn., *et al*., (2002) [12] developed a measure to assess human service workers' feelings of personal accomplishment, emotional exhaustion and depersonalization. Using this measure, Donat, and Mckeegan, (2015) [7] demonstrated that the mental health workers who were perceived by other workers as drained by their jobs were more likely to make negative evaluations of their clients. This tend to suggest that emotionally exhausted workers are less satisfied with their jobs and are easily irritated.

A survey in Saudi Arabia revealed that behavioral forms of occupational stress may be exhibited through aggression towards others and taking longer to finish a task (Monareh., Akbar and Ali, 2018) [18]. A study by Burbeck *et al*., (2002) [38] on occupational stress among Botswana police service revealed that 22% of police officers that were served with memorandum of warnings or reprimanded have increased their consumption of alcohol and 9% were increasingly aggressive to their juniors. These findings concur with Ha., *et al*., (2008) [9] observations. However, Burbeck *et al*., (2002) [38] study did not specify the gender distribution of the participants and neither did they give the age of the participants.

Research on physiological forms of stress led to the conclusion that vulnerability to occupational stress can create changes in metabolism, increased blood pressure headaches and back pain (Selye, 2006) [30]. In a survey by Neale (2014) [43] on American military recruits who were 72hours in the Navy training, some recruits showed physiological forms of

occupational stress such as, increase in cortisol level (19%) heart beat (67%) and urine catecholamine (25%). Brown (2013) [44] noted that an increase in urine catecholamines is associated with anxiety reactions especially epinephrine. However it was not clear whether administration of catecholamines would induce anxiety. Therefore, Bonanno (2014) [4] argued that research associating anxiety and catecholamines had not been conclusive.

Causes of Occupational Stress among Fire Brigade Officers

Firefighting is a very challenging and high-risk job which demands both physical and mental preparedness. Smith and Mcnamara (2012) [31] developed the Sources of Occupational Stress Scale (SOOS) that listed the sources of occupational stress into 14 sources including the following among them: sleep disturbance, job skill concerns, past critical incidents, management conflicts, apprehensions regarding personal safety, co-worker conflict, substandard equipment, reduction in force, wage and benefit worries, conveying news of tragedy, tedium, poor health habits, discrimination, family or financial strain and second job stress. The study revealed that the SOOS instrument appeared to have adequate reliability and concurrent validity for the fire fighters and correlated with job satisfaction and work outcomes. Results from Baker and Williams (2010) [34] study on 78 UK fire fighters indicated that work stress (i.e. organisational stress and incident-related stress) and problem-solving appraisal accounted for 49% of the variance in psychological distress. They found that those reporting higher level of psychological distress also reported less confidence. They also found that individuals in different fire service ranks reported similar levels of organisational stress.

Lee (2010) [14] found that poor physical health was a major stress outcome among 427 emergency service workers (fire service and ambulance services) in England. The results of the study presented a picture of occupational stress, its sources and effects for both public services. The results also showed that job dissatisfaction was revealed as a major problem for the ambulance service and fire service workers. Stoica and Buicu (2010) [46] also investigated job satisfaction but they focused on the relationship between job satisfaction and supervisor leadership behaviour among fire fighters. In the study, the sample was selected from a privatised aviation fire service in Australia and consisted of 56 fire fighters from two stations in Victoria (n=36) and New South Wales (n=20). They used a shortened version of the Smith*., et.al*., (1969) [36] as cited in Harrison (2015) [10] Job Description Index (JDI) to measure job satisfaction and the Leader Behaviour Questionnaire version 12 (LBQXII) to measure employees' perception of their superiors' leadership. The results indicated that there were significant positive relationships between co-worker satisfaction, supervision satisfaction, initiating structure and consideration leadership behaviour.

A study by Lou and Shiau (2014) [15] reported that, social support at home (with family and friends) was significantly higher than satisfaction with co-worker support and low social support and/or high relational conflict (especially work) may predict adverse health outcomes among 1,703 fire fighters and 253 paramedics U.S. A sample. Other studies Maslach (2015) [17] examined 543 male fire fighters and rescue workers from 71 Finland fire brigades by using a cross sectional questionnaire study. The result of their study found that the fire fighters working during the strike reported more stress than those in normal situations. However, they found that their first study conducted about perceived physical work capacity, stress, sleep disturbance and occupational accidents among Finish fire fighters during the normal situation were at the same level as compared to their second study of the Finish fire fighters work during a strike.

Another study by Bickford (2015) [3] poor motivation of employees may result in poor psychological wellbeing. Ackfeldt and Malhotra (2013) [1] described work motivation and coping strategies as a set of internal and external forces that initiate work-related behaviour; determine its form, direction, intensity and duration. This is propels the employee to put an extra effort towards achieving organizational goals. Comparing the level of motivation and job satisfaction with other profession, research studies seem to suggest that fire fighters should motivated to stay to stay on their jobs and even do better in their professions.

According to Karasek (2003) [13] as cited in Kazmi, Shehla and Delawar (2011) [45] a way in which work may affect the health and well-being of workers can be explained by the job demand-control theory of occupational stress. The demand-control model assumes that the work that places high demands beyond the workers' abilities threshold may result in occupational stress. However, Colquitt, Jeffery and Wesson (2011) [6] pointed out that, most studies support the effects of demand and control, but not the interaction between demand and control on occupational stress. Other research studies in the area of occupational stress urged that some aspects of work might be perceived stressful by employees when there is too much work or less work (Lou and Shiau, 2014) [15]. For example having too much work to do (role over load) may be generally considered stressful, but not having enough work to do (role under load) may lead to boredom.

Person-Environment (P-E) fit theory is also important in explaining the vulnerability and causes of occupational stress (Rollinson, 2012) [27]. It places emphasis on the interaction and congruence between the person and the environment. The central hypothesis of the Person –Environment fit theory is that, the misfit between the person and the environment may lead to psychological, physiological and behavioral strains, which ultimately increases chances of occupational stress (Donat, and Mckeegan, 2015) [7]. However, Paton (2010) [25] argued that there is a non-linear relationship between the person and the environment in the Person-Environment fit theory. He further stated that despite whatever selection criteria the Human Resources Department may use to select the best candidate for the job, work is naturally stressful.

The work can be a source of occupational stress due to the environment (Santos., *et al*., 2010) [29]. This environment can be internal or external. The internal environment includes factors that are related to the organizational structure and climate. These include the management styles and poor interpersonal relationships at work. Burbeck *et al*., (2002) [38] further suggest that good interpersonal relationship increases cohesion at workplace and poor interpersonal relationship may increase chances of distress.

Effects of Occupational Stress among Fire Brigade Officers

Occupational stress has unpleasant impacts on employees and organizations including psychological, physical and organizational effects. Anxiety, depression, nervous exhaustion, irritability, aggression, sudden emotional unloading, overeating, impulsive behaviour, inability to make decisions, poor concentration, distraction and heightened sensitivity to criticism are some of the most important

psychological effects of occupational stress (Baghianimoghadam., *et al*., 2015) [2]. The most common physiological effects include migraine headaches, increased heart rate, hypertension, cardiovascular disease, musculoskeletal disorders, pulmonary disease, digestive disorders, kidney disease, rheumatoid arthritis, sleep disorders, headache and immune system disorders. Moreover, some important organizational effects of occupational stress include: absence from work, increased career turnover, low production, alienation of co-workers, job dissatisfaction, reduced commitment and loyalty to the organization, and decline in occupational performance and job quality. In addition, occupational stress may lead to inappropriate behavioural changes such as drug abuse and unsafe workplace behaviours (Ha., *et al*., 2008) [9].

According to Ha., *et al*., (2008) [9] the effects of stress on the performance of emergency personnel were sometimes ignored or regarded as too enigmatic to quantify. According to Monareh., *et al*., (2018) [18] stress is an unavoidable part of working life and life generally. They further observed that while some stress could be a positive motivator, occupational stress among emergency response officers was generally regarded as destructive and even life threatening. It can affect employees' psychological well-being and task performance.

However, research that had been conducted to identify the effects of occupational stress on performance across group of individuals has provided equivocal findings (Burbeck., *et al*., 2019) [5]. For example, military recruits who were 72hours into the navy showed marked impairments on task of memory, vigilance and hand to eye co-ordination. Similarly, another study on Iraq army trainees in 1995 revealed that performance diminished under conditions of high occupational stress related to personal threat (Monareh., *et al*., 2018) [18]. Thus, this tend to suggest that occupational stress has an effect on a person's performance and fire brigade officers are equally affected.

Surprisingly, in the less extreme conditions of psychological laboratories, the finding on the effects of occupational stress on performance was ambiguous. Burbeck *et al*., (2002) [38] observed that laboratory studies have shown that individuals demonstrate a significant narrowing of attention (tunnel-vision) in stressful conditions, which may affect creative problem-solving and therefore impair performance. However, Ha., *et al*., (2008) [9] reported that some individuals demonstrate a broadened attention span under stress and are thus more susceptible to distraction.

Fire fighters have also acknowledged the continuing experience of musculoskeletal pain, stiffness, or discomfort in the absence of physical injury or trauma. One of the effects of adrenaline upon the body is to increase skeletal muscle tension a critical necessity for readiness for combat or flight. In addition, the increased muscular activity observed in response to adrenaline results in lactic acid and ammonia the wastes of muscular activity further increasing the experience of soreness and physical fatigue observed with substantial or prolonged stress (Monareh., *et al*., 2018) [18]. Still other fire fighters have reported the experience of repeated colds, influenza and a lowering of previous levels of resistance to illness. Again, a not surprising result of the effect of adrenaline upon immunosuppression during periods of heightened psychophysiological arousal (Saijo., *et al*., 2007) [28]. While it can be credibly stated that firefighting duties contain high levels of job demands, the existence of high job demand will not, in and of themselves, result in adverse health consequences to the individual performing them. It is only when high job are not prepared for, managed, or acknowledged, that adverse health problems will be observed (Saijo., *et al*., 2007) [28].

A study by Burbeck *et al*., (2002) [38] suggests that occupational stress appears to impair the performance of some individuals in some circumstances, but also appears to enhance performance for other individuals. For instances, in a study of paramedics in South Korea by Moustaka and Theodoros (2010) [19] significant individual variables were found in anxiety responses and performance changes when paramedics were exposed to a stressful simulated scenario. After working through challenging simulated scenarios, 60% of the paramedics demonstrated performance impairment in their ability to perform drug dosage calculations, 20% showed no change in performance and the remaining 20% showed an increase in performance (Bickford, 2015) [3]. However a study by Fabio and Ta, 2002 [37] as cited in Kazmi, Shehla and Delawar (2011) [45] among fire fighters tend to suggest that different body regions of human body experience muscle fatigue and injury when firefighting.

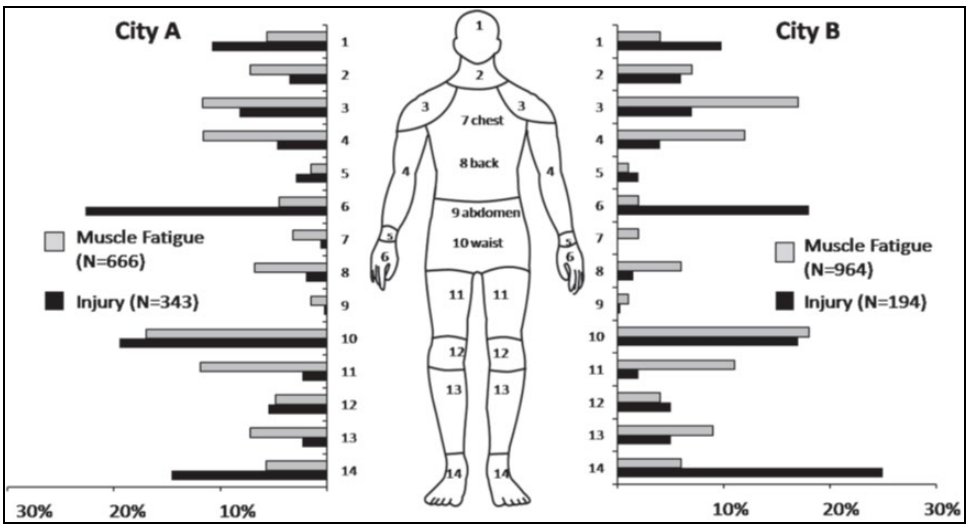


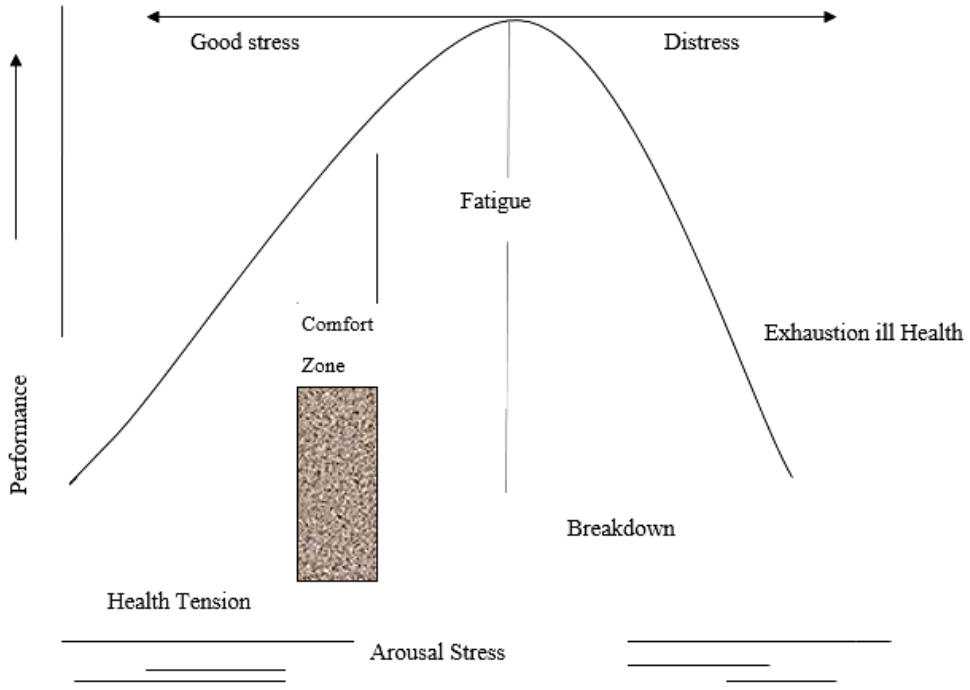
Fig 2: Body regions that experience strain on firefighters (*Source: Fabio and Ta, 2002*) [37]

Values (N) are expressed as the sum of cases (1-head; 2-neck; 3-shoulder; 4-arm; 5-wrist; 6-hand; 7-chest; 8-back; 9-abdomen; 10-waist; 11-thigh; 12-knee; 13-calf; and 14-ankle and foot).

Literature on occupational stress among emergency personnel emphasizes the direct contact with distress, injury, violence and death as central causes of stress (Burbeck *et al*., 2002) [38]. The tension between competing exigencies of call takers (dispatchers) to act instantaneously while simultaneously not overstepping decision-making power, combined with inadequate resources contribute to escalating powerlessness and cumulative stress levels (Smith and Mcnamara, 2012) [31]. The sense of responsibility is complicated by their role as intermediaries between the distressed, frequently panicked and incoherent public and paramedics. Based on these factors and research results it is possible to conclude, that the work of fire brigade officers represents a set of complex tasks, challenging the endurance of the workers and carry along relatively high stress factors and thus a risk of burnout.

Burnout occurs when employees experience prolonged stress responses due to the influence of uncontrolled occupational stress (Ziaei., *et al*., 2014) [35]. This is in line with the explanation by Santos., *et al*., (2010) [29], that burnout is a form of extreme cumulative stress. It is generally noted by most researchers that fire fighters are often exposed to physical, physiological, and psychologically traumatic experiences. Moreover, Burbeck., Coomber., Robinson and Todd (2002) [38] stated that fire fighters may experience chronic stress, which is often associated with constant tension and shift work as a result of working conditions. These conditions can in turn trigger great stress for fire fighters, which in turn can have a significant impact on their quality of life which may cause long-term physical and mental harm. Burnout is characterized by chronic emotional exhaustion, interpersonal cynicism, personal identity, and personal and professional effectiveness (Monareh., *et al*., 2018) [18]. In essence, burnout is considered a mental problem; however, it can have adverse psychological and physical effects on fire fighters. Several studies have documented that burnout has emerged as a dominant form of employment in dangerous and high-risk occupations, such as doctors, nurses, police officers, and fire fighters among others (Santos., *et al*., 2010) [29] Longitudinal studies involving emergency workers have shown that work-related stress is associated with fatigue, burnout, and post-traumatic stress (Monareh., *et al*., 2018) [18]. The effects of burnout among fire fighters can prompt an individual to stop working if he or she cannot control the source of stress that causes burnout.

As illustrated on Figure 3, overleaf, increased stress results in increased productivity up to a certain point, after which things go rapidly downhill (Maslach, 2015) [17]. However, that point or peak differs for each of the emergency response workers, so one needs to be sensitive to the early warning symptoms and signs that suggest a stress overload is starting to push him/her over the hump. Such signals also differ for each individual and can be so subtle that they are often ignored until it is too late (Moustaka and Theodoros, 2010) [19]. Not infrequently, others are aware that one may be headed for trouble before the affected person.



Source: Adopted from: Nixon. Practioner, 1979.

Fig 3: Human Function Curve.

Given the demands of the job during emergency and disaster response, the common experience is that fire fighters are equally affected (Burbeck., *et al*., 2002) [38]. Therefore it is recommendable to recognize signs of depression and burnout and also the difference between critical incidents related stress and cumulative stressors which are characteristic of the emergency and disaster response officers daily work environment into the formal training program.

The National Social Security Authority in Zimbabwe (2010) observed that, while some workers start their careers in excellent physical health, some retire early or even die from occupational related stress disorders. In their health and safety awareness bulletin for the year 2010 the National Social Security Authority observed that workers develop symptoms of occupational stress. This was supported by a survey that was carried by Omar (2011) [24] on American soldiers. The survey had a population sample of 1840 participants. The survey indicated that, the population sample suffered from stress related symptoms such as, anxiety (20%), depression (27%), cardiovascular diseases (11%) digestive disorders

(9%), post-traumatic stress disorder (23%) and attempted suicide (17%) (Omar, 2011) [24]. However, the study did not explain the gender proportion on the population sample; neither did it say how many soldiers died from occupational stress related symptoms. Despite these limitations the study provided valuable information on the effects of occupational stress.

Historically the studies of occupational have been limited to assessments on the effects of stress on-the-job behavior, but there is now a growing recognition on the important consequences work events have for family life (Burbeck., *et al*., 2019) [5]. For example, Mukhalipi (2014) [47] suggested that if a worker's job has a strong, negative impact on family life, as might be the case when occupational stress is 'taken home' the worker might consider giving up the job to preserve the family. An alternative is to relinquish family responsibilities and continue the job. To protect themselves from having to make such choice, many workers reported that they try to maintain a psychological separation between work and the rest of their lives by "leaving the job at the office". However, some critics argue that those in helping professions often find that separation cannot be maintained as the reactions to their jobs may permeate all aspects of their lives especially for fire brigade officers who are usually exposed to horrific scenes and always on call up (Saijo., *et al*., 2007) [28].

Strategies to Reduce Occupational Stress among Fire Brigade Officers

In order for one to design functional prevention programmes and treat employees at risk of occupational stress, it is important to understand the predisposing factors and the nature of the stressful events experienced by the employees. Predisposing factors basically begin with biological status of the individual. Moustaka and Theodoros (2010) [19] advised parents to go for medical checkup before they decide to have children. Medical checkup assist in reducing chances of giving birth to children who are vulnerable and susceptible to "some kinds" of stress by either getting the spouses treated of the problem (Steber, 2012) [32]. Once the spouses are treated, the likelihood of giving birth to ill-health children is reduced. As the children grow into adulthood and are employed elsewhere their chances of succumbing to occupational stress is minimized. Steber (2012) [32] quickly clarified that it is important to note that, he was not suggesting that children are born stressful, rather that the combination of environmental, neurobiological and health status of the person give rise to the likelihood of vulnerability and susceptibility to occupational stress in adulthood. However, Burbeck *et al*., (2002) [38] argued th*et al*though some people have been exonerated of any ill-health prior to employment, there is evidence suggesting that they still develop stress disorders after joining employment. This therefore tend to suggest that occupational stress is unavoidable.

Work experience seem to play an important role on one's susceptibility to occupational stress. Studies tend to suggest that the longer the employee stays at his job, the more resilient the employee would be to occupational stress (Ha., *et al*., 2008) [9]. However Saijo., *et al*., (2007) [28] argued that experience has little impact on one's susceptibility to occupational stress. If one's self-expectations are not met the employee may fail to cope, especially in emergency work. Psychological traits, states and self-expectations may influence the employee's ability to solve problems and address job related challenges (Steber, 2012) [32].

Social support from the family and workmates play an important role in coping with occupational stress for fire fighters. It gives the victim a chance to express how he/she feels and get suggestions of how to solve the problem at hand. Santos., *et al*., (2010) [29] observed that this makes the victim have a sense of belonging and disclose things that are bothering him/her. However, if the family or workmates are part of the stressors, the social support theory may not yield desirable results on coping with occupational stress as it might exacerbates stress as the significant others in the society would be perpetrators.

Literature on occupational stress placed very little emphasis is placed on pharmacological treatment of occupational stress. Ha., *et al*., (2008) [9] observed that, antidepressants of the tricyclic genes, for example neuroprime and amitriptyline, are sometimes used in the management of anxiety even in the absence of depression. However, the main problem with the use of psychopharmacological drugs is their failure to cure the disorder, such that the individual needs to stay on the drug for prolonged period as maintenance dose to stabilize the anxiety. This may result in drug dependence.

The complexity and demands of work, political influence, funding issues, and scheduling increase the pressure and stress on fire fighters in their professional and private lives. Better training, education, career counselling, and managerial duty updates will assist fire departments in their efforts to address social change. Fire fighters should have access to physical activity in fire stations, confidence-building social support from other Fire fighters and group cohesiveness from their own crews to help to reduce stress. Further training should include rapid intervention teams; inter-collaboration with hospital administration, staff, and personnel training; attendance at training sessions for national incident management systems, and updated paramedic and emergency medical technician training in the field.

More training and increased fire department personnel involvement will lead to positive social change within fire departments, including group work, groupthink, and the ability to learn prior to firefighting and medical emergencies (Burbeck., *et al*., 2019) [5]. Although their working environment may be extremely dangerous, adequately trained fire brigade officers will be able to provide a greater standard of care to the community, develop their skills, and assist in extreme emergencies. Lifesaving skills and regular training sessions will promote positive changes in firefighting techniques and demonstrate the competence of fire brigade officers to the community and residents.

Conclusion

Occupational stress is an unavoidable part of working life and life generally. It can affect employees' psychological, physiological and emotional well-being and task performance. Occupational stress has unpleasant impacts on employees and organizations. Therefore, it requires the attention of every organisation to come up with measures that will reduce instances of occupational stress among its employees.

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