**Improving Disaster Resilience Among the Elderly Living in Care/ Nursing Homes during Heatwaves**

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**Introduction**

Heatwaves pose significant challenges to vulnerable populations, particularly the elderly residing in care homes. Enhancing disaster resilience is crucial to safeguard the wellbeing and safety of older individuals in these settings as a result of the increased frequency and severity of heatwaves brought on by climate change (Sheng *et al*., 2023). Due to climate change, heatwaves are growing more frequent and powerful, posing a serious risk to vulnerable groups like the elderly living in nursing facilities, according to the Center for Climate Change and Energy Solutions (2022). The elderly are particularly at risk for heat-related illnesses and mortality due to a combination of age-related physiological changes, underlying medical problems, and restricted access to resources. To reduce the negative consequences of heatwaves, it is essential to increase this population's catastrophe resilience. A heatwave is an extended period of unusually hot weather, usually with high temperatures that are much higher than average for the area or season. Long-lasting heat, excessive humidity, and little to no relief during the day or night are the hallmarks of heatwaves. Both humid and dry climates can experience them, and they are frequently accompanied by stagnant air and little to no precipitation. There is a discernible pattern of rising temperatures around the planet, with hot days becoming hotter and more frequent while cold days are becoming fewer in number. across contrast to daily record low temperatures, the frequency of daily record high temperatures has increased by half across the continental United States over the past ten years. The Center for Climate Change and Energy Solutions (2022) states that this is a substantial change from the nearly 1:1 ratio seen in the 1950s.

Although some regions still maintain the record for heatwaves in the 1930s, which is partly related to the Dust Bowl and the conversion of prairie to agriculture, the frequency of heatwaves is increasing, especially in the western United States (Sheng *et al*., 2023). High levels of humidity increase the risk posed by heatwaves. A measurement of this combined effect is provided by the heat index, which combines temperature and humidity. According to a recent study, the number of nationwide yearly days with a heat index above 100 degrees Fahrenheit is expected to increase, while the number of days with a heat index above 105 degrees Fahrenheit is expected to rise three-fold (Center for Climate Change and Energy Solutions, 2022). A dramatic shift in temperature trends is being caused by global warming and the corresponding rise in greenhouse gas emissions, with hotter and more frequent heatwaves becoming a worry (Sheng *et al*., 2023). In most places, daily high and low temperatures will rise by at least 5 degrees Fahrenheit by the middle of the century and by 10 degrees Fahrenheit by the end if greenhouse gas emissions are not drastically reduced. By the middle of the century, most locations are expected to have 20 to 30 additional days that are 90 degrees Fahrenheit or above (Center for Climate Change and Energy Solutions, 2022). Extreme heat is one of the main factors in weather-related mortality, making heatwaves a serious threat to human health. Agribusiness and energy infrastructure are also at risk from heatwaves (Sheng *et al*., 2023). This article investigates how heatwaves, a type of natural disaster, can have a negative impact on the elderly population living in nursing homes, including by increasing mortality. It also examines different strategies to increase the elderly population's disaster resilience during heatwaves, with a focus on preventative measures, infrastructure modifications, community involvement, and policy interventions.

**Discussion**

**Vulnerabilities of the Elderly in Care/ Nursing Homes**

Physiological vulnerabilities related to changes caused by aging and medical disorders (Kar, 2016); the number of old people live in care facilities is growing as the world's population ages. Recognizing and comprehending the risks that this particular demographic encounters is crucial because it enables us to create measures that will effectively protect their wellbeing and safety. Physiological factors are among the many vulnerabilities that elderly people living in nursing homes suffer, and they have a big impact on how they do in terms of their health. Numerous physiological changes in the human body result from aging, and older people are more vulnerable to negative health impacts under extreme conditions like heatwaves as a result of these changes, which affect their general functioning and resilience. As an example, as people age, their ability to control their body temperature declines, leaving them more susceptible to heat stress and illnesses associated with it (Kar, 2016). The risk of heat-related problems can also be increased by aging-related changes in the cardiovascular system and decreased sweating. The health conditions of the elderly in nursing or care homes is another significant vulnerability; compared to their younger counterparts, the senior population in nursing homes frequently has a higher prevalence of chronic health disorders (Parke *et al*., 2018). Their susceptibility to heatwaves can be considerably increased by illnesses like cardiovascular disease, respiratory problems, diabetes, and immune system impairments. These underlying health issues could make it more difficult for them to adapt to intense heat, damage their thermoregulatory systems, and increase their risk of developing heat-related illnesses and consequences. In addition, many senior residents of nursing homes are taking various medications to treat their chronic illnesses. Diuretics and antihypertensive pharmaceuticals, for example, can interfere with the body's ability to maintain fluid balance and raise the risk of dehydration during heatwaves (Parke *et al*., 2018). Subsequently, healthcare professionals and other caregivers must evaluate the drugs that residents are taking and take into account any necessary modifications or safety measures to lessen the influence of heat on prescription side effects.

**Measures to Enhance Heatwave Resilience**

Elderly people living in nursing homes are at serious risk from heatwaves. Numerous precautions should be taken in order to increase their resistance to excessive heat and lessen its negative effects. These precautions include medical interventions, early warning systems, heatwave strategies, and education and awareness campaigns. Awareness and education are essentially self-care techniques and preparations for heat waves; education is crucial in enabling the elderly and care facility workers to respond appropriately to heatwaves (Eady *et al*., 2020). Effective communication channels and early warning systems enable prompt responses, while education and awareness campaigns encourage people to exercise self-care. It is crucial to provide thorough information about heatwave dangers, heat-related sickness symptoms, and self-care techniques. The personnel of care facilities should receive training on how to spot the symptoms of heat stress and heatstroke as well as how to use cooling techniques properly. Additionally, residents should be made aware of the need of staying hydrated, looking for shade, and dressing appropriately when it's hot outside. People can make wise judgments and actively take part in their personal heatwave preparedness by increasing their knowledge and awareness. Early detection techniques involve the effective communication and transmission of heatwave alerts; the ability to take preventative action depends on the timely and accurate broadcast of heatwave signals. To receive alerts from appropriate authorities, such as meteorological agencies or public health departments, care facilities should set up efficient communication channels. To make sure everyone is educated and ready, these notifications can be distributed to care facility personnel, residents, and their relatives. Eady *et al.* (2020) advise that the alerts should be accompanied by clear instructions on how to respond, such as increasing monitoring of residents' well-being and deploying cooling techniques. Care facilities can also think about implementing technology, such as text message alerts or mobile applications, to quickly distribute heatwave warnings to all stakeholders.

There should be in place comprehensive heatwave guidelines, plans and protocols for dealing with heatwaves. A systematic and well-coordinated reaction can only be achieved by creating and implementing heatwave strategies and protocols. These plans must to specify how to monitor indoor temperatures, guarantee sufficient ventilation, and give residents of care facilities access to cool spaces. They should also specify particular precautions for residents who have underlying medical issues, such as modifying medication schedules and carefully monitoring their level of hydration. The strategies should be continuously examined and revised to include the knowledge gained from prior heatwave incidents (Okwuofu-Thomas, 2017). To achieve thorough and efficient heatwave resilience, it is crucial to include all important stakeholders in the creation and implementation process, including care home personnel, medical professionals, and residents' families. Medical interventions involving consistent health examinations and medication administration should be undertaken as a measure for promoting heatwave resilience in this community. Monitoring the health of elderly residents during heatwaves requires routine health examinations. Daily assessments of residents' vital signs, such as body temperature, pulse, and blood pressure, should be made by care facility staff. Any deviations from the usual ranges need to be addressed right once, and the proper medical procedures need to be started. Additionally, it's important to monitor medications during heatwaves because some of them raise the risk of dehydration or other issues brought on by the heat. To lessen the potential negative effects of excessive heat, healthcare practitioners should assess residents' prescription regimens and think about changing dosages or timings (Okwuofu-Thomas, 2017). To maintain adequate coordination and monitoring of residents' medical needs during heatwave events, regular contact between healthcare professionals, care home employees, and residents' families is essential.

Infrastructure Upgrades for Care Facilities

Implementing infrastructure changes that improve the thermal comfort and safety of the environment is essential to effectively reducing the effects of heatwaves on the elderly living in care homes. Improvements to building layout and ventilation, the addition of cooling systems, the use of insulation and heat-resistant materials, and the provision of an emergency power source are a few examples of these adaptations. Natural ventilation and shading in respective buildings should be enhanced through building design and ventilation as designing nursing homes with natural ventilation and shading in mind would help keep the interiors of the buildings from overheating (van Hoof *et al.,* 2017). Larger windows, adjustable blinds or curtains, and cross-ventilation devices can all be used to achieve this. During the early morning and late evening, properly positioned windows and openings allow for the intake of cold air, and shading mechanisms like awnings or external blinds can reduce excessive solar heat input. Additionally, reducing heat absorption can be accomplished by covering exterior surfaces with light-colored or reflecting materials. Cooling systems should be put in place, such as by setting up fans and air conditioners; the installation of air conditioning equipment becomes necessary to maintain a reasonable indoor temperature in areas subject to intense heatwaves. In order to offer sufficient cooling in communal spaces, resident rooms, and care facilities, air conditioning systems should be of the right size and installed in the right locations. To improve airflow and add cooling, ceiling or floor fans can also be used, especially in places where air conditioning may not be available (van Hoof *et al*., 2017). These cooling systems can help avoid heat-related illnesses in elderly residents and greatly lessen the discomfort brought on by intense heat.

Heat-resistant materials and insulation need to be put in place to lower heat transmission and raise energy efficiency. Utilizing less air conditioning and preserving cooler indoor temperatures are two benefits of effective insulation; they reduce heat transfer from the outside to the inside by using insulating components like high-quality wall, roof, and double-glazed windows. Furthermore, using heat-resistant materials while creating a structure helps lessen the effects of radiant heat. These interventions, according to van Hoof *et al.* (2017), not only increase thermal comfort but also increase energy efficiency by minimizing energy use and the need for excessive cooling. The respective buildings and facilities should have an emergency power supply to ensure to continuous electrical access during heatwaves. Power outages during heat waves are widespread, and the lack of energy might endanger the health of senior citizens who depend on cooling systems. To guarantee continuous access to electricity, care facilities should have backup generators and other emergency power supply systems. These systems should undergo routine testing, be kept up to date, and have enough power to support crucial duties like running fans, air conditioners, and other important machinery. To properly handle power outages, there should be adequate fuel reserves and defined rules for activating and controlling the emergency power supply.

Community Support and Participation

Active community involvement and assistance are necessary for the effective management of heatwaves and the safety of older people living in nursing homes. The construction of heatwave shelters, cooperative partnerships, social support networks, and the encouragement of sociability and wellbeing can all considerably improve the resilience of care facilities as well as the larger community (Cannuscio, 2003). Collaborative partnerships with local communities, volunteers, and NGOs are essential for building resilience to heatwaves among the elderly in care/ nursing homes. They can help spread awareness, organize resources, and put strategies into action. According to Baldwin *et al.* (2020), Local communities, volunteers, and NGOs can provide knowledge, direction, and resources to help nursing homes prepare for heatwaves. Further, Baldwin *et al*. (2020) argue that community centers and neighborhood watch programs as social support networks should also be established; during heatwaves, social support networks can be critical in ensuring the safety of elderly people living in nursing homes. Creating community centers where locals may congregate, socialize, and access assistance services can promote a sense of community and offer a secure location during times of high heat. These facilities can provide social events, instructional programs on heatwave readiness, and cooling amenities. Social support networks can be strengthened and the community's general resilience can be improved by regular contact and collaboration between care facility personnel, neighborhood residents, and community groups. Heatwave shelters to act as temporary cooling facilities and secure areas for those in need should also be put in place.

Shelters from heatwaves are essential in giving temporary relief and security for those who are most in need, such as elderly residents of nursing facilities. These shelters, which come with fans, air conditioning, and water stations, can be set up in public buildings like churches, community centers, or schools. They offer people who might not have access to suitable cooling systems in their homes a secure and comfortable atmosphere in their care facilities or homes (Cannuscio, 2003). Elderly people in nursing homes should have easy access to heatwave shelters that are properly placed and equipped with mobility options. These shelters, which are staffed by experienced professionals, can provide relief during the hottest times of the day and aid in avoiding heat-related illnesses and emergencies. Actions to fight social isolation and loneliness will improve socialization and well-being, and so should always be promoted as heat waves can make seniors feel more isolated and lonely, especially those who live in nursing homes. Maintaining mental and emotional health during times of excessive heat requires encouraging socializing and overall wellbeing. Care facilities ought to plan enjoyable socialization-promoting activities like outings with friends, craft sessions, and educational events (Baldwin *et al*., 2020). Participating in these activities with volunteers, people of the community, and local businesses helps promote a sense of belonging and community. Furthermore, programs like buddy systems, in which seniors are partnered with volunteers or staff members, can offer companionship and support during the heatwave. Regular channels of connection with family members, such as phone conversations or video chats, can also aid in reducing feelings of loneliness and promoting mental wellbeing.

Governmental Initiatives and Policy Interventions

The government/ authorities are a major player in enhancing heatwave resilience in elderly homes; the elderly in nursing homes are more resilient to heatwaves thanks to effective policy interventions and government activities. Legislative measures, funding and grants, inter-sectoral collaboration, research, and collection of data. Authorities such as governments should implement laws and regulations that promote resilience to heatwaves among this population. The safety and wellbeing of elderly residents in nursing homes must be guaranteed by the development and enforcement of heatwave resilience legislation. These laws may include building guidelines and specifications that mandate care facilities build in heatwave resilience to their infrastructure. This may include recommendations for optimal insulation, ventilation, and cooling system installation (Fagan-Watson & Burchell, 2016). Regulations can also specify the number of workers needed during heatwaves to ensure proper care and support for the residents. Policymakers can encourage the adoption of heatwave resilience measures and hold care facilities accountable for ensuring safe and comfortable conditions for their inhabitants by defining clear rules and enforcing compliance. Authorities also ought to allocate funds and resources for training initiatives and upgrading infrastructure targeted at improving heatwave resilience requires allocating enough resources and grants. Governments have the ability to finance the installation of air conditioners, fans, and other cooling systems in nursing homes.

In order to minimize heat transfer, money might also be set aside for retrofitting buildings with insulation and heat-resistant materials. Support should also be given to training programs for care home staff on how to prepare for heatwaves, identify heat-related illnesses, and execute effective interventions. Governments can provide a well-coordinated and effective response to heatwaves, limiting the hazards encountered by older people in care homes, by encouraging teamwork and utilizing the expertise of many authorities. Further, research and studies to identify vulnerabilities and gauge the success of interventions, coupled with data collection should be undertaken to inform evidence-based policy decisions, research and data collection are essential (Walker et al., 2011). Governments should encourage research on the physiological effects of heat waves, the limitations of the infrastructure, and social dynamics, as well as the vulnerabilities of the elderly in nursing facilities. These investigations can help pinpoint problem areas and guide focused actions. Governments should also fund research to determine how well heatwave resistance measures and treatments work. This involves keeping tabs on and examining information on illnesses brought on by the heat, the length of time it takes to respond to emergencies, and the results of initiatives put into practice (Fagan-Watson & Burchell, 2016). Policymakers may improve their strategies and make sure that their efforts and policies are effective and supported by evidence by routinely analyzing vulnerabilities and gauging the success of interventions.

**Conclusion**

In summary, to protect the health and wellbeing of senior residents living in nursing homes during heatwaves, disaster resilience must be increased. Resilience can be improved by preventative measures, infrastructure modifications, community involvement, and policy changes. Residents and employees of care homes can be adequately prepared with the help of education and awareness campaigns, early warning systems, and heatwave plans. Infrastructure upgrades like new cooling systems and altered building designs contribute to safer residential areas. Initiatives to engage the community strengthen social networks and support systems, reducing the negative impacts of isolation. Comprehensive heatwave resilience initiatives and inter-sectoral coordination require government policy and funding. The advancement of intervention effectiveness and evidence-based decision-making are made possible through ongoing research and data collection. The senior residents of care facilities can have their ability to withstand disasters considerably increased by using a multifaceted strategy that includes several tactics. To maintain their safety and quality of life during heatwave situations, it is crucial to prioritize their protection and well-being.

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