Climate change is hurting Philadelphians' health, and the worst is yet to come

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The day they found Lee Odgers, it was so hot that the wax candles inside her Northeast Philadelphia apartment had started to melt.

The 87-year-old woman had been dead for hours, too long for investigators to get an accurate reading of her body temperature at the time of her death. They could not list hyperthermia—an abnormally high temperature—as the cause of death.

Yet the city was in the grip of an 11-day stretch with temperatures in the 90s that month, July 1993, and Odgers lived alone on the second floor of a red-brick rowhouse—a staple of the Philadelphia streetscape that retains heat with dangerous efficiency. She had no air conditioning and her windows were closed.

Then-medical examiner Haresh Mirchandani decided that a broader recognition of heat's deadly impact was in order. The deaths of Odgers and 100 others that month would be classified as "heat-related."

Call him a prophet for the climate change era.

Philadelphia ramped up its heat-emergency response program that summer, extending hours for air-conditioned public facilities and swimming pools, assigning block captains to check on older, vulnerable residents, even asking utility companies to delay shutoffs for unpaid accounts. The city has prevented an average of 45 heat-related deaths a year since then, Brown University researchers estimated in a 2018 study.

But with the continued rise in temperatures, the challenge becomes more daunting by the year.

Between 1950 and 1999, the city saw an average of three days a year when temperatures exceeded 95 degrees. By the end of this century, temperatures could cross that sweltering threshold on 17 to 52 days a year, according to a 2015 report from the Mayor's Office of Sustainability, using models from the World Climate Research Programme. The wide range in that projection depends on how much

governments rein in emissions of carbon dioxide and other heat-trapping greenhouse gases.

For those whose health already is compromised—such as the old and frail who lack air conditioning, and people with heart or kidney disease—physicians say this hotter future will be dangerous.

Extreme heat can kill in a variety of ways. Older people's blood vessels are less able to dilate in order to dissipate heat, adding strain on the heart. They also are more prone to dehydration and loss of vital electrolytes, raising the risk of kidney failure and irregular heartbeat—especially for those whose organs already are compromised. People with weaker lungs struggle to breathe, as heat contributes to the formation of ground-level ozone, the main component of smog.

"You get this kind of multi-factorial bomb that's going off," said Gregory McDonald, dean of the school of health sciences at the Philadelphia College of Osteopathic Medicine.

And in some cases, as happened dozens of times in July 1993, the immediate cause is not apparent.

Carlos Fonseca had just started a fellowship with the Philadelphia Medical Examiner's Office—his final year of training as a forensic pathologist—and his first weekend shift at the morgue came that July.

A typical day meant five or 10 bodies, often younger victims of drug overdoses, gunshots, and car accidents. But when he came in that Saturday, the death toll was in the dozens and the victims were disproportionately old and frail.

"The refrigerator was full," he recalled. "There were so many bodies. I was like, 'What's going on?' "

Colleagues were summoned to handle the overflow. The next day, there were dozens more bodies, said Fonseca, now deputy medical examiner in Morris County, N.J.

By the end of the heat wave, medical examiners would identify 17 victims who met the formal definition of hyperthermia, having a core temperature above 105 degrees. But dozens of others were found too late for that measurement, in some cases more than a day after they died.

Odgers, the 87-year-old who had the windows closed in her Northeast Philadelphia apartment, was typical. She lived alone and had declined offers of help. Researchers say that not only are the elderly are less able to regulate their body temperatures, but they can be less able to realize they are overheating.

"I offered to get her an air conditioner, but she refused," a relative said at the time. "She was a very independent-type person."

Medical examiner Mirchandani and his colleagues, with the support of then-Health Commissioner Robert K. Ross, came up with a set of criteria for such cases:

If a victim was frail and elderly, or even was younger and suffering from a chronic illness, and was found in a hot environment, the death would be classified as heat-related. In addition to the 17 formal cases of hyperthermia, the office determined that the extreme heat had contributed to 101 more deaths, bringing the toll to 118.

Initially viewed as alarmist by some, that definition soon became accepted by the research community, recalled McDonald, the medical school dean, who worked for Mirchandani at the time.

"That was definitely a game changer," he said.

Two years later, when the frail and elderly died in disproportionate numbers during a severe Chicago heat wave, officials there took the same tack: More than 450 deaths were classified as heat-related.

The effects of climate change are felt unequally around the world, with developing nations so far bearing the brunt of health consequence. Yet even in a big U.S. city such as Philadelphia, disparities also are clear.

In Philadelphia during a heat wave, temperatures in poorer, pavement-dense neighborhoods can be as much as 20 degrees higher than in leafier parts of the city, researchers have found. And residents of the hotter areas may be less equipped to cope, lacking air conditioning or money to power it.

In a first step toward addressing the imbalance, representatives from the Mayor's Office of Sustainability surveyed residents last year in Hunting Park, a lower-income section of the city that tends to be hit hard by the heat.

The neighborhood is not near any of the 12 air-conditioned library branches that are kept open late during heat health emergencies. So the sustainability office asked leaders of churches and mosques in the area if they could remain open as an informal alternative, and some were receptive, director Christine Knapp said. Other proposals include working with community groups to plant more trees, even adding bus shelters to shield people from the sun.

The need is urgent, Knapp said: "How can we start preparing some of our communities to understand what that heat is going to feel like, and how to make them more resilient?"

When the Department of Public Health declares a heat emergency, the city also contracts with the Philadelphia Corporation for Aging to take

emergency calls until midnight. In cases of dire need, a nurse is dispatched to the person's home.

The world at large also can do its part by limiting emissions, health experts say. Average global temperatures already have increased by nearly 2 degrees Fahrenheit since preindustrial times. The extent to which future warming can be limited will have a direct impact on human health, University of Bristol researchers found in a June study. If the increase is kept within one more degree, Philadelphia and 14 other U.S. cities would save hundreds of lives a year, compared with the death toll if average temperatures increased by 3 more degrees, the authors found.

In the more immediate future, the field of medicine is exploring ways to help the vulnerable cope. Medical schools have started to add units on climate medicine. And physicians are pondering how medications might need to be tweaked during a heat wave.

Patients with heart failure, for example, commonly take diuretics to eliminate excess bodily fluid and reduce the strain on their weakened hearts. But along with excreting the water, patients lose potassium—an essential element for heart muscle function.

The risk is especially pronounced in hot weather, said Sean Hennessy, a professor of epidemiology at the University of Pennsylvania's Perelman School of Medicine. In a study earlier this year, he and colleagues found that patients who take diuretics were more likely to survive hot temperatures if they also took potassium supplements.

Research on those with other chronic illnesses is increasingly needed, Hennessy said.

"People with heart failure, the frail elderly, people who don't have access to air conditioning, they're all vulnerable," he said. "Something that you

and I would bounce back from easily, that same thing could put them in a lot more trouble."

Because if the projections are correct, it is not a question of whether the northeastern U.S. will see another heat wave like the one that killed 118 Philadelphians in 1993.