Experts call for home battery storage to protect vulnerable during outages

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Extreme weather driven by climate change is making power outages more commonplace even as the need for electricity-dependent home health equipment grows. In this context, battery storage can help protect

medically vulnerable households, according to researchers at Columbia University Mailman School of Public Health. The article is published in the journal *Futures*.

For the millions reliant on electricity for home medical equipment, even short-term power outages can lead to a potentially life-threatening situation. Society's most vulnerable populations—elders, the ill, and the poor—face the greatest risks. Only a fraction of individuals who rely on medical equipment like oxygen concentrators, nebulizers, ventilators, dialysis, and sleep apnea machines has an alternative source of power to use in the event of an outage. During outages related to the 2019 Camp Fire in Northern California, vulnerable residents reported complications, including one man who awoke when his sleep apnea breathing machine failed in the middle of the night and he couldn't breathe. One woman had to spend the night in her wheelchair because her special mattress required electricity to remain inflated.

The researchers call for policies to support resilient power systems—ideally, battery storage paired with solar photovoltaics—that provide clean, reliable emergency backup power by storing electricity for use when grid power is unavailable. One model is the California Self-Generation Incentive Program, which provides incentives for residential battery storage, and includes energy storage incentives for low-income residents. Additional lessons come from a study in Puerto Rico after Hurricane Maria, which found that residents preferred solar-powered battery backups to diesel generators due to ease of use, low cost, and an elimination of fumes that exacerbate asthma and other lung conditions.

Community facilities like senior centers, public schools, and health centers often lack backup power, too. During an emergency, vulnerable residents typically turn to these facilities for heating/cooling, refrigeration to store perishable items and temperature-regulated medicines, lighting, and outlets to charge cell phones and medical

equipment. Without backup power, critical facilities ultimately must limit operations or close entirely.

"Climate change coupled with an aging energy infrastructure is driving extreme weather-related power outages, as we've seen recently in Texas," says co-author Diana Hernández, Ph.D., associate professor of sociomedical sciences. "The technology to improve resiliency and energy independence exists, and it needs to be made more accessible to those who could most benefit. Battery storage units, particularly those powered by the sun, are a critical tool to help vulnerable individuals and communities survive the climate crisis."

In a separate review of scientific literature published in *Current Environmental Health Reports*, researchers found that power outages have important health consequences ranging from carbon monoxide poisoning, temperature-related illness, gastrointestinal illness, and mortality to cardiovascular, respiratory, and renal disease hospitalizations, especially for individuals relying on electricity-dependent medical equipment. Evidence from the U.S. suggests older adults, poorer families, and individuals of non-Hispanic Black and Hispanic race/ethnicity are least likely to have a three-day supply of food, drinking water, and medication, a preparedness measure for power outages.

Overall, the researchers found that more work is needed to better define and capture the relevant exposures and outcomes. "There is urgent need for data to inform disaster mitigation, preparedness, and response policies (and budgets) in an increasingly energy-reliant world," said first author Joan Casey, Ph.D., assistant professor of environmental health sciences at Columbia Mailman School.

More information: Marriele Mango et al, Resilient Power: Battery storage as a home-based solution to address climate-related power

outages for medically vulnerable populations, *Futures* (2021). DOI: 10.1016/j.futures.2021.102707

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