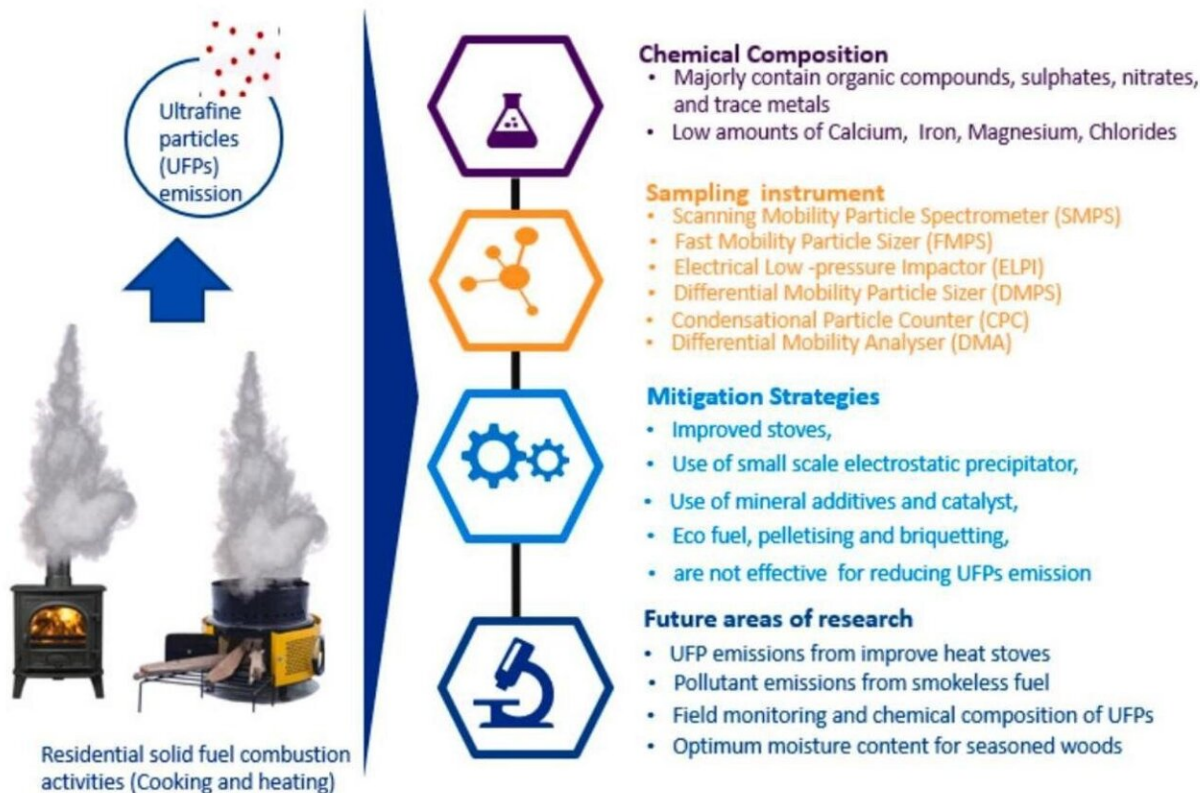


Improved cookstoves emit more ultrafine particles than conventional stoves, finds new study

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Graphical abstract



Graphical abstract. Credit: *Science of The Total Environment* (2023). DOI: 10.1016/j.scitotenv.2023.163747

Improved cookstoves, which are widely used for cooking in developing countries, produce twice as many harmful ultrafine air pollution particles (PM_{0.1}) as conventional stoves, according to a new study from the University of Surrey.

Researchers from Surrey's Global Center for Clean Air Research (GCARE) found that while improved cookstoves can reduce [fine particles](#) (PM_{2.5}) by up to 65%, they can actually increase the emission of ultrafine particles.

The GCARE team also found that ultrafine particles' large surface areas allow them to absorb a significant amount of hazardous metals and chemicals, such as arsenic, lead, nitrate, sulfate and [polycyclic aromatic hydrocarbons](#).

Professor Prashant Kumar, co-author of the study and Director of GCARE at the University of Surrey, said, "The global cost-of-living crisis has led to many turning to wood, coal, peat and other biomass fuels for domestic [fuel](#) combustion to cook or heat their homes.

Unfortunately, our research suggests that there may be an even higher health cost to pay in the near future.

"These tiny particles can easily infiltrate the nasal passages, leading to [potential health risks](#), and our most vulnerable will pick up that bill."

Improved cookstoves are designed to reduce [fuel consumption](#), smoke and harmful emissions during cooking. In addition, they are often designed to be more efficient and to burn fuel more thoroughly than traditional stoves.

Despite the known health impacts of domestic burning, it is thought that

2.8 billion people globally use solid fuels for heating their homes. About 20% of households in Ireland use wood for fuel. According to the Environment Protection Agency, approximately 12.7 million people in America use wood as a major heat source.

Professor Kumar added, "One bright spot that needs to be investigated further is the development of DEFRA-approved heat stoves that are designed to improve combustion efficiency and reduce pollutant emission. The use of eco-fuel pellets that emit fewer toxic fumes should also be considered as part of the package for improving the status quo.

"This is clearly a global issue impacting developing countries and superpowers alike, and so we all need to come together to ensure that clean air is available to all of society and not just the fortunate few."

The study is published in the journal *Science of The Total Environment*.

More information: Abidemi Kuye et al, A review of the physicochemical characteristics of ultrafine particle emissions from domestic solid fuel combustion during cooking and heating, *Science of The Total Environment* (2023). [DOI: 10.1016/j.scitotenv.2023.163747](https://doi.org/10.1016/j.scitotenv.2023.163747)

Provided by University of Surrey

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