

## Podcast Script: Indoor Air Quality

**Narrator:** Air quality inside the home plays an important role in human health, particularly for children and other vulnerable populations. In many regions of the country, particularly in the winter months, wood burning for residential heating contributes significantly to indoor air pollution in the form of particulate matter (or PM). Poor air quality can contribute to or worsen serious health problems, such as respiratory illness and infection, asthma, and cardiovascular diseases. Since approximately 11 million homes in the U.S. use wood as a primary or supplemental heating fuel and nearly half of the world's population rely on biomass such as wood for cooking and heating, this is a very important issue of global relevance.

Dr. Curtis Noonan is a professor of Epidemiology at the University of Montana. He says that reliance on biomass fuel is related to global health disparities because while wood may be plentiful and inexpensive, it contributes more to air pollution than some other more expensive fuel sources, such as natural gas.

**Noonan:** Globally the biggest contributor to household air pollution or poor indoor air quality, particularly in lower income countries or developing countries, is biomass cook stoves. Commonly, communities or households that rely on wood for heating tend to have lower incomes. This combined with rural settings where such fuel use is common, can result in populations that are both highly exposed and perhaps less likely to have access to health care.

The World Health Organization suggests that as many as 4 million people die prematurely from illnesses that are attributable to household air pollution. These include diseases such as stroke, cardiovascular disease, chronic obstructive pulmonary disease, and lung cancer among others.

**Narrator:** As with many relationships between environmental exposures and health problems, some people tend to be more vulnerable to the health impacts of exposure to air pollutants than others. For example, the elderly who may have compromised immune systems, and children whose lungs are still developing. But indoor air pollution and poor air quality are not just problematic for poor countries far away. Noonan and his team have been working in rural communities and with tribal populations in Montana and New Mexico to characterize indoor air pollution, evaluate different intervention strategies, and explore health outcomes in children and the elderly.

**Noonan:** Our work for several years now, with support from National Institute of Environmental Health Sciences, has focused on identifying sustainable and effective interventions to improve indoor air quality and health in households that use wood for heating.

**Narrator:** Noonan and his team have looked at several intervention strategies. The first was a woodstove change-out program where older less efficient woodstoves were replaced with newer more efficient ones. While this intervention decreased the amount of pollution leaving the home, the team found that the largest impact on indoor air quality had more to do with household wood burning practices.

**Noonan:** It turns out that behavior is really a huge factor in terms of indoor air quality. Regardless of whether you have an old woodstove or a new woodstove, if you burn wood that has a high moisture content you're going to generate a lot of smoke.

**Narrator:** Another intervention Noonan's team has tested is an air filter. This simple plug-in device has shown 60% improvements in air quality. But they discovered that this intervention was also limited as a long-term strategy because some households would not continue to use the air filter after completing the study, would use it inconsistently, or fail to replace the filter as needed.

**Noonan:** Some of it has to do with perceptions of cost, perhaps concern about noise, in some of the communities we work in space is a big issue, so even though these are relatively small devices they do take up space. So that has led us to look for another type of intervention that we hope will be an efficacious and sustainable intervention, and that is a focus on education and behavioral change among families that use woodstoves for heating.

**Narrator:** Working with local communities and tailoring outreach materials to specific audiences is incredibly important in translating research into action to address environmental exposures and health risks. The educational intervention developed by Noonan's team focuses on introducing people to concepts of best burn practices and tools to promote these practices to protect and improve their health.

**Noonan:** Partnering with community members has been essential for developing our educational intervention. It's been a real education for us to learn about people's traditional relationships with fire that's then passed down through oral history. So just to give you an example, in one of the indigenous communities that we work with the abalone shell is a symbol of fire, and that symbol is linked to a story about the origins of fire. So rather than presenting fire and smoke as negative or something that harms health, we enter the conversation with our community participants with an acknowledgement of the traditional importance of fire and smoke, and through that platform we can introduce ways to both appreciate the importance of fire, but also to share knowledge on ways to reduce the harmful effects of smoke exposures.

**Narrator:** By partnering with local communities, Noonan and his team hope to increase knowledge and behaviors that will make their interventions successful in the long term. They are also currently studying if these interventions result in improvements in respiratory infections in children and in respiratory and cardiac outcomes in elderly Native populations. These interventions are important because Noonan's work is contributing to a large body of evidence from the literature showing that improving air quality can also improve health outcomes. For example, Noonan's research has shown that children have improvements in asthma symptoms when indoor air pollution is reduced.

Finally, Noonan noted that people should still be aware of indoor air pollution even if they do not use woodstoves for heat in their homes. There are other contributors to poor indoor air quality, including outdoor air pollution from wood burning neighbors or from wild fires, that can then infiltrate homes downwind of the source. Noonan's findings and intervention strategies are relevant for these exposure scenarios as well as for the communities his team interacts with.

For more information about indoor air quality and Noonan's community-based interventions, you can visit our website at [niehs.nih.gov/podcasts](https://niehs.nih.gov/podcasts).

Thanks to today's guest Curtis Noonan.

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