

# The NNE-CTR Quarterly Newsletter



Fall 2024

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# Welcome to the NNE-CTR's Fall Newsletter



October is health literacy month, and so here's a humbling statistic: It's estimated that nine of out 10 of us, at some times or in some ways, experience health illiteracy.

That's right; a full ninety percent of us occasionally misunderstand something about our health. That's a lot of misunderstanding. But if nine out of 10 of us miss something, clearly, the issue is one of communication, not understanding.

So, let's go back and think about the term "health literacy" for a moment. What if we replaced it—at least in our minds—with something like "tailored and helpful health communication" that places the onus where it belongs, on the communicator?

The NNE-CTR embraces the critical responsibility of communicating clearly and respectfully to experts and non-experts alike—because shared understanding brings people together. For example, our Biostatistics, Epidemiology, and Research Design Core helps researchers turn raw data into narratives that explain and clarify. Our Community Engagement and Outreach Core initiates and maintains critical conversations with the people and groups of the region we serve. The Tracking and Evaluation Core works to answer the "So, what?" question of our work by crafting summaries about the effect our work is having. And a chief aim of every issue of this newsletter is to explain in common English the innovative work of our researchers.

This effort is greatly helped by the NNE-CTR members whose work we feature in the fall edition. So, in this issue, you'll read about Project ECHO and how people like Drs. Sally Kraft and Mark Pasanen are thinking way upstream—in other words, where people live. You'll learn about Dr. Charlie MacLean's career-long interest in understanding and addressing health issues across populations. And you'll hear from experts and researchers looking at air quality in that most personal of spaces, the home.

In all cases, the concern is people, our neighbors. The goal is to investigate and address the issues that concern them, and then respectfully communicate new knowledge that helps us all live better, healthier lives. It takes time, but the rewards are endless.

Our modern lives are bombarded with information, half-information, and downright falsehoods. Amid this overload, it will be those voices sharing the best, most helpful, most understandable, and most actionable information who will drive the critical narratives that safeguard the health of every person, animal, and plant on the planet.

Your voice—your human, everyday voice—matters. Let's keep up the conversation.





Clifford Rosen, MD



Gary Stein, Ph.D.

## A Message from Our PIs

### Our Valued Partners:

# The Northern New England New England CO-OP Practice and Community Based Research Network

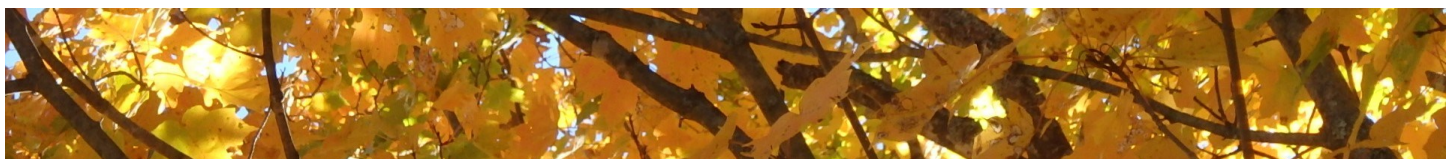
There is increasing recognition and appreciation of the importance that primary care provides in prevention, early detection, treatment, and survivorship of acute and chronic disease in rural northern New England. The expectation and responsibility of our primary care practices is for healthcare capabilities that are available at academic medical centers in Portland, Maine, Burlington, Vermont, and West Lebanon, New Hampshire.

For the past forty years, the Northern New England CO-OP Practice and Community Based Research Network (NNE-PCBRN) has been committed to optimizing healthcare delivery in community-based settings. Through strategic partnerships and advances in telehealth, specialized expertise is becoming increasingly available for patients with restricted access.

The NNE-CTR partnership with the NNE-PCBRN prioritizes addressing the health and healthcare challenges of northern New England rurality. Working with healthcare professionals in northern New England primary care practices, innovative strategies are being developed to support practice-based research to enhance rural healthcare delivery. Resources are being secured for primary care practices to engage in clinical investigation and clinical trials.

There is understanding for the magnitude of the initiative. Confidence in progress is reinforced by the shared dedication of the NNE-CTR and the NNE-PCBRN to health equity and the NIH initiative to improve access to clinical research that is focused on informed medical care with emphasis on communities underrepresented in clinical investigation or underserved in healthcare. For the NNE-CTR and the NNE-PCBRN, expansion of evidence-based research contributes to improve patient outcomes is not an option but an obligation and welcomed responsibility.

—Gary and Cliff



# Just Wade In

Déjà vu. Except with a twist. That was the Vermont summer flooding of 2024.

The twist was that, compared with last year's disaster, fewer volunteers showed up to help with the cleanup. Fewer businesses sent employees, the state did not allow workers paid time to volunteer, and as a result, the University of Vermont, waiting on the governor's office for a cue, did not, either.

If we collectively decide there was no major flooding, then perception becomes reality. And here's how that looks: On a hot and muggy Saturday two days after the flood, while volunteers on one side of Route 100 sweltered in mud-covered Tyvek suits mucking out basements, just feet away, riders in sleek biker duds pedaled their way up to ride the App Gap.

While it's true that both the wealthy and the poor are affected by natural disasters, it's also true that floods are often eerily knowing demographers that carve lines in the landscape between households with sufficient resources and those that struggle. Suddenly, geography is what determines whether you'll have a road you can drive on, running water, electricity, and air conditioning on an 85-degree day.



*A volunteer's pair of muck boots dries in the sun*

In the academic-research sector, the current buzz is all about how to bring together town and gown. And for so many reasons: We face existential climate, population, environmental and social issues. Politically, we're increasingly divided. Trust is down, suspicion is up. Government workers enjoy only about a 30% approval rating among young adults. Fewer than half of adults say a four-year college degree is worth the money (and that's only if the student doesn't have to take out loans).

And so, we're talking more and more about the need to bring both research and innovations to the folks who drive the economic and social and political realities of the states we live in. We're talking about forming economic partnerships. We're talking about grant possibilities and climate resilience. We're talking about housing and job creation and building the future. We're talking about how to listen. At the University of Vermont, just days before the floods, the RISE Summit in June brought together nearly 1000 people to brainstorm about just these things.

But as the saying goes, the devil is in the details. Between the eagerness to be involved and the flood response, there's a vast middle ground. In public health, we talk often about "barriers" between people and better health. Ironically, our vast middle ground is littered with barriers of our own in the form of systems and approvals and permissions.

Rahm Emanuel said, "You never let a good crisis go to waste." and, at least based on the institutional response to the 2024 floods, we did. So, what to do?

One day, likely sooner than we hope, it'll be déjà vu all over again and we'll have another opportunity to not let a good crisis go to waste. Indeed, as this newsletter hits your inbox, residents of the Southeast U.S. are just beginning the long recovery from the damage of two powerful hurricanes.

Clearly, our systems have much evolving to do, and it's up to us to push them, hard, so that we adequately respond to disasters. And there's good news there. Just one result of the RISE Summit is that, with the active participation of UVM Interim President Patricia Prelock, there are now conversations taking place across departments at the university.

In the meantime, as we wait for systems to catch up, we can think as humans instead of as the subjects of systems. What does that look like?

It's easy: Just wade in.

In Waterbury, Vt, a volunteer drove two hours in response to a local TV news report. One woman, there with her daughter, took vacation time from her job UVM to help. A third volunteer, Scott, had been in the state less than a year. Another, Justin, had arrived just a month before. In response to a joke about the timing of their moves to the state, both smiled and said they had no regrets, were, in fact, happy to pitch in and get to know their neighbors.

In an instant, these flood volunteers and hundreds more across the state learned buckets about their neighbors and how the systems around them support them or fall short. They accessed the very people the academic-research sector wants to know, serve and understand better. They formed new relationships and did the critical work of restoring social connection. They didn't need to work through a system or obtain funding or approval. They just waded in.

That option is available to us all. Crisis becomes an opportunity for research projects because there's no better way to get to know your neighbors—and their challenges and issues and hopes—than to be there when they need a hand. "What ifs ...?" spring to mind. Inspirations strike.

Your NNE-CTR, with a pledge to improve the health of our northern New England neighbors, is here to brainstorm, fund, and assist those ideas. Do you have thoughts? Talk to us.

Amid all the mud and misery, last summer's volunteers managed to plant the seeds that have the potential to bring us all closer together, to restore trust, and to create the conversations that help us collectively design a future to feel hopeful about. In doing so, they just might have showed the way for us all.

Let's consider that a challenge accepted.



# On the Road to Making Practice Perfect

## A Doorway Conversation with Dr. Charles MacLean

*Over a long and fruitful career, Dr. Charles MacLean has served patients, students, the Larner College of Medicine, the NNE-CTR, and the Northern New England CO-OP Practice and Community Based Research Network in his various roles as internal medicine doctor, professor, associate dean for primary care, and liaison. He's also conducted research in a variety of areas including depression, opioid prescription, obstructive lung disease, cannabinoids, pharmacist-primary care integration, health policy, health literacy, systems, information and more. On his way out the door to retirement, we had a chance to chat about his work and legacy. This interview has been edited for length and clarity.*



*Charles MacLean, M.D.*

**Matt:** What does the day-to-day of your soon-to-be-former job look like?

**Charlie:** Not all medical schools have an associate dean that is focused on primary care issues. I view the role as kind of two main categories of work. One is work within the college, so within the Larner College of Medicine, working on curriculum to provide our students with the best possible education in primary care. And as you know, primary care is viewed sort of as the backbone of the U.S. healthcare system. It's the first point of entry for most people, and there's a whole body of research, both in the U.S. and internationally, that shows that the higher quality and more available primary care is, the higher the quality of the outcomes among the population.

And then the other arm of support is helping our students be successful in community practices. That's kind of a workforce development strategy. In rural settings, they can see what it's like to practice in those settings and decide whether it's right for them. So, we work with practices to help make those experiences as good as they can be. It's good for our students [and] it's interesting for the practices to have learners around and then it might attract students to end up practicing in those locations.

**Matt:** You have another role that you've described as akin to that of an extension agent for a land-grant university. Could you elaborate?

**Charlie:** In my office of primary care, we have various programs that help support the primary care workforce. We bring the latest quality information on whatever topic is most pertinent in primary care. So [for example] maybe a new class of drugs comes out [or] people don't know

about a new treatment approach to a condition [or] a new problem that's arisen. Topics might include prescribing opioids, new classes of meds for diabetes or weight loss, meds for anxiety or depression, other sort of prevalent issues. We offer this to practices around the state at no charge to them. We also offer a Project ECHO (*more on Project ECHO is available later in this newsletter*).

**MATT:** You've had an extensive research career. What is the common element that ties together all the far-flung topics you've tackled?

**CHARLIE:** Most of my research has been in topics that are pertinent to primary care. I'm interested in chronic disease management. So, if a patient's sitting across from me and we're having a conversation about management of blood pressure and we're adjusting medications towards a target, that's very much a personal connection. The concept of chronic disease management is sort of taking a step back and saying, OK, [a patient's] blood pressure may be under good control, but how am I doing for my panel of patients with hypertension? If I have a panel of 1000 people and the prevalence of hypertension is 30%, I've got 300 people with hypertension. So, using benchmarking, peer comparison interventions to improve, and thinking population instead of individuals—that's the underlying theme of what I've researched over the years.

*"Thinking population instead of individuals, that's the underlying theme of what I've researched over the years."*

**Matt:** Let's talk about your role with the NNE-CTR.

**Charlie:** I'm a past board member of the co-op formerly known as Dartmouth Co-op (now the Northern New England CO-OP Practice and Community Based Research Network, often referred to as the PCBRN), and I've been a member there since I first started my career in Vermont 35 years ago.

The whole concept of a PCBRN is that it's answering questions that arise out of daily practice. What are the things that are bothering you in your practice today? What are problems that you see that need to be fixed? Because if they're an issue for you and your practice, they're probably an issue for many other people who are doing similar kinds of work. It really typically is more focused on improving a process.

**Matt:** Clearly, discovery regarding systems is an important theme in your career.

**Charlie:** There is a continuum across this research spectrum from pure research on one end to pure quality improvement implementation on the other. The thing about discovery is it's new and

exciting, and so anywhere along that spectrum can be interesting. So, I've found the benefits of being part of a PCBRN and playing a role with the NNE CTR have been the intellectual stimulation that comes out of not just viewing your day job as seeing people one at a time, but really fixing the bigger system. The other motivating piece is just the collegiality--meeting other people who are curious and trying to fix stuff and comparing notes of how different practices work and what brings people joy in their work every day.

In playing the role as the liaison between the NNE CTR and the PCBRN, my role has been to get people excited about participating in activities of the NNE CTR. And so I can speak from experience about the fun projects I've been on, what I've gotten out of it, the fun people I've met and how it can just be an extra added part of your career.

*"As the liaison between the NNE CTR and the PCBRN, my role has been to get people excited about participating in activities of the NNE CTR. And so I can speak from experience about the fun projects I've been on, what I've gotten out of it, the fun people I've met and how it can just be an extra added part of your career."*

There's a lot of innovations that can be tested in primary care that actually help to make your job go more smoothly. [For instance], when it comes to burnout, there's a lot of contributors to burnout, but to me, one of the key ingredients or contributors is a lack of self-efficacy. If you go home at the end of the day [and] you've helped some people, that's a good day. If you go home at the end of the day and you feel like you're beating your head against the wall, that's not a good day, right?

So anything we can do to make us feel that we're doing quality work and helping people individually or populations or helping our colleagues, then you know that's what really helps people feel optimistic about their jobs and want to keep doing them. People are willing to work hard as long as they feel like they're getting stuff done.

*"Anything we can do to make us feel that we're doing quality work and helping people individually or populations or helping our colleagues, that's what really helps people feel optimistic about their jobs and want to keep doing them."*

**Matt:** What's an example of a great research relationship that you've enjoyed over the years?

**Charlie:** Neil Corson is my counterpart as the liaison to the PCBRN from Maine. We try to connect investigators from our respective states to collaborate with one another. So, if somebody says,



'Hey, do you know how I can broaden this project to include sites from more than just Vermont?' then I would reach out to him. And then we have a counterpart, Meagan Stabler, at Dartmouth. The three of us interconnect investigators and primary care people as much as possible.

**MATT:** I am curious to hear your thoughts about the next generation that you've been helping train and inform, the young people who are going to step into your shoes, and along with all that, your thoughts on the future of population health studies.

**Charlie:** The biggest advantage people being trained now have is the fact that electronic medical records are ubiquitous. So, doing population medicine is orders of magnitude easier now than it used to be, because if you were trying to figure out, "OK, who do I have in my practice? Who has diabetes?", there were piles of paper charts filed in cabinets, and the amount of manual effort it took was just huge.

And so now it's really at the fingertips of every clinician to be able to query their system to say, show me whatever populations of interest who had an operation here last year, who went to the emergency department, who has diabetes, who's over 65 and has hypertension that's well controlled and is on these three medicines--all those slices are really easy to produce. It's easier now than ever before to get people excited about population health approaches.

**Matt:** What is your advice for today's students/tomorrow's researcher-physicians?

*"It's easier now than ever before to get people excited about population health approaches."*

**Charlie:** Getting some training in research design is really an important next step. To design a good quality improvement project or a good research project, you need to know some fundamentals; you need to know some analytic approaches, a little bit of statistics. Not that you're going to become necessarily an expert statistician, but at least you need to know how to talk to a statistician and understand one another.

So, you know, finding a little bit of professional development or training and then finding good collaborators to round out a team because research, just like clinical care, requires inputs from a lot of different people, and having a team that can bring different areas of expertise is really critical. And that's kind of what the CTR is designed to do, right?

There's the Professional Development Core that's designed to help people bring their skill level up. There's connectivity to find good collaborators, and there's people on the front lines looking for research collaborators. There's research-intensive folks who are looking for clinical folks to partner with. There's really great opportunity to support one another.

**Matt:** So you're saying the future looks bright?

**Charlie:** We're moving towards a future where the available data across systems is only going to get better. I had a clinical experience a couple weeks ago where a patient was moving to Vermont from out of state and had a huge medical history, [an] organ transplant and a lot of things going on. And then on their way here, they got sick and were admitted at another hospital halfway between here and where they are coming from.

*"I'm very optimistic about the future because of the availability of data and particularly the interoperability of systems."*

[They spent a] a month in the hospital, super complicated ICU, rehab, the whole thing and then arrived here, and I'm seeing this person a week later, and all of that information was available to me. [Just a few years ago] I probably would have had a stack of faxes that were blurry and they would have been faxed in twice because someone couldn't find them and they would just be impossible to go through.

I feel like from a safety perspective and ease of use, it's just night and day, so that that makes me super optimistic about the future.

**Matt:** One gets the feeling that you won't be retiring entirely.

**Charlie:** I definitely am going to keep my hand in where I'm needed or can be helpful. I think staying involved with primary care and doing whatever I can to support the clinical mission, the research mission, support the next generation, that's where I'm going to continue to be active. I was on a call yesterday where I was supporting a junior faculty member who is supporting a student on a project where I was kind of playing the role as the statistician for a colleague who's not. I'm no expert, but I could help that person help that student, and so doing that kind of mentoring support for people is always fun.



# Your Project ECHO Primer

(Because if you're not going, you don't know what you're missing)

*It's this simple: If you're reading this newsletter, then ECHOs are for you. If you don't know about Project ECHO and the programs you could join at MaineHealth, Dartmouth Hitchcock Medical Center, or the University of Vermont's Larner College of Medicine, we think you'll like what you read here.*

*Your ECHO guides today will be program coordinators Kelly Barnes (MaineHealth), Dr. Sally Kraft (Dartmouth Hitchcock Medical Center), and Dr. Mark Pasanen (University of Vermont).*

## **"What is Project ECHO, anyway?"**

*ECHO is a nice acronym, but it stands for a less than descriptive title: Extension for Community Healthcare Outcomes. What the name may lack in beauty is made up for in the elegance of the model. Think in terms of a mini-course that can run from a few months to years depending on popular demand. The idea is to educate and share ideas around specific topics to improve practice and outcomes. The idea was launched at the University of New Mexico in 2003 by Dr. Sanjeev Arora. Kelly Barnes discusses the model's roots in rural medicine.*

**Kelly Barnes:** [Medical specialists] in New Mexico wanted to reach physicians six hours away to train them on how to treat people with hepatitis C rather than having (them) send their patients to the University of New Mexico Hospital for treatment. [Patients] weren't coming because they didn't have the resources to travel to the place where the specialty care was provided. And so, people were dying of hep C when it's actually a very curable condition.

[The ECHO model] has morphed over the years to be applicable to many different areas. [People are] using the ECHO model in India and Africa and places where they can train community health care workers because there aren't enough physicians to meet the needs of some of those countries.

So, obviously this lends itself well to rural areas because we can use technology to teach people rather than have all the community healthcare workers travel to the one place where they can get the education.

But now it's actually used not just in medicine, but in education or in research or in other areas where you just want to bring people together without having them have to travel. So, it doesn't have to be exclusively for rural practitioners anymore.



*Kelly Barnes, MaineHealth  
Project ECHO coordinator*

### **“What happens in an ECHO session?”**

*ECHO “courses” are held via video and each session in a series includes a teaching (didactic) component, a case study related to it, and discussion. Attendee numbers are kept relatively small to provide a sense of community, openness, and collegiality as participants interact, share, and advise.*

**Mark Pasanen:** This is not a seminar. (Each ECHO session features) some basic didactic information to give us a base to work off of, but that is going to be half or less than half of the session. The other half is going to be us talking about what's out there and happening in your practice and how it can help. And so that is 100%, what makes it more interesting than putting their together a webinar series; it allows us to hear the voice of the people and what they're doing and where they're struggling.



*Dr. Mark Pasanen,  
University of Vermont  
Larner College of Medicine*

**Kelly Barnes:** It's supposed to be interactive. It's meant to be like little, tiny adult education-sized pearls and information with Q&A for half of it, and then the other half has to be a case that ideally comes from the community, comes from the participants.

### **“Sounds interesting! Are these ECHOs open to anyone?”**

*Yes, although with guidelines. Let's say you see an ECHO series that's of interest to you (and you can find the websites at the bottom of this article). You are welcome to sign up, but interest/expertise and commitment are key. Kraft and Barnes explain.*

**Sally Kraft:** ECHOs [offer] not only the ability to touch so many people, at such an affordable price—zero for the participant who's dialing in—but also the ability to use that as a tool to bridge that gap between health care and health outcomes and the public or public health. And to me, it just seems like an incredibly efficient way of reaching a very broad audience and bringing people together who normally don't get in the same conference room. It's 45 minutes or an hour at lunchtime every other month. That's not that big a deal to really start to address broader health issues, not just health care service issues.



*Dr. Sally Kraft, Dartmouth  
Health Medical Center Project  
ECHO coordinator*

**Kelly Barnes:** We welcome anybody to attend our ECHOs. We aim for having 40 to 50 people on an individual call. Over 50, it gets way too big, although it has happened that people are reluctant to cap and so they say, 'Oh, if you're interested, we don't want to push you away.'

The message is we don't want people to just float in for one topic that interests them and then never see them again. The idea of any ECHO series is that it's going to run for six to 10 months and we would hope that you would come to as many as you possibly can during that time period, because [for example], this year in geriatrics the whole 10 months they've decided to focus on dementia because it's such a concern among PCPs and they're just seeing a lot of it. But the first session is diagnosing it. And the second session is about different treatments. And so, they build on each other.

**“Um ... But it sounds like ECHOs are strictly for medical professionals.”**

*Given that three medical institutions provide ECHOs in our region, it's natural to assume that the featured topics would be all strictly medical. And for sure that's a central focus. But ECHOs are now held in hundreds of countries and have hosted over six million people, and the topics have ranged widely. That's no different in our region.*

**Mark Pasanen:** As time has gone on, we've covered many areas from chronic pain to mental health, diabetes, tick-borne disease. But we've also started to think about things like connecting our school nurses. We did an ECHO with the judges of Vermont where we learned a lot about helping them understand the substance-use crisis which they were seeing every day.

I think I probably said I came away from that knowing my gosh, being a judge is hard. And they're not just these big, bad people making these decisions around taking kids away from families who are having these stressors of substance use. They're incredibly thoughtful and they really appreciated the opportunity to talk about some of their cases with their colleagues.

**Sally Kraft:** [At the Dartmouth Hitchcock Medical Center], we really live and breathe the fact that 20% of health is probably determined by our clinical care; 80% by the conditions in which we work, live, and play. We have focused our ECHO program on being extremely broad. We really have developed this program to share knowledge in order to improve the health and health equity of patients and communities.

*“We really live and breathe the fact that 20% of health is determined by our clinical care; 80% by the conditions in which we work, live, and play.”* —Dr. Sally Kraft

We're focusing on getting upstream—really, really upstream—talking about the political determinants of health and the real social drivers. More than half of our ECHOs have been community-focused. We've done plenty of clinical courses. But what I've really been excited about have been the courses we've developed thinking about that 80% component of what creates health—courses for community health workers, courses for employers on how do you support people in the workplace who have mental health disease or substance use disorders.

One of our most exciting courses was related to town health officers and how do we support them as they work with a particular problem which was hoarding and people living in squalor. I think the most innovative ECHO we've produced is the Political Determinants of Health. This course was developed in response to the fact that we identified that state governments and state policy are probably going to have more impact on population health in the future than ever before.

**“Project ECHO sounds like a supportive space to meet smart people.”**

*ECHOs are even more than that. The ECHO model also creates a much-appreciated sense of community.*

**Kelly Barnes:** I think what's really interesting about our ECHOs and why they last so long is

because we really create a community of learners while supporting each other.

**Sally Kraft:**

It's not even so much what you're talking to people about. It's the dialogue of the ECHO that is really important, having people feel safe as they're asking questions, offering observations. It's really great. This is not unique to our ECHO, I'm sure, but we survey everyone pre and post from our courses and I think it's 96 or 98% of the attendees say that they feel less isolation after the course. And we're all dealing with really big problems and we have to create more community.

*"[The reason] our ECHOs last so long is that we create a community of learners while supporting each other."* —Kelly Barnes

**Mark Pasanen:** I think it's absolutely been important to be able to just talk about the situations that are haunting you at night and you don't know what to do. We're like, come on, present your toughest stuff. That's what we're here to talk about. That door is open and I'm very grateful that we've been able to open that up for a lot of the providers who may not even have a partner. Some of them are in practicing by themselves. They're all kind of swamped.

I think the sort of space that we've created--and I think so true of many of the ECHOs--is a safe space. And so I think just having an environment where we literally go, like, "This is hard work. The work you're doing is so important. And I can just tell how much you care about this person." They know they have someone who's trying to help them. And I get goosebumps when the people say it. It's just really empowering [for them to] get up tomorrow do it again.

**"But surely I must have to have some kind of affiliation in order to sign up?"**

*You don't have to be affiliated with any of the three institutions whose ECHOs are featured here to request access to an ECHO series, but if you're not a member of the NNE-CTR, you ought to be! It's free and it opens the door to a whole toolkit of valuable resources. Just click [here](#).*

**"OK, I'm in! How can I learn more about the topics that apply to me?"**

*Check out the links below for information on current and upcoming ECHO sessions. And when you're scrolling through, consider this: All ECHO programs area are also open to ideas for new series, so if you have something on your mind, propose it!*

<https://www.dartmouth-hitchcock.org/project-echo>

<https://www.mainehealth.org/health-care-professionals/project-echo>

<http://www.med.uvm.edu/ahec/healthprofessionals/continuing-education-and-quality-improvement/project-echo>



# The Air is Really Clean Here ... Right?



## Part I: Problems, Perspectives, and Research Possibilities Regarding Indoor Air Quality

We take over 20,000 breaths a day, and, according to the American Lung Association, 7.5 million breaths a year. That's a lot of air entering our lungs.

Here in northern New England, where we're surrounded by greenery and wild landscapes, it's common to assume the air we're breathing is pristine. But the reality is more nuanced than that, and so a better answer to the question of local air quality is a two-word sentence:

It depends.

This article is part one of a two-part series. It's intended for researchers, citizens groups and everyday people alike. Its purpose is to ponder that miraculous mix of oxygen and nitrogen and other gasses and compounds we all rely on with every breath and to, well, clear the air about air quality and our health.

## **Are You In or Are You Out?**

The assumption that our local air is pristine is understandable. The general improvement in America's air quality is one of the perhaps under-recognized success stories of the last half-century. Since 1970, levels of six dangerous pollutants (particulate matter 2.5 and particulate matter 10, sulfur dioxide, nitric oxide, volatile organic compounds, carbon monoxide and lead) have decreased by 77%. That alone is impressive, but consider that in 1970, the U.S. gross domestic product (GDP) was about a billion dollars and the population was a little over 200 million. Today, the current GDP is well over 28 trillion dollars and the country's population stands at 341 million. A success story, indeed.

That's not the whole picture, however. From the increasingly frequent and increasingly larger wildfires in places like California and Canada to common household products, many factors affect our air both inside our homes and out.

With fall upon us, we're about to start spending the vast majority of our time indoors. So, in part one of this series, we take a look at indoor air.

*Give yourself this pop quiz: True or false: "When I think about air quality, I think mostly about the air inside my home." If you answered "false," then you've put your finger on the challenge and the problem.*

## **An Issue (Very) Close to Home**

When we utter the phrase, "I need to get a breath of fresh air," we're not talking about going into the next room. We're invariably talking about going outside. And the cliché is apt: Indoors is where a variety of irritants and pollutants affect the quality of our air. Fortunately, it's also the place over which we can exercise a great deal of control, in effect, becoming our own air quality monitors.

But give yourself this pop quiz: True or false: "When I think about air quality, I think mostly about the air inside my home." If you answered "false," then you've put your finger on the challenge and the problem.

Heidi Hales, Ph.D., is the Director of Air Quality for Vermont's Department of Environmental Conservation (DEC). "In the area of risk perception, researchers have found that people are, in general, more vocal and active about those issues they feel are out of their control than those that they can

exercise power over," says Hales. "So, for example, a concerned citizen's group might protest a manufacturing facility or a landfill due to air impacts, but individuals are traditionally often less active when it comes to affecting the air quality in their own homes."

That may be slowly changing. Michelle Thompson is a public health industrial hygienist for the Vermont Department of Health, where she is tasked with helping the public create healthier indoor spaces. She said, "I think there's been a really nice increased focus on indoor air quality, in particular after the pandemic, and people are just more aware of their indoor environment." Along with this, Thompson said, there has been more funding to examine indoor air issues. However, "I think there's



still a lot that we can do to make people more aware of contaminants indoors and to help them address those issues." In many cases, she said, "We're encouraging [people] to use safer products and they're having a hard time either understanding why or finding and switching to those products."

Behavior is one significant issue, but in addition, it turns out that to truly make progress, there is much about indoor air we still need to learn.

### **Behind Closed Doors (and Windows)**

Cigarette smoke is the leading cause of lung cancer deaths and radon is number two. Both are well-studied indoor air pollutants. But, according to the U.S. Environmental Protection Agency, a typical home can contain many other harmful pollutants, including mold, cleaning products, pesticides, perfumes and other personal-care products. Pollutants can also reach dangerous levels due to the improper use of heating or cooking devices and inadequate ventilation. To the EPA's list, the American Lung Association adds other sources such as dust, asbestos, cockroaches and dust mites, formaldehyde, and pet dander.

Thompson said that among the Vermont Department of Health's concerns is mold, "especially with all of the flooding and extreme weather events" the region has been experiencing. With increased moisture comes increased risk of health effects, particularly for those with asthma. And according to researchers, our region is indeed becoming wetter as a result of climate change, which is related to increased incidence of mold exposure.



*Common household products can contribute to indoor air quality issues.*

When people call the Vermont Department of Health about an indoor air issue, it's usually not with a specific culprit in mind. "Most often, the calls that come in are, 'I'm experiencing these symptoms,'" said Thompson, "And they're a big range of symptoms. They've got a cough, a headache, they're tired, those kinds of symptoms."

Thompson then walks callers through a list. "What are you doing in your home? Have you changed anything? Have you renovated? Have you started using new products? Do you have new furniture? When did the symptoms start?' So, I have a whole list of questions that I go through and try to try to walk them through that because sometimes that's not what people are thinking."

People often assume there's a one-size-fits-all way to test indoor air quality, but as Thompson explains, often "testing isn't helpful because we have a very few residential exposure limits for contaminants." In the professional workplace, such exposure limits do exist. In other words, best practices and regulations exist in the spaces where the chemicals and materials are created but often not in the spaces where many of them end up, which is our homes.

David Kaminsky is a pulmonologist at the University of Vermont Medical Center and medical director of the Pulmonary Function Laboratory. He said, "I'm a lung doctor, so I think about air all the time. I think indoor air pollution is something we've neglected for a long time. We live in these tight homes, especially in cold climates where we try to keep [them] well-insulated."

Thompson agrees. "There's a big push for weatherization in the state. And there are some drawbacks to that in terms of tightening up the home. I think there's some education missing. When you do weatherization and tighten up the home, that means that you need to do things like use your bathroom exhaust fan more."

Kaminsky said he was concerned about several issues, including "outgassing of chemicals that are in the carpets, and the paints, microplastics, which we're learning more about now" and added, "There's so many reasons why they think cancer in general has increased in modern times, and indoor air pollution could be one of those reasons."

And, as anyone who's lived in New England for the past 20 or more years has noticed, we used to have our windows open all summer. Today, with muggier weather and warmer nights, it's becoming more common to seal our homes to keep the cool inside. But that means we're keeping other things inside, too, and we're keeping fresh air out.

*"There's so many reasons why they think cancer in general has increased in modern times, and indoor air pollution could be one of those reasons." —Dr. David Kaminsky*

There's a significant, well-studied source of indoor pollution that hasn't yet been mentioned in this article. It might be referred to as the cast-iron elephant in the room.

That's because, unlike other indoor pollution sources such as carpeting or paint, there are social, financial, and even political considerations that swirl like embers around the hearth. So, it's fitting to put wood burning in a category of its own.

### **Home is Where the Hearth Is**

If someone told you that formaldehyde and benzene were emitted as a result of burning gasoline products, you might find that not so surprising.

But what if someone told you the same is true of wood?

"Hearth" is a synonym for "home" in most dictionaries. We rhapsodize over fireplaces, carry fond memories of campfires, are drawn to the pop of burning wood and the sprite-like embers that swirl and soar toward the skies. Yet the hearth, in times both past and modern, has been the place from which an array of harmful chemicals and particulates issue into the home as a result of combustion. This results in a central contradiction—that the place where one comes to find rest from the perils of the world can be a place where they are created.

Wood smoke is a mix of gases, aerosols and fine particulates. It contains organic compounds known to cause cancer (e.g., PAH, benzene), and other toxic compounds, including carbon monoxide,

Wood smoke is a mix of gases, aerosols and fine particulates. It contains organic compounds known to cause cancer (e.g., PAH, benzene), and other toxic compounds, including carbon monoxide, organic gases, particulate matter (PM2.5), and nitrogen oxides. Exposure to PM2.5 from wood smoke emissions has been linked to increases in bronchitis, pneumonia, asthma and other respiratory diseases and to decreases in lung function.

To be clear, these effects have been measured *inside* the home. Researchers have found an association between wood stove use and an increase in hospitalizations for respiratory and cardiovascular issues and in respiratory illnesses in children. Wood smoke may also aggravate chronic heart and lung disease and lead to premature death. The elderly and those with preexisting respiratory and cardiac disease are particularly susceptible to the harmful effects of wood smoke.

To that end, researchers are eager to learn more about the topic. Thompson, from the Vermont Department of Health, said, "There's a lot of work going on right now about particulate matter, both indoors and outdoors, and the department just recently got a COPD program started."



*Smoke rises from a fireplace in a residential neighborhood in Vermont*

### **Opposing Views, Economic Drivers, and Political Considerations**

If the health effects of burning wood comes as news, take a deep breath. You're not alone, and, given that human history is inextricably entwined with that of wood, it's not surprising. Fire and humans have had a relationship for at least 300,000 years and probably much longer. So, it's not surprising that many voices are involved in the discussion about wood and health, which can make the topic a bit hazy. In a 2019 article on Vermont's wood industry and the health and climate effects

of burning wood, Jonathan Mingle brings in pro-wood voices from Vermont's Department of Forestry, Parks, and Recreation and the Vermont Natural Resources Council who argue that wood can be burned cleanly and that it is a beneficial local alternative to fossil fuels.

Jeff Crawford is Bureau Director for the Maine Department of Environmental Protection. He sums it up this way: "You've got a couple of things working at odds there. You've got the environmental agencies and the health agencies [saying] smoke is bad for you and you know we shouldn't really be encouraging this. And then you just have political considerations [saying] we should be encouraging more wood burning because it's good for a forest products industry."

Taking part in this conversation, as well, are woodstove industry groups who have promoted the sale of newer-generation "EPA-certified" wood burning devices that purportedly are better for

both health and the environment. However, the EPA is facing a lawsuit from 10 states who allege that the stoves are not, in fact, any cleaner than older models. Researchers have looked at the difference in pollutant concentrations, specifically PM 2.5, between homes with older woodstoves and those with newer ones with modern controls. The findings are mixed and in any case, modern or not, woodstoves must be opened to be fed, which creates the potential for sudden surges of pollutants into the living space, which is one of Kaminsky's concerns.

And it's worth mentioning the climate as well. While carbon is released when wood is burned, trees also store carbon, leading to the theory that burning wood has a neutral effect on the climate (the majority of the science disagrees). Maine does not consider wood burning to be climate-neutral; Vermont classifies wood burning as "renewable," which sidesteps the issue of CO<sub>2</sub>.

Finally, there are also financial considerations. It is generally less expensive to heat with wood than with all other fuels, particularly for people with woodlots and available time for cutting, hauling, and splitting. And the U.S. Forest Service promotes wood banks in an effort to ensure that disadvantaged households can stay warm.

With all these considerations swirling about—not to mention that wood has been a reliable source of heat since prehistoric times—it's helpful to take the broad view: Any source of heat comes with a health effect, even if you consider that hanging solar panels on a roof carries more danger than your typical desk job. And so, the question becomes about how widespread the health effects of a particular technology are, how to mitigate them, and how to move toward ones that are less harmful.

In the meantime, whether your concern is chemicals, off-gassing, ventilation, or combustion, there are ways to make the indoors a healthier place.

### **Cleaning Your Personal Air**

Poor air quality days aside, the air outside is generally much cleaner than the air inside. So, one solution to all of the threats detailed in this article is, simply, ventilation. Whole-house, attic, or room systems can help air out modern homes without compromising heat or cooling by relying on heat-exchange technology.

HEPA filters have been demonstrated to help lower ambient pollutants from wood-fired devices. Regarding other pollutants, air purifiers (non-ozone-generating), dehumidifiers, and cracking the window whenever the weather allows can help as well, particularly if there's some kind of cleaning or home improvement project going on.

Regarding chemicals, the EPA recommends choosing safer alternatives (such as non-toxic soap or vinegar) and reducing or discontinuing the use of certain cleaners, pesticides, and soaps and perfumes (yes, personal care products can be a significant source of air pollution).

Kaminsky relates a recent anecdote that perhaps should become more common. "People just want the nicest carpet they can find, but, you know, they should pay attention to the VOC's which are the



*Residential HEPA air cleaner*

gases, the volatile organic compounds, that come out of those things. We once bought shades from a company and we wanted them aired out and they said, 'Oh, they're not a problem.' And we hung them up in our house and the house stank terribly. And we brought them back and made them hang them in their warehouse for us for a couple of weeks, and they were not happy with us."

As for the wood dilemma, Maine's Jeff Crawford told a story about his neighbor, a woman in her 70's on a limited budget who burns with wood. He asked her, "'Well, you looked into a heat pump?'" She was not familiar with the technology.

"'Oh,' I said, 'Well this is how this works. I'm guessing you probably will be eligible for \$8000 from Efficiency Maine and \$2000 from the feds. You've got a small house. That means it will cost you nothing.'" ([New Hampshire](#) and [Vermont](#) residents also have access to state and federal incentives).



*A wall-mounted heat pump head in a residence*

### **The Future of Indoor Air Research**

For all researchers have discovered, there's far more to figure out about what happens to our health in that space where we take nine out ten of our breaths.

For his part, David Kaminsky intends to continue his woodstove research and to look into other indoor air issues in general. "The American Lung Association has a number of research grants for all different types of lung disease, and I'm on a committee that just formed this year to create a brand-new research opportunity specifically for indoor air pollution." In the meantime, he says, "I just think that it's all about education and getting people to understand that indoor air quality is a thing."

*"Our Maine CDC has done work analyzing asthma rates in low/moderate income communities, and there seems to be a definite correlation. When you factor in that wood burning is the lowest-cost heating alternative, you have your likely cause."*

*—Jeff Crawford*

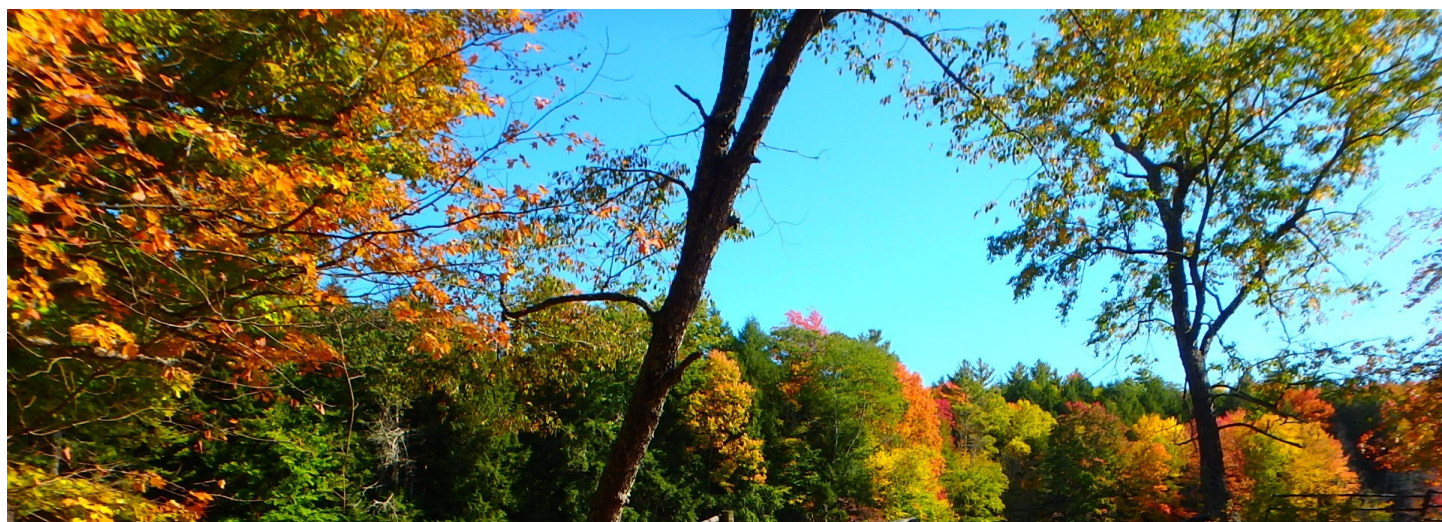
Jeff Crawford would like to see more research on wood stoves, with a focus on lower-income individuals and communities. "Our Maine CDC has done work analyzing asthma rates in low/moderate income communities, and there seems to be a definite correlation. When you factor in that wood burning is the lowest-cost heating alternative, you have your likely cause."

Michelle Thompson was interested in how to better influence the public. "There's so many issues in indoor air come about because of human behaviors." For example, she said, "in schools a lot, they have what's called a unit ventilator, which is just like a box that ventilates a single classroom. And it might be noisy and so the teacher turns it off because students can't hear, and then they're not getting any ventilation. Or they block them. Also, just using different products in your home. A lot of behavior can affect indoor air."

Heidi Hales would like to see more research on volatile organic compounds and off-gassing from “For example, in the winter, should you perhaps never paint in a space you can’t seal off from the rest of the house? Also, I’d like to know more about the interactions between chemicals in a household. For example, do chemicals off-gassing from materials interact in certain ways with certain ingredients of, say, household cleaners?”

She’d also like to know more about the effect of cars and other gas-powered devices such as lawn mowers parked in attached garages. “Since gas vehicles aren’t going away any time soon, what does the effect of evaporating gasoline have on indoor air quality, particularly if you compare ventilated garages with unventilated ones?”

Hales says, simply, “There are so many interesting topics to look into. For pollutants in other areas—for instance, if you think about the Clean Air Act’s effects—we’ve made a lot of progress, and we know we can here as well. And in the meantime, it’s empowering that individuals can take so many positive steps to safeguard their local air.”



*Clear fall skies after a summer of Canadian wildfires, Swanzey, NH*



# Events and Happenings

## Whole Health for People and Planet October 16-17, 2024

A Planetary Health Summit hosted by Osher Center for Integrative Health at UVM

- Wednesday, October 16: **In-person Keynote featuring Molly Kawahata**
- Thursday, October 17: **Hybrid Summit**



Register for the Summit

The **Whole Health for People and Planet Summit** brings members of the [Osher Collaborative](#) and the UVM community together to address challenges to human and planetary health. As part of the [University-wide Planetary Health Initiative](#), this event will explore cross-discipline connections and inspire action so that both people and planet can thrive.

Works presented and solutions-based discussions are structured on the foundational principles of:

- Whole Health (complete physical, mental, social, spiritual, community, and ecological well-being)
  - Reciprocity (the idea that human and planetary health are inextricably linked)
  - Relationships
  - Hope
- To register, click [here](#).

**44th Annual NNE CO-OP PCBRN Meeting**  
GRAND SUMMIT HOTEL AT ATTITASH  
JAN 26 - 28, 2024

REGISTER

0	0	0	0
DAYS	HOURS	MINUTES	SECONDS

### INTRODUCTION

The Northern New England CO-OP of Practice and Community Based Research Network (NNE CO-OP PCBRN) is excited to announce our 44th Annual Meeting, centered around "Revitalizing Primary Care." Continuing our tradition of addressing vital healthcare issues, we're committed to connecting with our local communities in northern New England.

As the foundation of a robust healthcare system, the urgency to revitalize primary care has never been clearer. Pressing challenges in accessibility, quality, and sustainability demand transformative change for primary care to effectively meet evolving needs.

Just as last year's discussions focused on Climate & Political (Social) Determinants of Health, this year, we're delving into the pertinent topic of primary care renewal across New England. We'll explore crucial pillars like technological innovations for enhanced patient experiences and policy reforms ensuring equitable healthcare access. Topics include optimizing panel size teams and payment reforms for value-based care.

Join us at the 44th Annual NNE CO-OP PCBRN Meeting as we unravel the multifaceted dimensions of revitalizing primary care. This platform unites healthcare professionals, students, and researchers, as we chart a course toward revitalized primary care that authentically caters to our diverse communities' needs.

To register, click [here](#).

## NNE-CTR Fall Seminar Series

Click on links below to view past seminars or obtain zoom links for upcoming seminars.

<a href="#"><u>Preventing HPV-Associated Cancers by Vaccination and Screening</u></a>  <b>9/27/24</b> Douglas R. Lowy, MD Principal Deputy Director, National Cancer Institute	<a href="#"><u>GIS Capabilities and the Importance of Spatial Connections in Health Science Investigation</u></a>  <b>10/25/24</b> Paige Brochu, PhD Director, Spatial Analysis Laboratory, UVM Rubenstein School of Environment & Natural Resources	<a href="#"><u>NIH Commitment to Empowering Clinical Investigation in Rural, Underserved Communities through Primary Care Practices</u></a>  <b>11/8/24</b> Tara A. Schwetz, PhD NIH Program Director for Program Coordination, Planning and Strategic Initiatives
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The NNE-CTR was delighted to kick off our fall seminar series by hosting Dr. Doug Lowy, co-inventor of the HPV vaccine. In an impactful and informative session, Dr. Lowy discussed why cervical cancer disproportionately impacts poorer women and how cervical cancer screening and the HPV vaccine can prevent serious illness or death. Below is a summary of his talk, which is also available by clicking the link in the left-hand box at the top of this page.

Dr. Lowy began by quoting Martin Luther King in saying, "Of all the forms of inequality, injustice in healthcare is the most shocking and inhuman." He paired this quote by summarizing the story of Henrietta Lacks, subject of the Pulitzer Prize-winning book, who died of what is now a preventable disease, HPV18 cervical adenocarcinoma.

He also noted that, in the United States, incidents of cervical cancer have dropped among Black, Hispanic, and White women. While White women's rates have been traditionally lower, and, indeed, remain lower overall, they have plateaued and been more or less flat since about 2004 at 2 incidents per 100,000 women. Rates among Black women declined from about 5.5 in 2000 to a little over 3 today, while rates among Hispanic women dropped from 4 per 100,000 to 2.5 in that same period of time.

In Africa, rates of both cervical cancer and deaths as a result of cervical cancer far outpace those of most of the rest of the world. Most women who develop cervical cancer in Africa will die of it, according to Lowy. Further, the rate of cervical cancer and deaths in lower to middle-income countries is projected to increase by about 2% per year.

About 99% of cervical cancers are related to the HPV virus, but Lowy also shared that male oropharyngeal cancer (at about 12,100 cases per year) is actually the leading HPV-related cancer. Cervical cancer is second at about 11,100. Lowy emphasized that the HPV vaccination does not treat established infection.

The good news is that the HPV vaccine has an efficacy rate at greater than 95% and lasts at least 10 years. It prevents infection in most vaccine recipients and, even at sub-optimal vaccination rates, provides herd immunity. Lowy emphasized the importance of vaccination prior to engaging in



sexual activity, referenced a Danish study showing that the vaccine reduced cervical cancers by about 90% in younger women. Efficacy dropped as women aged, an effect Lowy attributed to their likely having contracted the virus prior to vaccination.

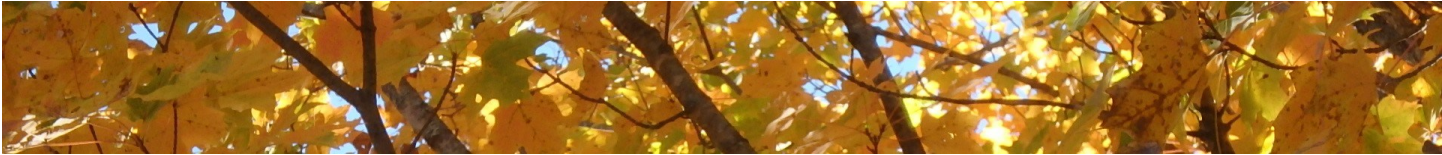
The vaccine has also been responsible for a dramatic decrease in genital warts in men just the first year after its introduction, and it's greatly reduced incidents of a lesser-known HPV-related illness called juvenile onset recurrent respiratory papilloma, which occurs in children whose mothers carry the HPV virus and which, according to Lowy, "can really be devastating, requiring multiple surgeries."

While everyone should be vaccinated, Lowy discussed prioritization. So, in developing countries, where over 90% of the HPV-related cancers are cervical, the best use of scarce resources is to vaccinate women. In more developed countries, Lowy suggested that "gender-neutral" vaccination should be the priority in order to protect against a range of cancers that affect both women and men in these countries.

Other take-homes from the presentation:

- Vaccine hesitancy has been an issue with the HPV vaccination, said Lowy, but there was no drop-off during the pandemic.
- The national average for youth aged 13-17 who have received at least one shot of the HPV series is 77% percent. Vermont (at 84%) and New Hampshire (at 86%) are above average while Maine (at 73%) is slightly below, but mortality rates for cervical cancer are lower in all three states than the country on average. (It is important to note that these are state averages; some individual counties fall far below national and state averages.)
- Youth whose primary care physicians recommend the HPV vaccine are 20% more likely to receive the vaccine than those whose physicians do not mention it.
- Research is indicating that one dose of the HPV vaccine (versus the currently-recommended two until age 15 and three for youth over 15) conveys substantial benefits and may therefore be a way to increase vaccination in low-to-middle income countries. Some high-income countries are now recommending one dose as standard, and, after further study, this may become the case in the United States as well.
- Increasing cervical cancer screening to 90% of women will more quickly lower rates of cervical cancer than increasing HPV vaccination, although both steps are critical.
- Pending full FDA approval, cervical cancer screening may soon be available via an at-home test.
- The most effective way to prevent HPV-related cancers is for youth to be vaccinated and for adult women to be screened for cervical cancer.





## What Are You Up to These Days?

Your work, your perspectives and your voice matter as we build our NNE-CTR community and seek to improve the health of our neighbors in northern New England. Do you have a story to share or work you would like us to write about? Let's put it in our newsletter. (And yes, even the seed of an idea is good; that's where this issue's air quality story came from!)

Email [matthew.j.dugan@med.uvm.edu](mailto:matthew.j.dugan@med.uvm.edu)

