What’s New

Three innovative projects that earned DLSPH faculty 2025 NSERC grants

Three innovative projects that earned DLSPH faculty 2025 NSERC grants

September 10/2025

DLSPH Profs. Zahra Shakeri Hossein Abad, Patricia Trbovich and Camellia Zakaria received 2025 NSERC grants for innovative projects that apply cutting-edge technology to help catch health issues early, monitor operating room procedures, and map black carbon pollution from traffic.

By Marielle Boutin and Ishani Nath

To expand the impact of their research, three Dalla Lana School of Public Health faculty members have been awarded Discovery Grants from the Natural Sciences and Engineering Research Council of Canada (NSERC).

Profs. Zahra Shakeri Hossein Abad [https://www.dlsph.utoronto.ca/faculty-profile/shakeri-hosein-abad-zahra/], Patricia Trbovich [https://ihpme.utoronto.ca/faculty-profile/patricia-trbovich/] and Camellia Zakaria [https://www.dlsph.utoronto.ca/faculty-profile/zakaria-camellia/] have been awarded 2025 NSERC grants for their projects spanning areas such as digital health interventions, improving safety in high-risk settings, and environmental monitoring. Securing 2025 NSERC grant funding is an exceptionally meaningful recognition for these scholars since applied health research often falls outside of the traditional scope of natural sciences and engineering. This achievement highlights the broad interdisciplinary impact of health systems research.

Meet the 2025 NSERC Discovery Grant Recipients from DLSPH:

Zahra Shakeri Hossein Abad, Assistant Professor
Health Informatics and Information Visualization, Public Health Sciences (PHS)
Director, Health Informatics, Visualization, and Equity (HIVE) Lab

Prof. Shakeri is investigating how to harness the power of artificial intelligence (AI) as a tool that can help clinicians catch health issues early. Her project explores multimodal foundation models for responsive and responsible behaviour modeling in digital health interventions. Shakeri explains that she's "training computers to read words, look at pictures, and listen to sounds all at once so they can help doctors understand what people need and keep them healthier."

She was inspired for this project when she considered how data could create a more holistic picture of a patient's health. "Digital health tools often see only one slice of a person's story," she says. "Bringing many kinds of data together lets us build fairer, smarter systems that truly understand and support every patient."

Shakeri says receiving this funding signals trust in this vision and provides resources so she and her research team can "push the boundaries of responsible AI in healthcare while mentoring the next generation of public-health innovators at DLSPH."

Patricia Trbovich, Associate Professor
Institute of Health Policy, Management and Evaluation (IHPME)

Prof. Trbovich's project is centred on the creation and testing of automated prototypes such as ambient listening systems to monitor interactions in high-risk work environments, in particular, operating rooms. Surgeries will serve as case studies for this research, monitored using the Operating Room Black Box© [https://www.surgicalsafety.com/solutions/or-black-box] to identify emerging patterns associated with safety risks. Similar to a black box in an airplane, this technology is used in surgical settings to record and analyze everything that happens during a surgery, including actions, communication and equipment performance.

According to Trbovich, despite the advances in automated monitoring systems, there is still a gap in the ways in which they are implemented in high-risk environments. Traditional safety procedures rely heavily on basic incident reporting, often overlooking the nuanced interactions between staff and their work environment.

"In the consumer market, we have smart home systems, cars that detect when we're falling asleep and wearables that can alert us to when people fall, experience atrial fibrillation, and so on. but we may not be taking advantage of similar automated monitoring systems to reflect real-time safety predictions to workers in high-risk industries," says Trbovich.

She adds that as it becomes easier to record surgeries, more information will become available about what happens before errors occur. This could potentially lead to the development of models that paint a clear picture of how "safe" a procedure is when compared to previous surgeries. According to Trbovich, the potential impact of this research could reach far beyond the operating room.

"I am incredibly grateful for the NSERC funding – even though we are applying our study to a healthcare setting, it supports human factors engineering research in safety-critical industries," says Trbovich. "I believe our study has implications for the design and reception of such automated systems far beyond healthcare. If we are able to successfully show beneficial results, and acceptance or adoption by operating room staff, there is reason to explore how this concept might also be implemented in other environments, for example, submarines and firegrounds, where real-time monitoring and enhanced team awareness can help prevent harm."

Camellia Zakaria, Assistant Professor
Biostatistics Division, Public Health Sciences (PHS)
Institute of Health Policy, Management, and Evaluation (IHPME)

Imagine opening your map app to get directions, and it does more than guide you. As you move along your route, it shows in real time how much particulate matter you are likely inhaling and what it means to your health. By presenting this information in a way that connects directly to your daily actions, the app helps you make healthier choices and puts air quality data into a context you can understand and act on. That's the kind of human-centred AI modeling Prof. Zakaria's project is tackling.

Zakaria's project focuses on projecting black carbon concentration from traffic activities, which she explains is a harmful component of vehicle emissions that can get deep into the lungs and bloodstream. "Measuring black carbon requires a specialized sensor that costs over $8,000; far too expensive to deploy pervasively in a large city like Toronto, let alone across Canada," she says. "We are exploring modeling techniques that leverage widely deployed infrastructure, such as traffic cameras and low-cost sensors, enabling broader coverage and consistent systems without solely relying on specialized equipment." Zakaria emphasizes that this approach is not meant to replace highly precise research-grade sensors. It is also not a "silver bullet" for addressing the complex challenge of black carbon pollution from traffic, which affects both the environment and individual health. However, developing and validating such techniques can help in forecasting traffic pollution trends and retrospective analyses to inform city planning, policy decisions and public health strategies.

"Receiving this NSERC funding as part of the DLSPH community demonstrates that we, as public health researchers, are aligned with cutting-edge, forward-thinking innovations that are practical for public safety," she says.