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Research Competition Abstract Booklet



A One Health Approach Utilizing Mycelium to Prevent Wildfires in Southeast Ontario

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The prevalence and intensity of wildfires have increased dramatically in Ontario, Canada since 2022. This has been exacerbated by climate change, clearcut logging, and poorly extinguished campfires. While previous interventions have targeted the downstream effects of wildfires such as deforestation, there have been no interventions that utilize a One Health approach to equally consider the health of humans, non-human animals, and the environment. This paper proposes a novel and cost-effective initiative utilizing cultivated mycelium from degraded slash piles, harvested and transformed into an organic fire-retardant spray for application on nearby trees. The proposed initiative aims to reduce the risk of wildfire ignition from at-risk trees in Lyndhurst, Ontario to protect the lives of humans and non-human animals as well as the integrity of properties and wildlife habitats, simultaneously contributing to the restoration of forest health as a crucial carbon sink. This may mitigate the effects of climate change and improve air quality, acting as a protective measure for human, non-human animal, and environmental health.

Health Care in Urban Environments: A Case Study on Public Transit Accessibility in Kingston, Ontario

David Vaz

Background

Health care accessibility is a human right enshrined in the Canada Health Act. In automobile-dependent urban environments, public transportation is essential to bridging gaps in health care access for those who cannot or choose not to use a personal vehicle. Understanding the degree to which local transit systems interface with health care facilities can provide actionable insights for promoting health equity on a population level.

Methods

This study was conducted using spatial analysis in R. By integrating data sets from the Ministry of Health, census data, and open-source public transit information provided by Kingston Transit, I calculated measures of network connectivity and transit accessibility to Hospitals, Family Health Teams, and Pharmacies in Kingston - a mid-sized urban city in southeastern Ontario. Transit accessibility was calculated using the “Public Transit Accessibility Level (PTAL)” – an advanced, validated measure developed in London, UK for use in urban contexts.

Results

Generally, Kingston Transit bus stop density was positively correlated with neighbourhood population density ($r = 0.786$), indicating good network connectivity. Health facility PTALs varied from 1a (Very Poor, 12.3% facilities) to 5 (Very Good, 12.3%), with the largest portion of health facilities falling at 2 (Poor, 34.2%). No statistically significant differences were noted for public transit accessibility levels between Family Health Teams, Hospitals, and Pharmacies. Nearly every health facility in Kingston (95.9%) had at least one bus stop within a 400m radius (an urban planning standard roughly corresponding to a 5-minute walking distance). The three exceptions include two rural pharmacies, and Providence Care Hospital.

Conclusions

This study suggests that Kingston Transit provides a basic level of connectivity and accessibility to most health facilities. However, ongoing work is needed – notably to improve access to regional health facilities like Providence Care Hospital.

Promoting Sustainable Inhaler Prescribing Practices for Asthma Treatment: QI Curriculum for Queen's Family Medicine Residents

Nikita Chopra

The Canadian healthcare system contributes to 4.6% of Canada's total greenhouse gas emissions, surpassing emissions from aviation and shipping¹, positioning Canada as one of the leading healthcare polluters per capita globally¹. One key contributor to greenhouse gas emissions from healthcare is pressurized metered dose inhalers (pMDIs), which are currently the most widely prescribed treatment option for respiratory conditions such as asthma. The pMDIs use and emit hydrofluorocarbons as a propellant, resulting in a substantial climate impact of 18,000 ktCO₂-eq in 2018.² Dry powder inhalers (DPIs) present as a "greener" alternative, by delivering powdered medication without using propellants, and subsequently have a lower climate impact than pMDIs by ten-fold.² Furthermore, DPIs are both technically and economically feasible,² and present as a suitable alternative for many patient populations. Transitioning from pMDIs to DPIs not only mitigates carbon emissions but can also be used to facilitate the reduction of unnecessary inhaler prescriptions. A study from 2017 revealed that 33% of patients diagnosed with asthma in the last 5 years did not have objective evidence of asthma based on lung function test results.³ Thus, focusing on sustainable inhaler prescribing practices is an important approach to reduce the healthcare carbon footprint. Our research aims to integrate quality improvement (QI) curriculum into the Queen's Family Medicine Residency program with the overarching goal of reducing the environmental impact of healthcare within the Queen's Family Health Team. The primary objective is to reduce pMDI prescription rates by 50% across 6 teaching sites between June 2022 to June 2024 while discerning if there are statistically significant improvements in attitude, engagement, knowledge, and confidence of residents towards QI through pre- and post-surveys following completion of an educational workshop. This project will enhance understanding of sustainable healthcare systems and improve medical education by instilling a culture of environmental consciousness and QI.

Global Circular Economy in the Healthcare Industry: A Scoping Review

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Purpose

The healthcare industry wastes billions of dollars annually due to unnecessary services and inefficient care delivery. Environmentally, it has led to disastrous consequences for human and animal health as well as for Earth. This calls for a systemic change from our linear practices towards a circular economy. This scoping review describes circular practices that can be introduced in healthcare.

Methods

A search string was used to search MEDLINE via Ovid, Embase via Ovid, Scopus, and Web of Science databases. Established eligibility criteria were applied to articles, the PRISMA-ScR checklist was used, and independent reviewers were consulted.

Results

There were 480 hits, and 64 articles were analyzed. The review demonstrated that incentivizing procurement practices to improve reuse and recycling could decrease hospital spending as well as greenhouse gas emissions (GHG). Additionally, a global extended producer responsibility scheme may promote harmonized collaboration within the healthcare industry, ensuring products remain in the circular economy and waste never leaks into the environment. Furthermore, AI-driven data analysis empowers transdisciplinary stakeholders to create informed choices about resource utilization and prioritizing sustainable practices. Collecting recycled materials using blockchain, a powerful tool that enables real-time visibility about reduction efforts for GHG emissions, and reverse logistics are other possible strategies. Many authors noted that excluding Indigenous values in waste management contributes to waste colonialism. This leads to poor health outcomes for at-risk communities. Hence, diversified values from various stakeholders should be considered in global climate policy frameworks.

Conclusion

This review strives for a holistic and sustainable approach to a global circular economy in healthcare. This proposal uses a product-centric approach that integrates socio-economic well-being and environmental stability. It explores the use of policies, responsibility schemes, and AI technology. Ultimately, the circular economy affords economic development and resilient growth in the global healthcare industry.

A Call for a New Imagining of Climate Action: How Women Are Leading the Way

Aghia Mokhber

Climate change poses a critical threat to global ecosystems and human well-being. Despite scientific consensus and escalating impacts, conventional responses often overlook gender disparities and social dimensions. This paper advocates for an ecofeminist approach to climate justice, highlighting the interconnectedness of gender, environment, and social justice.

Ecofeminism emphasizes how climate change disproportionately affects women, exacerbating existing inequalities. Traditional mitigation strategies neglect social and political contexts, further marginalizing vulnerable populations. By centering the voices of women and marginalized communities, an ecofeminist lens offers a more inclusive and holistic response to climate challenges.

Drawing on the activism of women and grassroots movements worldwide, this narrative review showcases their pivotal role in reimagining climate justice. Through advocacy and mobilization, women challenge dominant paradigms, envisioning a future rooted in sustainability and equity. Embracing an ecofeminist perspective is essential for addressing the complexities of climate change. Therefore, this project calls for inclusive, intersectional approaches to climate justice, urging stakeholders to embrace a more just and sustainable future.