Proposal to alternative policies to minimize the impact of extreme heat events in the Downtown Eastside

Impacts of Extreme Heat Events

On the low-income neighbourhood of the Downtown Eastside

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Table of Contents

Problem set-up, client and stakeholders 1
Refined policy problem definition 3
Policy options identified to date 3
  Cool Roof Subsidy 3
  Rental AC Bylaw 4
  Community Outreach Pilot 5
Key criteria for analyzing the options 5
  Status Quo 6
  Cool Roof Subsidy 6
  AC Bylaw 7
  Community Outreach Pilot 8
Initial assessment of policy options 9
Implementation and monitoring 10
Approach for stakeholder engagement 11
How interviews will be used to learn more 11
Research Methods to close identified gaps and to investigate 12
Appendix 13

Problem Set-up, Client and Stakeholders

The number of annual heat-related deaths in Canada has been increasing in the last decade, coinciding with years that had record-breaking extreme heat events (EHEs) in greater frequency and severity. From 1981 to 2022, two-thirds of recorded heat-related deaths occurred in the last 7 years.[1] Global temperatures are rising and just a 2°C to 3°C increase in air temperature can translate to a 4% to 7% increase in mortality rates attributable to heat.[2] One study forecast that heat related deaths could increase between 45% (best case) to 455% (worst cast) between 2031-2080, relative to 1971 to 2020.[3] Data gathered in Canada from 2000 to 2020 supports this and shows that there's a higher risk of mortality during EHEs.[4] During this time period more than 670 deaths occurred than usual in the country's 12 largest cities that experienced extreme heat lasting two days or longer.[5] Mortality rates were higher for people aged 65+, among renters, and was worse in Montreal, Quebec City, Surrey, and Toronto.[6] Cities where extreme heat events are less common, such as Vancouver, saw greater spikes in deaths when temperature increased.[7]

Urban areas are impacted more heavily by this due to the Urban Heat Island (UHI) effect which refers to the temperature being relatively hotter in urban areas vs. surrounding rural areas due to more dense development and concentrated human activity.[8] [9] A study looked at 13,115 urban settlements from 1983 to 2016 and found global exposure to extreme heat increased nearly 200% during that period. Climate change has exacerbated UHIs and EHEs causing an increase in frequency, duration, and magnitude.[10] By 2050 many parts of Canada are projected to experience a doubling in the annual number of very hot days.[11] There are significant health impacts correlated with extreme, pro-longed heat exposure which can be captured by morbidity and mortality rates.[12] Prolonged exposure to heat increases the risk of heat-related mortality, especially for those with pre-existing health conditions, the elderly, and people living in low-income neighborhoods.[13] In particular, low-income neighborhoods are susceptible because they tend to have a higher percentage of residents vulnerable to heat, worse housing quality, and less access to social and material resources.[14] [15]

In B.C., low-income individuals are more than twice as likely to die during EHEs due to lack of resources and pre-existing health conditions.[16] More recently, we saw the devastating effects of the heat dome in B.C. during the summer of 2021. There were more than 619 deaths attributed to the EHE and 911 calls doubled province wide.[17] A recent study found 11% to 15% of were directly attributable to human-caused GHG emissions.[18] Of these deaths, 98% of deaths were indoors, 56% of decedents lived alone, and 73% occurred in private residences.[19] Of those at home, at least 66.9% didn't have access to AC.[20] Decedents were more likely to be materially deprived.[21] The impacts in Vancouver were devastating. June 28th was the 10th hottest day ever recorded in Vancouver at 31.7 degrees.[22] By township, Vancouver had 117 heat-related deaths (ranked 1st) and 17.7 per 100,000 (5th

ranked); 23% of deaths occurred in Vancouver Coastal Health.[23] In particular, the Downtown Eastside experienced an abnormal number of deaths and high rates of heat-related E.R. visits.[24] [25]

Historically, Vancouver has 0.6 very hot days per year, and future forecasts estimate it could increase from 2.6 days to 13.4 days (see figure 1). Events, such as the heat dome, are likely to increase in frequency and severity. Given the effect of the heat dome, it is likely that without intervention more residents will die. While other cities are set to experience similar increases, they tend to have dedicated heat action plans and higher rates of cooling measures such as AC units (appendix 1). Vancouver's residential building infrastructure is outdated and was not designed with the current temperatures in mind. These older buildings tend to be occupied by low-income renters and concentrated in low-income neighbourhoods such as the DTES.[26] As the 'poorest postal code' in Canada it is home to outdated quality housing, low-income, lack of access to cooling measures, and a concentration of vulnerable demographics. Policies need to be implemented to address the high rate of mortality and morbidity that is straining healthcare systems.

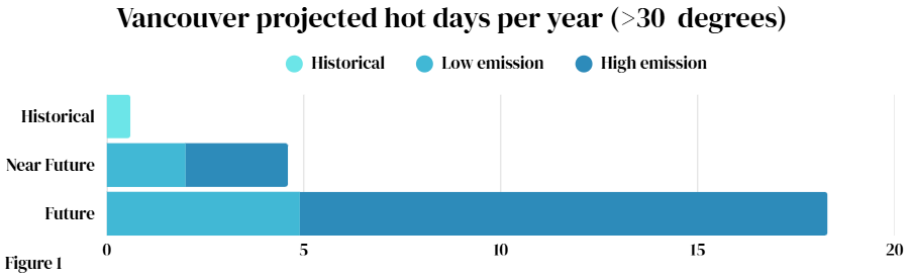
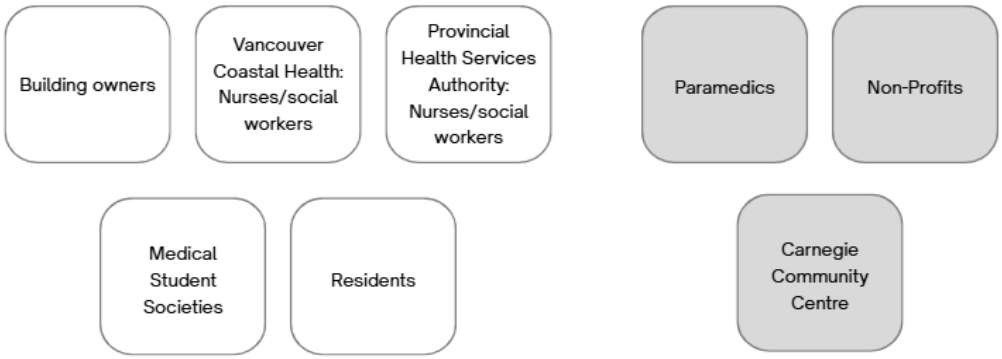


Figure 1

Client and Stakeholder Analysis

Those who are most affected by this phenomenon in their day-to-day lives are residents, particularly the previously identified marginalized groups. These concerned groups will likely look to their local governments for resources. Additionally, given the compounding factors of UHIs which are unique to morphology and urban design, local municipalities, such as the city council, should tackle this problem. They have the best knowledge of communities and the urban setting impacting the issue. There are other stakeholders who are impacted and should be consulted as well as below:



Many of these stakeholders are either directly impacted by this issue or are directly involved with possible policy options. Those who are directly impacted by this issue are primarily our healthcare

providers and residents. The other stakeholders may see the impacts on the DTES neighbourhood and have valuable knowledge to share.

Refined Policy Problem Definition

When considering this problem there is various data and numbers we can use to refine the definition. By focusing on health impacts, we can track empirical data that can be monitored to examine the effects of policy. In this proposal, we will consider mortality rates in the low-income neighborhood of the DTES. This issue envelopes multiple variables and to make a meaningful impact it's essential to narrow the focus on target populations identified by the research to be most susceptible to the negative impacts during EHEs. As one of the poorest urban neighborhoods in Canada and Vancouver, the Downtown Eastside is the geographic area to be prioritized, and low-income residents are the population. There are several other factors that will have an effect that are outside of the scope of this project including age, tree coverage, green space availability, and pre-existing health conditions.

The policy problem is defined as: The mortality rate is too high in the low-income neighborhood of the Downtown Eastside during EHEs. It's imperative that the City of Vancouver (COV) addresses this issue as it continues to worsen due to climate change effects.

Policy Options Identified to Date

Currently, the City of Vancouver (COV) addresses extreme heat as part of the Climate Change Adaptation Strategy (appendix 2.0). Actions outlined by the city fall under three categories: supporting indoor cooling and thermal safety at home, improving access to cooling in public spaces, and stewarding the urban forest and greenspace to support outdoor cooling. Most of these policies aim to reduce heat, and few are targeted at supporting vulnerable populations during EHEs. The Cool Kit project (expansion underway), heat transportation pilot for seniors and those with disabilities (not started) and retrofitting 3 community facilities (underway) are the main actions outlined to support residents during EHEs (appendix 2.0). Additionally, there are actions outlining general research to scope ways to reduce indoor temperatures for new and existing residential buildings, advocacy to the province to reduce barriers to cooling measures at home, and specific programs to retrofit rental and non-profit buildings (all underway; appendix 2.0). However, there is a gap in measures aimed at supporting the DTES residents during EHEs, though it's acknowledged there is inequity in this neighborhood. To help address this gap, this report will propose 3 policy alternatives.

Cool Roof Subsidy

The first alternative option is offering a subsidy for residential building owners to update their roof material with 'cool roof' technology which can either be new material or reflective paint to reduce temperatures in older buildings in the DTES. Studies on 'cool roof' technology have been shown to

decrease internal ceiling temperatures by 3.2°C to 5.5°C, internal air temperatures by 1.2°C to 3.3°C, and surface temperatures by up to 10°C with poorly insulated buildings having the greatest benefit.[27] [28] [29] Many of the residential buildings in the DTES are older buildings that are in disrepair and likely have poor insulation.[30] One study calculated that cool roofs may reduce total heat-related deaths by up to 8% and reduce deaths attributable to the UHI effect up to 25% during heatwave periods.[31] Additional benefits include reducing the cooling loads of a building by 18-93% and peak cooling demand in air-conditioned buildings by 11-27%.[32] Reducing the required energy to cool buildings saves energy costs and reduces energy footprints of cooling technology like AC units. The COV has a similar initiative of 'green roofs', which are roofs that have some form of plant life incorporated into rooftops to maintain temperatures among other benefits. However, this approach is significantly more expensive to implement and maintain and it's unlikely that the older buildings in the DTES have the proper infrastructure to support a green roof.

Toronto has an eco-roof incentive program that provides grants and subsidies for green roofs and cool roofs. They offer $5/m2 for a cool roof with a new membrane or $2/m2 for a cool roof coating over an existing roof with a maximum of $50,000 per cool roof project. Since 2009 over 600 eco-roof projects have been supported, creating over 1.1 million square meters of eco-space.[33] This program is estimated to have reduced energy consumption by over 2,200 megawatt hours annually and avoided 425 tonnes of GHG emissions.[34] While specific data is not available on reducing temperatures of buildings, there is a clear benefit for reducing energy use and reducing GHGs. In 2024, 41 new projects were approved, showing strong interest.

Rental AC Bylaw

Another alternative option is restricting landlords' ability to bar AC units from rental buildings. This policy aims to address the barriers to cooling technology in rental buildings commonly found in the DTES. As previously noted, 66% of decedents during the heat dome did not have access to AC. Having access to AC units is known to reduce heat-related mortality in Canada.[35] In Vancouver, only ~26% of residents have access to AC and low-income individuals and renters are 25% less likely than their counterparts.[36] [37] In B.C., landlords have been found to be discouraging and barring renters from installing AC units leading to B.C. health authorities to urge landlords to remove AC and cooling barriers.[38]

Currently, there is no bylaw under the Residency Tenancy Act (RTA) that addresses issues of AC units in rentals. A study on the impacts of EHEs in Canadian cities from 2000 to 2020 found that renters are at higher risk for mortality during EHEs and in low-income neighbourhoods.[39] While the province does currently have a free portable AC program, only current clients of a regional health authority's Home Care Program or Mental Health and Substance Use Program who received a letter of recommendation, and acquired consent from landlords are eligible.[40] These are relatively high

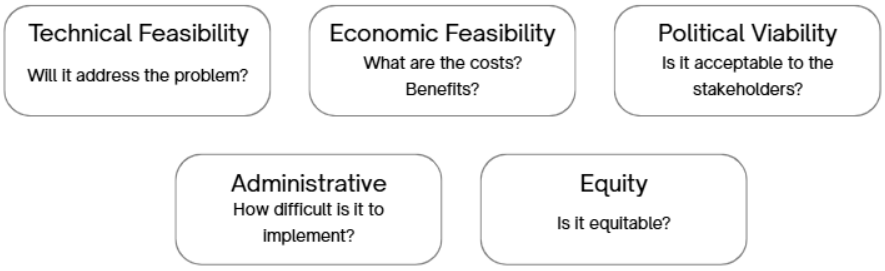
barriers and contingent on landlord approval. This proposed bylaw should cover both portable and window AC units, specifically ensuring window AC units are allowed because they are cheaper, more energy efficient, quieter, and offer a wider range of cooling capability than portable AC units.[41] We suggest advocating to the province and Rental Tenancy Board ability to prevent tenants from installing AC units since landlord and tenant relationships are covered under the Rental Tenancy Act. Given the potential safety risk and damage to the building of an improperly installed AC unit, landlords may require inspection to minimize potential damage.

Community Outreach Pilot

The last policy option is a Community Outreach Pilot that is aimed at addressing the gap in outreach support for the DTES during EHEs. Since 98% of deaths were indoors, 56% of decedents lived alone, and half of those who died during the 2021 heat dome were found during a wellness check initiated by family or friends, proactively reaching out could reduce mortality.[42] Generally, such a program entails assigning nurses or social workers to visit pre-determined, heat-vulnerable areas to ensure access to cool environments, assist in accessing healthcare services, and distributing resources such as the Cooling Kit. Some versions include pre-determined sign-up systems, resident demographics, or housing quality. In Vancouver, there is limited nurses' availability, but there are ample aspiring medical students (A.M.S) who could be used as the ‘boots on the ground’ while a nurse or social worker acts as a section leader to provide direction. The A.M.S would gain valuable volunteer medical experience while increasing the implementation possibility.

Montreal implemented a similar policy as part of their Heat Action Plan (HAP) in 2004. The plan included home visits, increased surveillance of at-risk populations, daily contact by telephone, distributing water bottles and cool meals, increasing access to AC areas including transport. [43] The plan’s objective was to support populations by meeting vulnerable residents where they are and reducing barriers to accessing cooling measures. A study looked at data from 2000 to 2007 to compare heat-related mortality rates before and after the plan implementation. The HAP was estimated to reduce mortality during hot days by 2.52 deaths per day.[44] Additionally, it was estimated that the program reduced differences in mortality between neighborhoods with low socio-economic status and neighborhoods with high socio-economic status by 2.48 deaths per day.[45]

Key criteria for analyzing the options



Status Quo: Current policies under the CCAS.

Technical feasibility:

The current policy approach is all encompassing and doesn't have a targeted approach for residents in low-income neighborhoods like DTES. It is reliant on stakeholders with little direct stake, lacks specifics, and they're unable to execute some elements of the plan.

Economic feasibility:

While there are no additional costs to this policy option, there are current costs associated with it. The cost for current policy is capital for subsidies/grants to retrofit residential buildings and community centres, cost for cooling kit supplies, staff cost for the research and administration of the program. Benefits include reduction of GHGs and reduced energy costs of buildings, increase accessibility to community facilities at all times of year

Political viability

These policies are currently in effect and approved by council and relevant stakeholders.

Administrative

Currently in progress through various city departments.

Cool Roof Subsidy: Subsidizing upgrades for residential roofing materials

Technical feasibility

The Cool Roof Subsidy offers a structural option to lower internal and surface temperatures to provide cooler temperatures in residential buildings. This approach directly addresses the housing quality factor that is a large contributor for housing temperature. Additionally, by reducing surface temperatures it could contribute to reducing the intensity of UHI effects which exacerbate heatwave intensity. However, it is a voluntary based program that requires building owners to sign up and does not directly target the DTES.

Economic feasibility

This policy option has relatively straightforward economic considerations. In Toronto, the infrastructural subsidies cost between $2-$5 per square meter (maximum $50K per project) over 600 projects since 2009. This would be an approximate cost of $1.875 million a year for a larger city like Toronto. Additional costs include the administrative costs to organize and run the program including site inspections. The direct benefit is reducing internal temperatures by 1.2°C to 3.3°C, which could translate to a reduction in mortality rates of about 8% to 25% per EHE.[46] Indirect benefits include lower cooling loads of buildings, energy consumption, and GHG emissions would also address the underlying issues of climate change having an impact on increasing intensity of EHEs.

Political viability

As previously mentioned, this policy option is voluntary, so it has limited enforcement.

Stakeholders can opt in while receiving a subsidized benefit that improves the values of their property. The City of Vancouver is responsible for shouldering about 1/3 of the cost of these upgrades, though it could seek funding from the province or even federal branches of the government. Engagement with building owners to ensure incentive to take part of program would be needed. Additionally, this option is in line with 2.5 of CCAS, identifying ways to reduce cooling initiatives in existing residential homes.

Administrative

Given the nature of the subsidy, it would require administrative support to process applications, verify proper installation with program guidelines, and connect with the financial team to administer rebates. Additionally, we would need to connect with engineering services to ensure qualified professionals are available.

AC Bylaw: Advocate to the province to restrict landlord ability to bar A.C. units in rentals.

Technical feasibility

Lack of cooling technology at home is one of the highest risks for heat-related mortality. Implementation of a bylaw that provides clear legislation for allowing AC units in rental units will give renters more agency to reduce temperatures in their homes. This addresses issues with current policies on ACs that are reliant on landlord approval. Healthcare workers are advocating for a policy such as this. Low-income individuals are often in older buildings which are more susceptible to heat and can't afford to move to better housing quality.

However, this option is not perfect. It doesn't address the underlying issues of increasing temperatures and ACs contributing to GHG emissions which could further exacerbate the issue. Additionally, residents would still have to purchase their own AC unit, which can be difficult for low-income individuals on a limited income. Further, there is limited power of the client, City of Vancouver, as it requires provincial intervention since the RTA, a provincial entity, oversees landlord and tenant relations.

Economic feasibility

The cost for this policy option is relatively low as the burden is primarily on the province. However, there would still be staff or consulting costs to conduct research for advocacy report, and cost for public engagement with renters and landlords to come to a politically agreeable place. Indirect costs include increased energy use thus energy costs and related emissions. Benefits of this policy include reducing barriers to decreasing temperatures of homes. As previously mentioned, 2°C to 3°C increase in air temperature can translate to a 4% to 7% increase in mortality rates attributable to heat.[47] Logically, by reducing temperatures, we can reduce mortality rates based on this scale.

Political viability

The City of Vancouver would need to advocate to the province as they oversee tenant and landlord relations under the Rental Tenancy Act. This is in line with 2.7 of the CCAS, advocating to the

province for reducing barriers to cooling measures. Additionally, requires working with landlords to ensure their concerns are heard and incorporated. It is unlikely that this stakeholder group will be supportive of this policy as it reduces their power of their own property. However, it would garner support from health authorities and rental advocacy groups which are calling for such an intervention.[48]

Administrative

The primary administrative burden of this option is advocating to the province and consequently the Rental Tenancy Board. Currently, the City of Vancouver is looking into ways to advocate the province as outlined in 2.7 of the CCAS. This could be incorporated into the team responsible.

Community Outreach Pilot: Conduct, pre-determined home visits in heat-vulnerable areas to check on residents and distribute resources.

Technical feasibility

Community outreach is a policy that is aimed at providing immediate aid to communities in need during extreme heat events. Part of its strength is that it is flexible and can be adapted based on community needs or to target specific areas or populations. For example, by using aspiring medical students, we can increase technical feasibility. A.M.S need health-related volunteer hours for their applications, so this could be a mutually beneficial relationship. For the DTES, this policy addresses the lack of target specific polices to help the low-income residents of this neighbourhood by providing immediate aid during EHEs. Additionally, this option is not dependent on the approval of non-government stakeholders such as landlords as in the previous policy options. As seen in the Montreal case study, deaths could be reduced by up to 2.5 a day. However, this policy option does not address underlying inequities such as housing quality or addressing factors that contribute to Climate Change.

Economic feasibility

This policy option does require organizing and funding for various key groups to implement:

- Salary of nurses/social workers as section leaders
- Administrative staff to organize program implementation and recruitment of A.M.S
- Supplies for outreach workers' own safety (water, food, sunscreen etc.)
- Supplies to distribute (Cooling Kits, water, food, sunscreen etc.)
- Opportunity cost of nurses/social workers not in hospitals or clinics to administer aid during peak events

However, there are several benefits as well including:

- Low-income neighborhoods have reduced deaths during EHE up to 2.5 per day
- Indirectly could contribute to development of community ties

- Sooner intervention means less intense illness and thus reduces the load on the healthcare systems/emergency response services

Political viability

While similar policies have been implemented elsewhere in Canada, there isn't currently a similar policy in the Lower Mainland. Pitching new policies can be difficult and, in this case, requires connecting with various stakeholders such as Vancouver Coastal Health, Provincial Health Services authority, and medical undergraduate societies to connect with aspiring medical students. Additionally, while the DTES is a neighbourhood often in the spotlight, there is not always positive association or overall community support. However, this option is somewhat in line with 1.1 of CCAS (not started); which is a program that offers heat transport for seniors and those with disabilities. These demographics tend to be in low-income neighborhoods, and this option would serve them. Additionally, framing the policy option of being pro-active by reducing the strain on the healthcare systems which benefits all of Vancouver could increase political viability.

Administrative

Of the policy options identified, this is the most complex option as various stakeholders need to be coordinated, but it is also the most flexible. The city could serve as a coordinator of the program while working with VCH to allocate nurses or social workers as section leaders and medical student groups for A.M.S recruitment. A policy such as this would likely fall under the Social Policy portfolio. This program is adaptable and depending on administrative constraints can be altered to meet resources available. Finally, given that EHEs are predictable on a relatively short timeline. Most extreme weather notices are given within a week's time, which would provide limited time to recruit people.

Initial Assessment of Policy Options

Each of these proposed policies target different ways to reduce mortality in the low-income neighborhood of the DTES through meeting the community where they are to provide necessary support, lowering barriers to cooling technology at home, and facilitating residential building retrofitting to reduce internal temperatures and increase cooling efficacy. The issue of EHEs, compounded by UHIs, is multi-faceted with several contributing factors that cannot be solved by a single policy. However, as temperatures increase, the need for immediate intervention is becoming pertinent. Below

is a chart that provides an assessment overview of the policies based on the key criteria:

Policy Option	Technical	Economic	Political	Administrative	Equity
Status Quo					
Cool Roof Subsidy					
Rental A.C. Bylaw					
Community Outreach Pilot					

The Community Outreach policy has the best technical feasibility as it can be directly addressing the DTES during EHEs, doesn't involve barriers from other organizations like the AC bylaw or cool roof subsidy options. By doing a pilot program in the DTES we can mold the policy to make it better and reduce costs before implementing it in other neighborhoods. Framing the policy as reducing strain on our healthcare services also makes it appealing to stakeholders and the public alike.

Implementation and Monitoring

Implementation of the Community Outreach policy is the most complex of the policies, but it is also the most adaptable. Case in point, utilizing A.M.S volunteers instead of nurses lessens the financial cost and reduces the need for nurses or social workers which are already in high demand. It would still require having a section or group leader to organize the 'boots on the ground' staff of volunteer A.M.S and provide heat specific training to them. Additionally, there would need to be an overarching administrative team to organize the logistics and coordinate with the various representatives prior to forming and during the policy program. To pilot the program, we suggest utilizing a sign-up program where residents of the DTES could sign-up to receive home contact during EHEs. This would pre-determine the number of outreach workers needed. I suggest having a larger pool of A.M.S than needed, to account for the short notice of EHEs and increase coverage. Finally, the program could be triggered to coincide with provincial heat warnings to reduce the need to determine when to implement the program. EHEs are difficult to predict and are often on short notice which will need to be accounted for to mitigate the implementation difficulty.

To monitor the effects of the policy program on the issue, we could track mortality and morbidity rates during heatwaves by neighbourhood address of the DTES, tracking emergency service calls related to heat to the DTES, and hospital admissions by neighbourhood for heat related illnesses. It's important to include morbidity rates as they are closely related to mortality and could be mitigated by the policy as well. Tracking these numbers provides an absolute comparison of pre and post policy implementation. Additionally, we could compare these numbers to another low-income neighbourhood

that has similar traits of heat disparity and intense heat during EHEs. Finally, to gain more insight into residents' perspectives, we suggest following up with residents after the EHE. This could include their personal experience in the program, things they've heard from neighbours, or other lived experience. Utilizing various methods to monitor the policy provides a holistic understanding of the policy impact.

Approach for Stakeholder Engagement

There are several stakeholders that are directly and indirectly involved with this policy option. Those directly involved and required to implement this policy program are Vancouver Coastal Health, Provincial Health Services Authority, nurses/social workers, and Medical Undergraduate Societies to reach A.M.S. They must be consulted in such a way that they are supportive of this policy and agree to take part in it. Interviews with VCH and PHSA representatives would allow us to learn more about nurses and/or social workers opinion of this policy and any adjustments necessary to get them on board. Additional workshops with the nurses/social workers, would provide additional information to refine the policy. Finally, we seek to reach out to medical undergraduate societies such as the one at the University of British Columbia to develop a strategy to recruit A.M.S. These students are often seeking volunteer positions related to medical care to gain experience prior to their medical school applications so there's likely already a level of interest. Overall, connecting with these stakeholders would be a collaborative approach.

Finally, I would like to engage with residents as they are the target population for this policy. It is important to inform them of this pilot and how they can sign up for more information or to register. Additionally, they could provide insight into how EHEs affect the neighbourhood through their lived experience and provide insight into the best way to inform other residents. We could provide public notice at local community centers, mail out notifications, and conduct voluntary door-to-door questionnaires. Engagement with these stakeholders would be at the inform and consult level.

How Interviews Will Be Used to Learn More

I would use interviews to learn more about the impact of EHEs on the Downtown Eastside community at large. Connecting with indirect, community stakeholders would provide insight into community cultural considerations and demographics relative to the policy. I would do interviews with the following groups:

Who I would contact	Why	What I would gain from it
Carnegie Community Centre	Works directly with the community daily 'Living room of the DTES'	Have deep knowledge of the community, and acted as a cooling centre and distribute cool kits

Paramedics	Medical experts who respond to EHEs in the DTES with high level knowledge	Have knowledge of 'on the ground' conditions and can provide insight into the realistic implementation
Indigenous groups	Disproportionately represented in the DTES	Provide insight to ensure policy aligns with culturally aware practices
Academic experts	Hold general knowledge of the impacts and provide further insight theory	Provide insight into field theories and best practices

I'd conduct semi-structured, open-ended interviews. Semi-structured so I can track certain questions but still leave the possibility open for unknown knowledge. Primarily, the goal is to learn more about the unique conditions to the DTES that could have an impact on the efficacy of the policy and approaches that may be suited for the community. Since we're seeking to learn more about the unknown, interviews would primarily utilize open-ended questions. Given there are extensive statistics available on mortality, heat, and other related factors, close-ended quantitative data is less of a priority.

Research Methods to Close Identified Gaps and to Investigate

To learn more about the potential impacts of the Community Outreach Pilot policy we propose a comparative case-study that compares heat action plans of different cities across Canada that include a community outreach component or similar policies. By doing so, we can see different approaches to this issue, what made them successful or 'lessons learned', and help consider what may be unique to the DTES. This would be valuable information that could be incorporated into the pilot to make it more effective at addressing the policy problem. I hypothesize that municipalities that include home-visits or outreach in their heat action plan have fewer deaths during EHEs. The methods measure the dependent variable of mortality rates during EHEs and the independent variable is home-visits or resident contact during EHEs as part of an extreme heat response. We've identified three cities that all deploy community outreach as part of their heat response: Montreal, Ottawa, and Hamilton. As part of this, we would like to interview the teams responsible for the policies and compare mortality and morbidity rates prior to and after the community outreach policies were put in place to track efficacy. By tracking health data, we can investigate if there's a correlative relationship between HAPs and mortality rates.

Appendix

1.0

City	Historical	Neat future (low emissions)	Near future (high emissions)	Future (low emissions)	Future (high emissions)	Provincial AC per household
St. Johns, NL	0.1	0.3	0.6	0.5	1.7	19%
Halifax, NS	0.6	2	2.5	3.7	8.1	43%
Charlottetown, PEI	0.6	2.9	3.7	6.4	14.7	46%
Moncton, NB	4.5	11.1	12.5	16.6	30.5	56%
Montreal, QC	8.2	21.9	23.9	31.9	50.4	63%
Toronto, ON	12.2	27.3	30.7	38.6	54.9	84%
Winnipeg, MB	11	22	25.7	32.4	47.1	90%
Saskatoon, SK	10.9	18.9	21.9	28.5	42.5	75%
Calgary, AB	3.7	8.4	9.7	14.8	26.9	37%
Vancouver, BC	0.6	2	2.6	4.9	13.4	36%

Source: Health Canada, *Reducing Urban Heat Islands to Protect Health in Canada: An Introduction for Public Health Professionals* (Government of Canada, April 29, 2020)

2.0

	Milestone	Due Date	Responsible	Progress
	Extreme Heat			
	Improving Access to Cooling in Public Spaces			
1.1	Launch extreme heat transportation pilot for seniors and people with disabilities in 2024.	2025	VEMA, ACCS	Not Started
1.2	Pursue upgrades in two community-use facilities and one civic-operations facility with mechanical cooling by 2025 and continue to develop design plans for future cooling upgrade projects while seeking external funding to accelerate cooling retrofits for additional sites.	2025	PB, REFM	Underway
	Supporting Indoor Cooling and Thermal Safety at Home			
2.1	Expand on 2022 and 2023 Cool Kit project in partnership with community-based organizations and Vancouver Coastal Health, delivering 3,000 kits.	2025	VEMA	Underway
2.2	Initiate work to scope, resource, and determine legal, technical, and economic feasibility for reducing indoor temperatures in existing multi-family residential buildings.	2025	PDS	Underway
2.3	Develop and launch a multi-family heat pump incentive and owner support program with BC Hydro, Province of BC and Zero Emission Innovation Centre in 2024.	2025	PDS	Complete
2.4	Complete two existing building retrofit programs: the Rental Apartment Retrofit Accelerator (RARA) and Non-Profit Resilient Retrofit Grant (NRRG). These programs will seek participating buildings from the rental and non-profit sector to complete retrofits that reduce emissions and improve resilience	2027	PDS	Underway
2.5	Complete a study on cooling measures in existing multi-family buildings, in partnership with Metro Vancouver and the City of North Vancouver. The findings will inform direction on short, medium and long-term strategies to reduce heat-related morbidity in existing multi-family buildings.	2025	PDS	Complete
2.6	Implement requirements for mandatory cooling in new multi-family residential buildings in Vancouver Building By-law effective 2025 and explore for 1-3 story residential buildings.	2024	PDS	Complete
2.7	Advocate to Province to reduce barriers to installing cooling measures outlined in the Strata Property Act and Residential Tenancy Act.	tbd	PDS, VCH, FH	Underway
2.8	Complete analyses and report out on findings from multi-year Measuring Indoor Temperature Initiative in partnership with Vancouver Coastal Health and BC Centre for Disease Control.	2025	PDS	Complete
	Stewarding the Urban Forest and Green Space to Support Outdoor Cooling			
3.1	Continue to advance tree planting on public land to support efforts to increase the urban forest canopy to 30% by 2050, with a focus on below average canopy neighbourhoods.	2050	PB	Underway
3.2	Install 20-40 new tree pits (and planted trees) in low canopy areas per year, including appropriate soil volume improvements.	2025	ENG, PB	Underway
3.3	Assess the resilience of specific climate-adapted tree species to extreme heat and drought by implementing and monitoring three pilot tree-planting projects and use the outcomes of these pilots to inform the use of climate-adapted species in future tree-planting projects.	2026	PB	Complete
3.4	Explore priority areas for tree planting and retention on private land.	2025	PDS	Underway
3.5	Following update to the Tree Bylaw, develop a monitoring approach to track changes to tree coverage on private land as a result of permitted tree removal.	2025	SPSO	Not Started

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