Risk and Insurance Studies Centre

Team

05.

Indigenous Communities, Northern Infrastructure & Insurance Gaps in Canada's Commercial Insurance Market

How can insurance models address climate-driven insurance gaps in Indigenous and northern communities?

Indigenous and northern communities face major insurance gaps driven by climate risk and remoteness.



Wildfires, flooding, and permafrost thaw have intensified underwriting challenges, causing insurers to retreat from high-risk regions, which limits long-term infrastructure and business development opportunities. This project proposes a layered public-private insurance system improving accessibility, resilience, and sustainability.

Methodology

Step 1: Literature Reviews

Step 2: Built a quantitative dataset of 1,141 Indigenous communities across Canada.

Step 3: Applied GAM, Random Forest, and MICE techniques to analyze predictors of insurance gaps.

Step 4: Framework Development

A collaborative project with:

UNIVERSITY OF TORONTO

YORK UNIVERSITÉ UNIVERSITY

AVIVA

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Insights

- Insurance gaps are driven by interconnected structural and climate-related risks.
- **Income was the strongest predictor of insurance accessibility,** followed by flood, remoteness, wildfire, housing, and permafrost risks.
- Wildfires and catastrophic losses **increased reinsurance costs** and **reduced underwriting capacity.**
- Remote communities face **higher reconstruction costs** and **limited mitigation infrastructure.**
- Permafrost thaw independently increases infrastructure vulnerability.

Solution

The team developed an **Integrated Parametric-Cooperative Insurance Model (IPCIM),** a unified framework designed to address the structural, financial, and climate-related drivers of insurance inaccessibility.

Proposed IPCIM

Cooperative Risk Pooling	Addresses limited private insurance infrastructure in band-housing communities.
Parametric Climate-Risk Triggers	Provide rapid payouts after climate-related events without requiring lengthy claims assessments
Income-adjusted Premium Subsidies	Concentrates support on lower-income communities while maintaining long-term sustainability through pooled pricing and government participation.
Government-backed catastrophe financing	Limit catastrophic exposure for private insurers and reinsurers.

Qualitative Feedback

- Industry mentor feedback emphasized that isolated insurance solutions would not sufficiently address the complexity of Indigenous insurance gaps, validating the IPCIM framework.
- Academic mentor guidance strengthened the methodology through Multiple Imputation by Chained Equations (MICE) implementation for missing data.
- Research findings supported integrating cooperative insurance, climate triggers, subsidies, and government backstops into one system.
- Overall, the IPCIM framework has the potential to improve insurance access, climate resilience, and Indigenous economic self-determination.



Next steps?

The project was limited by incomplete insurance-loss data and proxy measures for insurance accessibility. Future research can improve the model with direct claims data and better climate-risk monitoring.

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