Injection drug use & depressive symptoms are associated with food insecurity in HIV-hepatitis C virus co-infected individuals in Canada


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• **Food insecurity (FI):**

  • **Common** in HIV-positive & HIV-HCV co-infected \(^{[1]}\)
    - FI in HIV-positive (British Columbia): **71%** (2007-2008) \(^{[2]}\)
    - FI in HIV-HCV co-infected (Canada): **59%** (2012-2014) \(^{[3]}\)
      - Much **higher** than general Canadian population (8%) \(^{[4]}\)

• **FI:** Limited or uncertain -
  - **Availability** of nutritionally adequate & safe foods
  or
  - **Ability** to acquire acceptable foods in socially acceptable ways \(^{[5]}\)

• FI is **context-specific:**
  - General population **vs.** sub-groups of population
20% of HIV-positive: HIV-HCV co-infected \[^{[6]}\]
- Vulnerable sub-set of HIV-positive \[^{[7-9]}\]
  - High prevalence of injection drug use (IDU)
    - HIV & HCV - bloodborne viruses
  - High prevalence of depressive symptoms

Fl is associated with:
- Sub-optimal HIV treatment adherence \[^{[10]}\]
- Incomplete HIV viral load suppression \[^{[11]}\]
- Lower CD4 cell counts \[^{[12]}\]
- Higher rates of mortality \[^{[13]}\]

Due to consequences of Fl:
- Identifying risk factors for Fl may inform interventions to:
  - Reduce Fl & consequences of being food insecure
Objectives

- Objectives:
  - Separately examine 2 associations:
    - (1) Injection drug use $\rightarrow$ food insecurity
    - (2) Depressive symptoms $\rightarrow$ food insecurity
  - Population: HIV-HCV co-infected in Canada
    - Prospective longitudinal cohort data
    - Temporality (exposure precedes outcome)
Methods

• Data sources:
  
  • **Food Security & HIV-HCV Study:**
    
    • Canadian Co-infection Cohort (CCC) \(^{[14]}\)
      • Multi-centre study of co-infected in care
      • 17 HIV clinics, 6 provinces
      • Questionnaires & blood samples (every 6 months)
    
    • FI-related:
      • Integrated in CCC: Nov 2012 - May 2015 \(^{[3]}\)
      • Additional questionnaire
        • Household Food Security Survey Module (HFSSM)
Methods

- **Measurements:**
  - **Exposures** (2 analyses):
    - (1) Self-reported IDU *(in the past month)*
      - none **vs.** occasional IDU (< 1 day / week) **vs.** frequent IDU (> 1 day(s) / week)
    - (2) Self-reported depressive symptoms *(in the past week)*
      - Center for Epidemiological Studies Depression Scale (CES-D-10)
      - CES-D-10 score ≥ 10
  
- **Outcome**: food insecurity *(in the past 6 months)*
  - 10-item adult scale: Household Food Security Survey Module (HFSSM) \[^{15}\]
  - Binary indicator: food secure **vs.** food insecure (marginal/moderate/severe)
    - # of affirmative (✓) responses on Health Canada’s HFSSM
      - 0 affirmative responses: food secure
      - ≥ 1 affirmative response: food insecure
• Measurements cont’d:
  • **Confounders** (self-report / blood tests):
    • Selected on substantive grounds (*a priori*)

• (1) **IDU analysis**:
  • **Socioeconomic**: income, employment, education
  • **Sociodemographic**: age, gender, ethnicity, born in Canada, province, living / housing situation, unstable housing
  • **Behavioural**: IDU in lifetime, use of other illicit substances (via snorting / smoking), alcohol / cigarette use
  • **Clinical**: Long-term / recent depressive symptoms [exposure in (2)], self-reported health state

• (2) **Depressive symptoms analysis**:
  • Adjusted for all above
  • **Additional**: recent IDU [exposure in (1)], use of food assistance / mental health professionals, indicators of health status (AIDS-defining illnesses, long-term depressive symptoms, issues with mobility / self-care, end-stage liver disease), & sexual orientation
Methods

• Data analyses:
  
  • Generalized estimating equations (GEE):
    
    • Estimated adjusted **odds ratios** (ORs)
      • 2 multivariate logistic regression models

    • **(1) IDU** (occasional / frequent) → FI
      • Adjusted for confounders

    • **(2) Depressive symptoms** → FI
      • Adjusted for confounders

  
  • Repeated (correlated) measurements – longitudinal data
  • Temporality: exposure & confounders lagged in time
Results

• N = 725 HIV-HCV co-infected participants

• 17 centres, 6 provinces (2012 - 2015)

• **Baseline** (visit 1):

  • **26%** engaged in IDU *(in the past month)*
  • Occasional (12%) / Frequent (14%)

  • **52%** experienced **depressive symptoms** *(in the past week)*
  • CES-D-10 ≥ 10

  • **64%** experienced **FI** *(in the past 6 months)*
  • ≥ 1 on HFSSM
Results

• After temporal-ordering & adjustment for confounding:
  • 2 multivariate logistic models

  • Occasional IDU → FI:
    • adjusted odds ratio = 1.22 (95% CI = 0.79 - 1.90)

  • Frequent IDU → FI:
    • adjusted odds ratio = 1.93 (95% CI = 1.16 - 3.22) *

  • Depressive symptoms → FI:
    • adjusted odds ratio = 2.01 (95% CI = 1.48 - 2.74) *

*p < 0.05*
Discussion

- IDU, depressive symptoms, & FI: common in study sample

- Frequent **IDU** (in the past month) & **depressive symptoms** (in the past week)
  - Significantly **associated** with FI ($p < 0.05$) *

- **The odds of FI are:**
  - 1.93 times *higher* for those who engage in frequent IDU
  - 2.01 times *higher* for those who experience depressive symptoms

- **IDU → FI:**
  - Directly: disrupt food intake patterns by reducing appetite & metabolism $^{[16]}$
  - Indirectly: drug-using environments creating barriers to food access / availability $^{[16]}$

- **Depressive symptoms → FI:**
  - Potential neuro-vegetative role: loss of interest, appetite change, psycho-motor effects, fatigue $^{[17]}$
Limitations

- Relatively short duration of follow-up
  - Loss of power when lagging covariates

- Sample limited to co-infected in HIV care
  - May not be representative of entire co-infected population

- Self-report of exposures & confounders
  - Potential measurement error / misclassification

- Observational study - residual confounding
  - Unmeasured factors / imperfectly measured factors
Conclusions

- Significant risk factors for FI:
  - (1) Frequent IDU & (2) depressive symptoms
    - Co-infected individuals engaged in IDU or experiencing depressive symptoms may be higher risk
    - FI: potential harm of IDU & depressive symptoms

- Existing interventions aimed at IDUs or depressive symptoms:
  - Substance abuse treatments
  - Harm reduction programs
  - Mental health services

- These programs & services may:
  - Reduce FI & consequences of being food insecure
Acknowledgements

- **Study participants** across Canada

- **My PhD co-supervisors**: Drs. Joseph Cox & Erica Moodie

- **Food Security & HIV-HCV Study PIs**: Drs. Anne-Marie Hamelin & Joseph Cox
  - **Funding**: CIHR & CIHR Canadian HIV Trials Network
    - www.hivnet.ubc.ca/clinical-trials/ctn264

- **Canadian Co-infection Cohort**: Dr. Marina Klein & co-investigators & staff

- **Personal stipend support**: CANOC Centre Doctoral Scholarship Award


