

# Association between food insecurity and food procurement methods among people living with HIV/AIDS in British Columbia

A. Anema<sup>1,2,3</sup>, S.J. Fielden<sup>3</sup>, S. Shurgold<sup>4</sup>, E. Ding<sup>4</sup>, J. Messina<sup>5</sup>, J.E. Jones<sup>6</sup>, B. Chittock<sup>7</sup>, K. Monteith<sup>8</sup>, J. Globerman<sup>9</sup>, S.B. Rourke<sup>9</sup>, R.S. Hogg<sup>4,10</sup>, and the Food Security Study Team\*

1. Harvard University, Boston, MA, USA; 2. Boston Children's Hospital, Boston, MA, USA; 3. University of British Columbia; Vancouver, BC, Canada; 4. British Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital, Vancouver, BC, Canada; 5. Immune Deficiency Clinic, St. Paul's Hospital, Vancouver, BC, Canada; 6. Pacific AIDS Network; Vancouver, BC, Canada; 7. AIDS Vancouver; Vancouver, BC, Canada; 8. Coalition des organismes communautaires québécois de lutte contre le sida, Montréal, QC, Canada; 9. Ontario HIV Treatment Network (OHTN), Toronto, ON, Canada; 10. Simon Fraser University; Burnaby, BC, Canada.

## Introduction

Food security exists "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life." Implicit in this definition is the notion that people who are food insecure may consume insufficient, poor quality or unsafe foods, and may procure food in non-traditional ways. In British Columbia (BC), Canada, food insecurity among HIV-positive individuals has been independently associated with increased behavioural risk of HIV transmission and a two-fold increased risk of mortality when controlling for potential socio-demographic and clinical confounders. However, little is known about which sub-components (i.e. insufficiency, dietary diversity, safety, procurement methods) are driving food insecurity.

## Methods

We sought to evaluate the relationship between food insecurity and its sub-components in a community-based sample of people living with HIV/AIDS across BC. This analysis was conducted within a national community-based research initiative involving 30 AIDS service organizations and four universities. Peer research associates led participant recruitment and survey / dietary recall administration. Food security was measured using the Health Canada Household Food Security Scale Module. Logistic regression was used to determine key factors associated with food insecurity, controlling for potential confounders.

## Results

Of 262 participants deemed eligible for analysis, 192 (73%) reported being food insecure. Sub-components associated with food insecurity in bivariate analysis included having below the daily recommended intake consumption of protein ( $p = 0.046$ ); being sick from spoiled/unsafe food in the past six months ( $p = 0.010$ ); and using non-traditional means of food procurement ( $p < 0.05$ ). In multivariable analyses, factors significantly associated with food security included: non-traditional food procurement methods [adjusted odds ratio (AOR)=11.11, 95% confidence interval (CI): 4.79-25.68,  $p < 0.001$ ]; younger age [AOR=0.92, 95% CI: 0.86-0.96,  $p < 0.001$ ]; unstable housing [AOR=4.46, 95% CI: 1.15-17.36,  $p = 0.031$ ]; lower household gross annual income [AOR=4.49, 95% CI: 1.74 - 11.60,  $p = 0.002$ ]; and symptoms of depression [AOR=2.73, 95% CI: 1.25 - 5.96,  $p = 0.012$ ].

**Table 1: Bivariate comparison of daily caloric and nutrient sufficiency, by food security status**

Characteristics	Food Insecure n (%) 192 (73%)	Food Secure n (%) 70 (27%)	P-value
<b>Caloric sufficiency</b>			
<b>Energy intake (Kcal)</b>			
Median (IQR)	1840 (1293 - 2578)	1796 (1364 - 2256)	0.747
<b>HIV-specific energy sufficiency (Kcal) *</b>			
No	50 (78)	14 (22)	0.314
Yes	142 (72)	56 (28)	
<b>Dietary Diversity: Nutrient intake (g) by DRI †</b>			
Vegetable			
Below	179 (74)	63 (26)	0.384
At or above	13 (65)	7 (35)	
Fruit			
Below	132 (73)	48 (27)	0.978
At or above	60 (73)	22 (27)	
Protein			
Below	78 (80)	19 (20)	0.046
At or above	114 (69)	51 (31)	
Fat			
Below	35 (81)	8 (19)	0.188
At or above	157 (72)	62 (28)	
Carbohydrate			
Below	39 (78)	11 (22)	0.402
At or above	153 (72)	59 (28)	

\* Notes: Derived using Harris Benedict Equation

† Notes: Daily Recommended Intake (DRI), based on Canada Healthy Eating Food Guide: fruits and vegetables (7-8 servings for men; 8-10 servings for women); protein (34-56 for men / 34-46 for women) based on age; fat (30 g); carbohydrate (130 g)

**Table 2: Bivariate comparison of participant food safety, by food security status (n=262)**

Characteristics	Food Insecure n (%) 192 (73%)	Food Secure n (%) 70 (27%)	P-value
<b>Access to a refrigerator</b>			
No	8 (100)	0 (0)	0.113
Yes	170 (72)	65 (28)	
<b>Hand washing before food preparation</b>			
All/most of the time	165 (72)	65 (28)	0.367
Sometimes/rarely	23 (82)	5 (18)	
<b>Sick from spoiled food past six months</b>			
No	140 (69)	63 (31)	0.009
Yes	46 (87)	7 (13)	
<b>Physician confirmed food-borne sickness past six months</b>			
No	9 (82)	2 (18)	0.479
Yes	9 (100)	0 (0)	

**Table 3: Bivariate comparison of procurement methods, by food security status (n=262)**

Characteristics	Food Insecure n (%) 192 (73%)	Food Secure n (%) 70 (27%)	P-value
<b>Any non-traditional food procurement*</b>			
No	53 (50)	53 (50)	<0.001
Yes	138 (89)	17 (11)	
<b>Attended any food distribution/bank/program</b>			
No	17 (47)	19 (53)	<0.001
Yes	174 (77)	51 (23)	
<b>Begged or panhandled for food</b>			
No	167 (71)	68 (29)	0.019
Yes	24 (92)	2 (8)	
<b>Stole food</b>			
No	156 (70)	68 (30)	0.002
Yes	35 (95)	2 (5)	
<b>Traded sex for food</b>			
No	180 (72)	70 (28)	0.040
Yes	11 (100)	0 (0)	
<b>Traded drugs for food</b>			
No	174 (72)	69 (28)	0.049
Yes	17 (94)	1 (6)	
<b>Sold/pawned for food</b>			
No	140 (67)	69 (33)	<0.001
Yes	50 (98)	1 (2)	
<b>Borrowed money for food</b>			
No	66 (54)	56 (46)	<0.001
Yes	124 (90)	14 (10)	
<b>Procured dumpstered or discarded food</b>			
No	165 (71)	69 (29)	0.002
Yes	26 (96)	1 (4)	

\* Composite variable includes all methods of procurement listed, except 'attended any food distribution/bank/program'

**Table 4: Univariate and multivariate analyses of factors associated with food insecurity (n=218)**

	Univariate Model		Multivariate Model	
	OR (95% CI)	p-value	AOR (95% CI)	p-value
<b>Any non-traditional procurement</b>				
No v.s. yes	10.11 (4.90, 20.84)	<0.001	11.11 (4.79, 25.68)	<0.001
<b>Age</b>				
Per 10 year increase	0.92 (0.89, 0.96)	0.001	0.91 (0.86, 0.96)	<0.001
<b>Unstable housing</b>				
No v.s. yes	5.13 (1.51, 17.41)	0.009	4.46 (1.15, 17.36)	0.031
<b>Household gross annual income</b>				
< 20,000 v.s. >= 20,000	5.49 (2.54, 11.86)	<0.001	4.49 (1.74, 11.60)	0.002
<b>HIV stigma</b>				
No v.s. yes	2.65 (1.40, 5.01)	0.003	--	--
<b>Symptoms of depression</b>				
No v.s. yes	2.54 (1.37, 4.70)	0.003	2.73 (1.25, 5.96)	0.012

## Conclusion

Food insecurity among people living with HIV/AIDS in BC appears to be defined by poor dietary diversity and food procurement methods. Notably, participants who reported using non-traditional means of food procurement were over 10 times more likely to be food insecure. These findings suggest a need for tailored food security and social support interventions in this setting.



We would like to acknowledge the hard work and commitment of PRAs in the Food Security Study, including: Sylvain Beaudry, Andrew Beckerman, Scott de Blois, E.L. Cioppa, Paul F. Cogan, M. Desbiens, André, Esmeralda, Brenda Gagnier, James Gough, R.K., Mary Mwalwanda, Valerie Nicholson, D. Northcott, Chuck Osborne, C.J.R., Rob Rollins, Tim Walker, K. Webster and those who prefer to remain anonymous.

Conflict of Interest Disclosure: I have no conflicts of interest