

# How does food insecurity relate to health and what are the implications for health care providers?



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# Household Food Security Survey Module

*(administered on the Canadian Community Health Survey since 2004)*

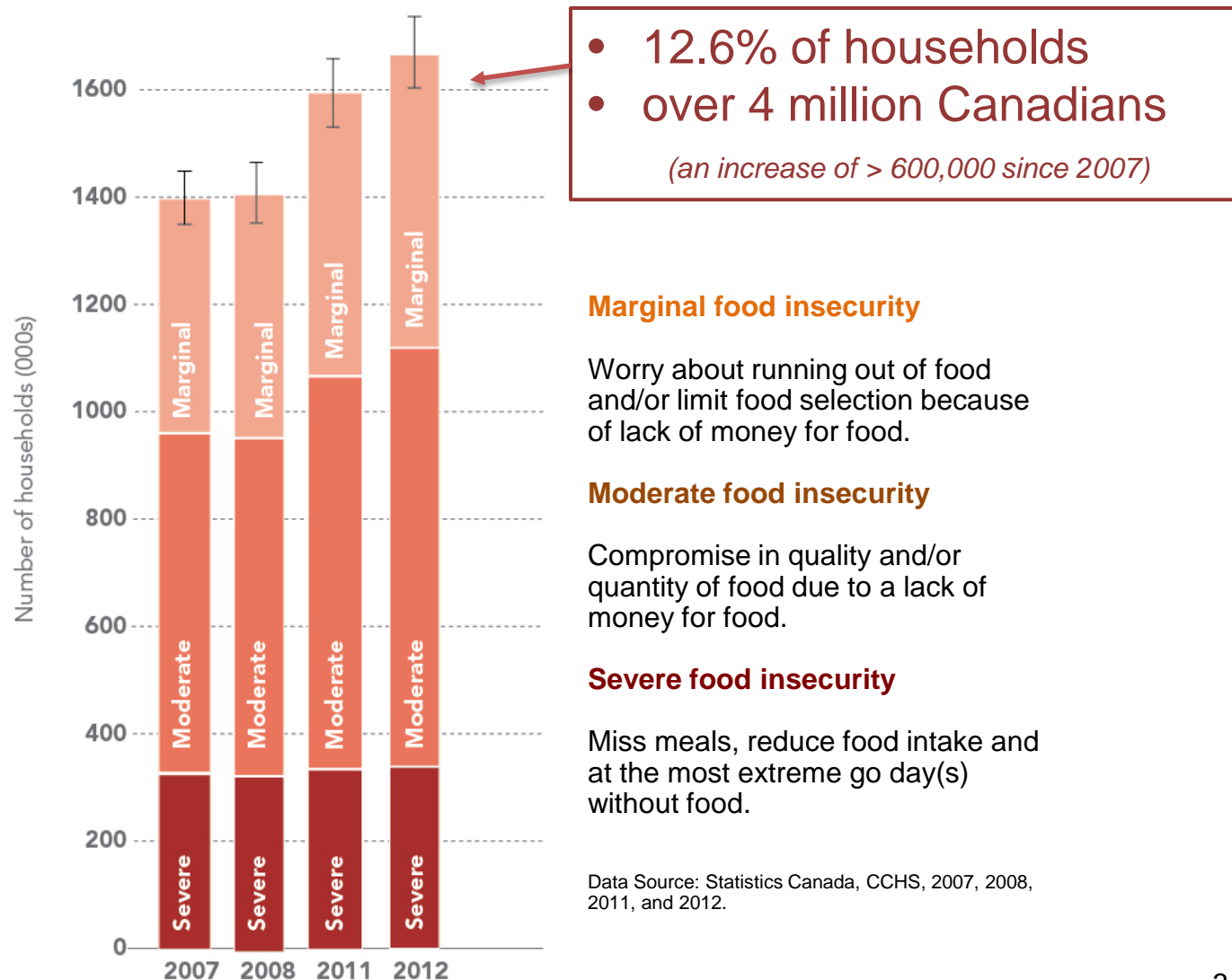
18 questions, differentiating adults' and children's experiences over last 12 months:

- Worry about not having enough food
- Reliance on low-cost foods
- Not being able to afford balanced meals
- Adults/children skip meals
- Adults/children cut size of meals
- Adults lost weight
- Adults/children not having enough to eat
- Adults/children not eating for whole day

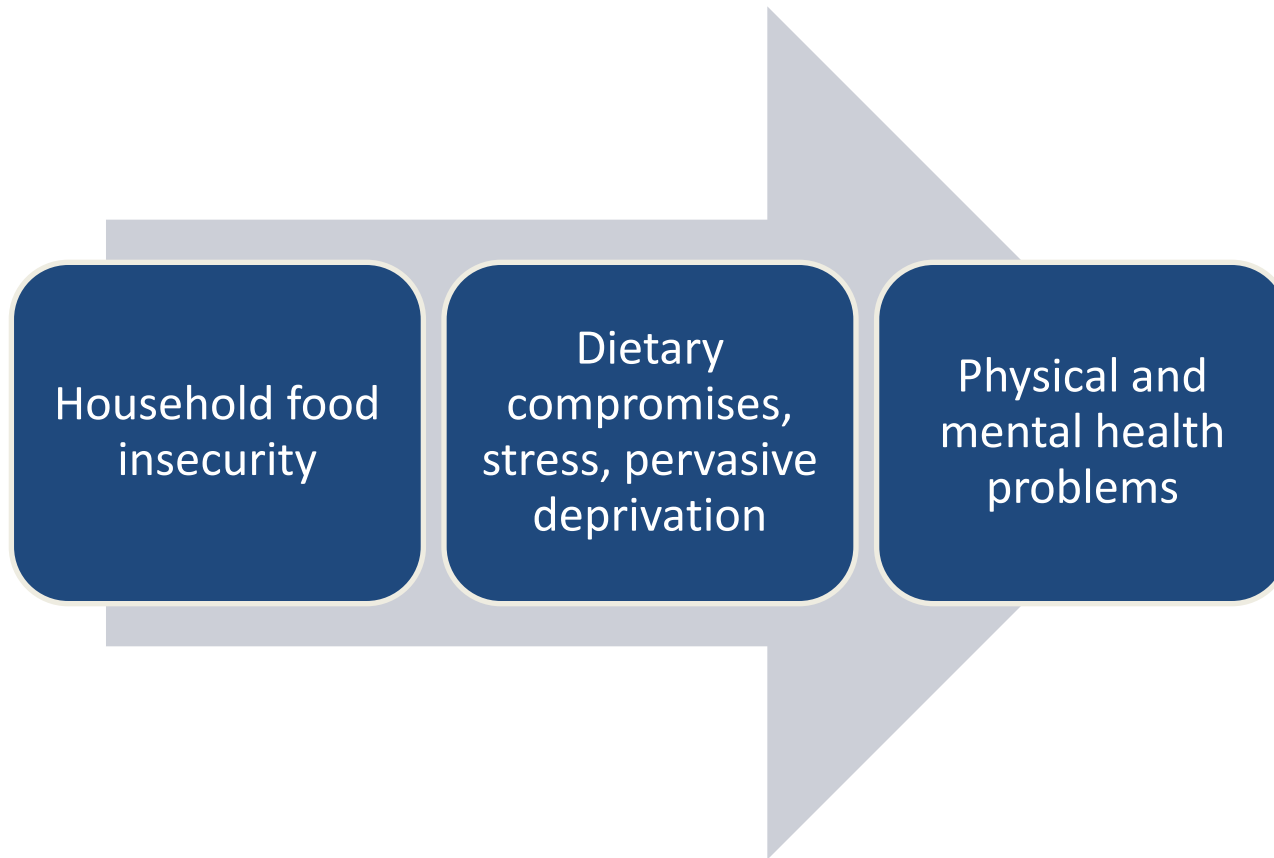


“because there wasn’t enough money to buy food?”

# Household Food Insecurity in Canada, 2007 - 2012



# The deprivation and stress associated with food insecurity erode health and impede the management of chronic conditions.



# DIETARY INTAKE & NUTRITIONAL STATUS

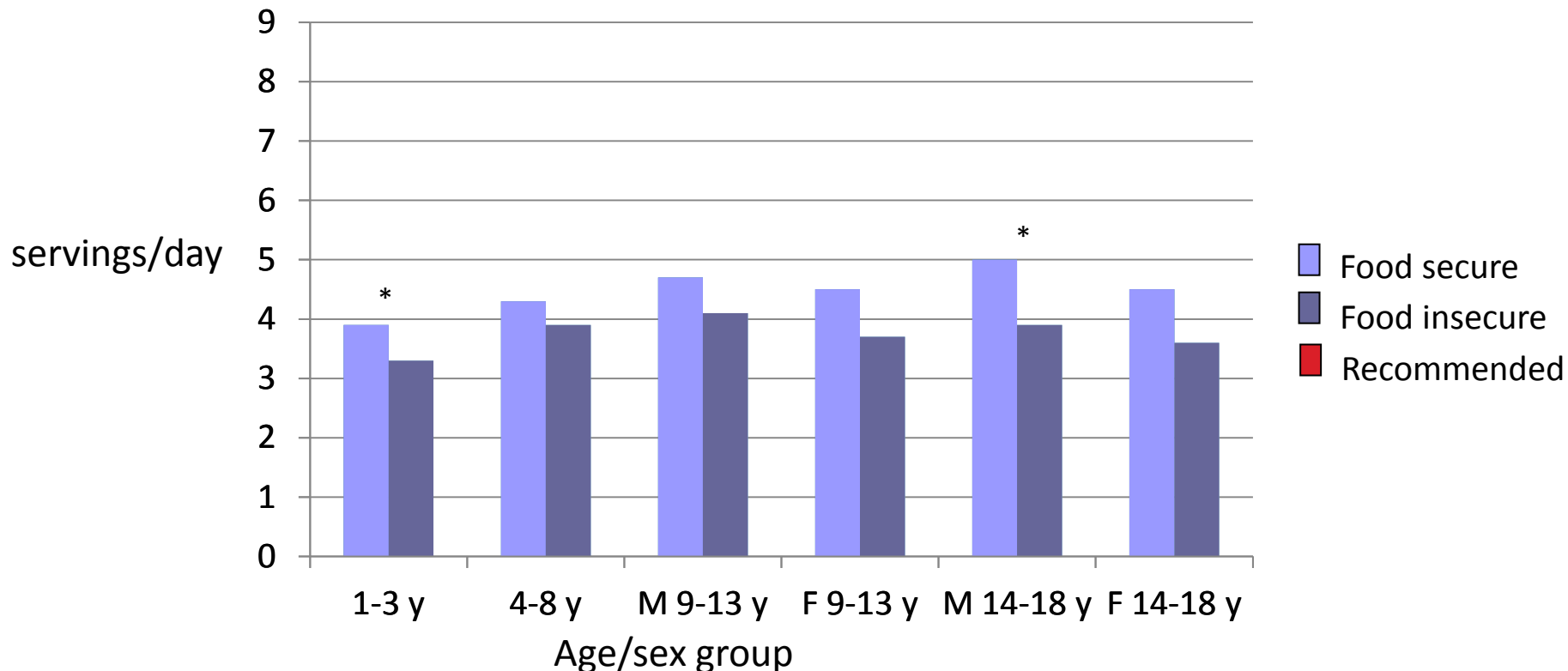
# The relation between household food insecurity and inadequate nutrient intakes:

## Results of population-level analysis, CCHS 2004 (n ≈ 35,000, 10 provinces):

- Little evidence of nutrient inadequacies among young children, and few differences in relation to household food insecurity.
- Adults and adolescents in moderately or severely food insecure households had
  - poorer quality diets (i.e., fewer servings of milk products, fruits and vegetables, and for some groups, meat and alternatives)
  - higher risk of inadequate intakes for protein, vitamin A, folate, magnesium, phosphorus, zinc, iron (women), vitamin B6 (adults), vitamin B12 (adults).

(Kirkpatrick & Tarasuk, J Nutr, 2008: 138: 604-612)

# Children's fruit and vegetable consumption, servings per day by food security status

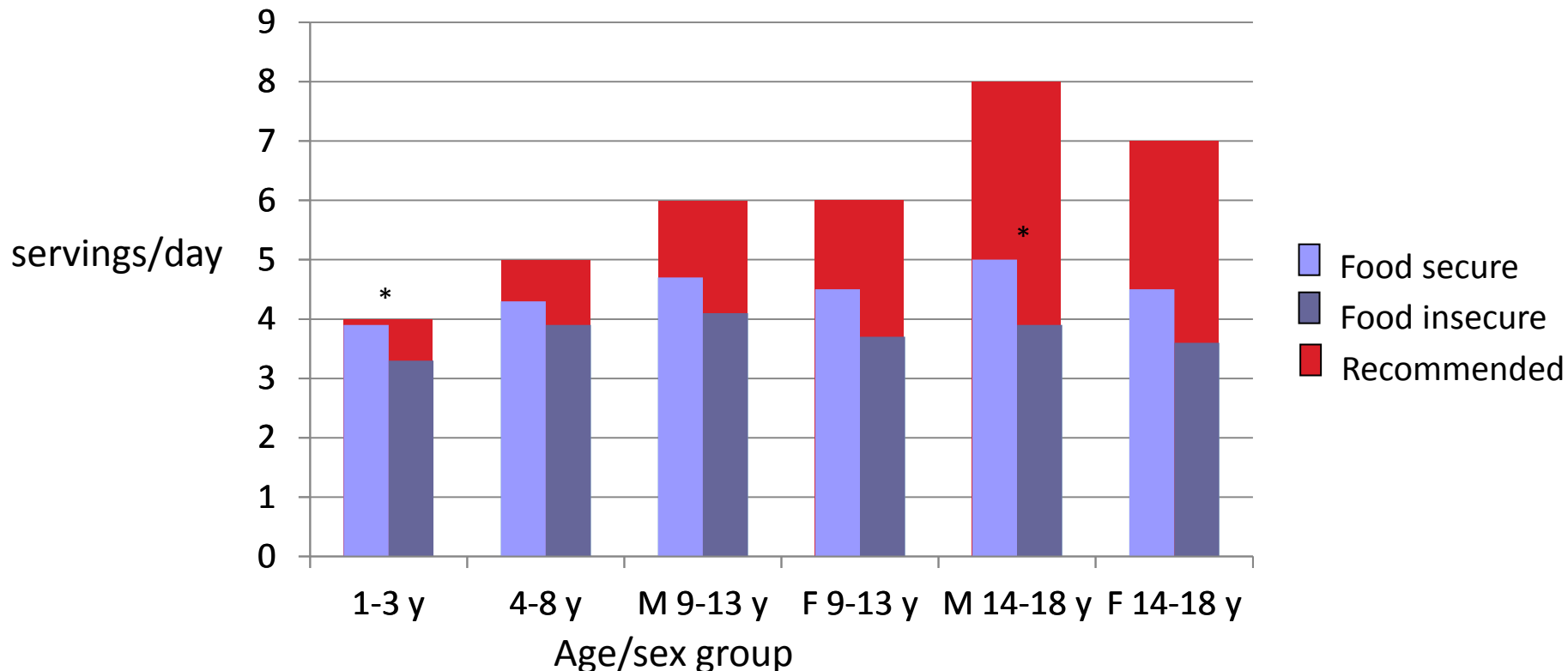


Food insecurity here includes only moderate and severe food insecurity.

\*Significant difference between food-secure & food-insecure subgroups,  $p < 0.05$

(Kirkpatrick & Tarasuk, J Nutr, 2008: 138: 604-612)

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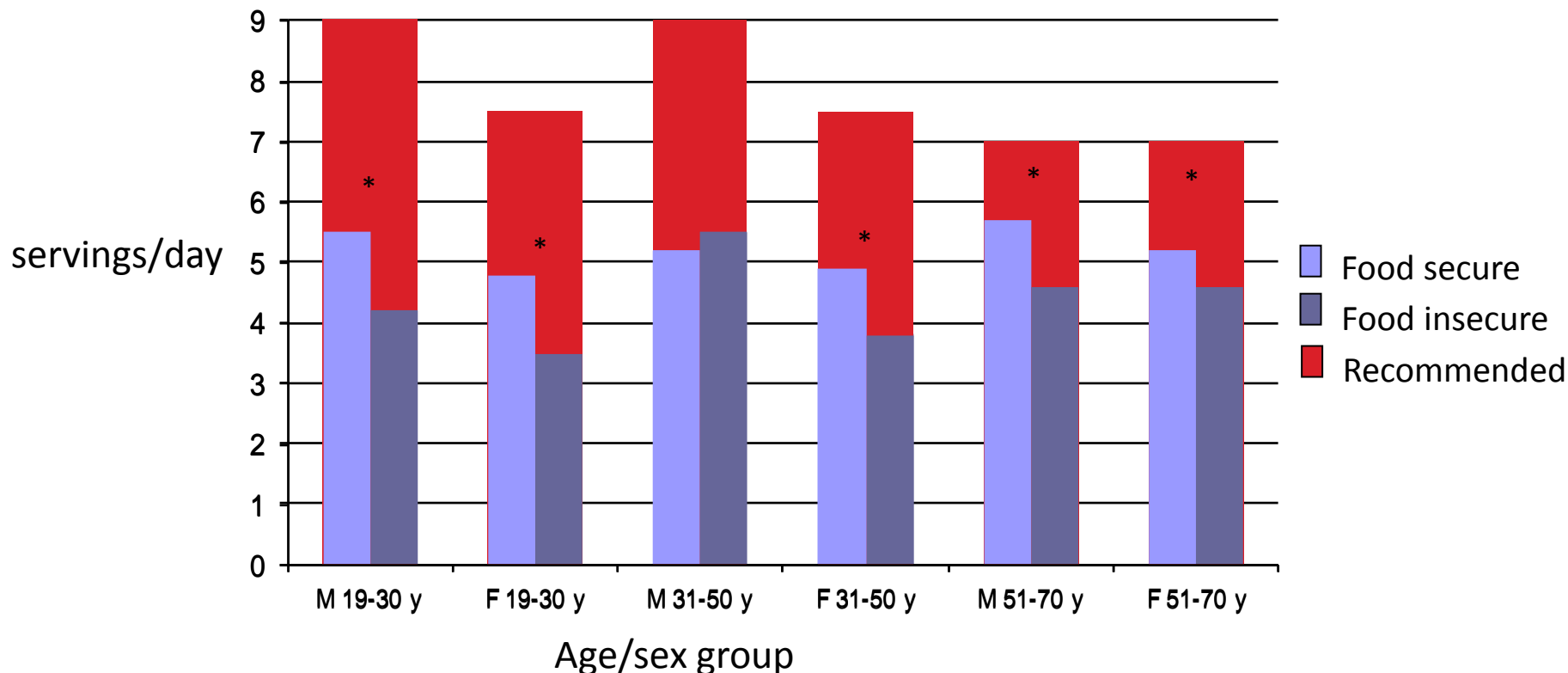


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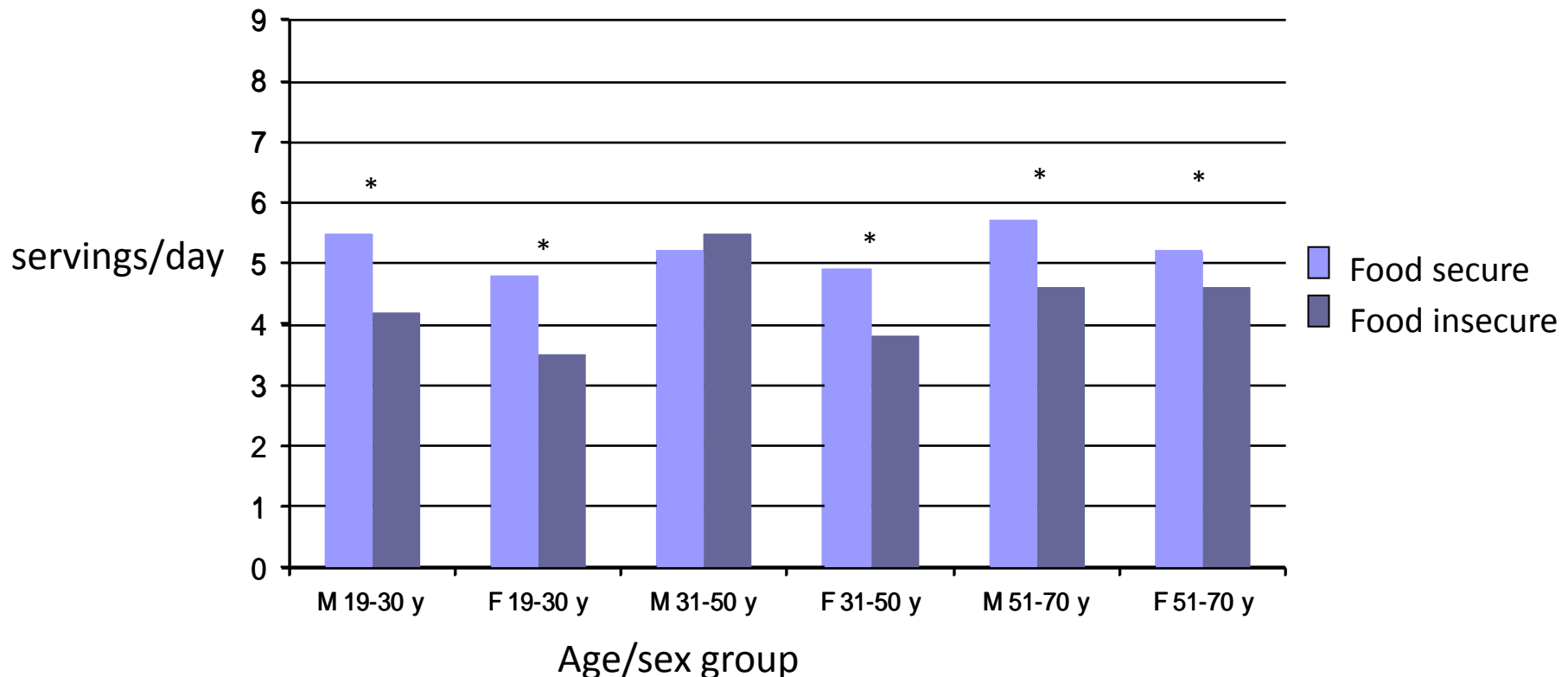
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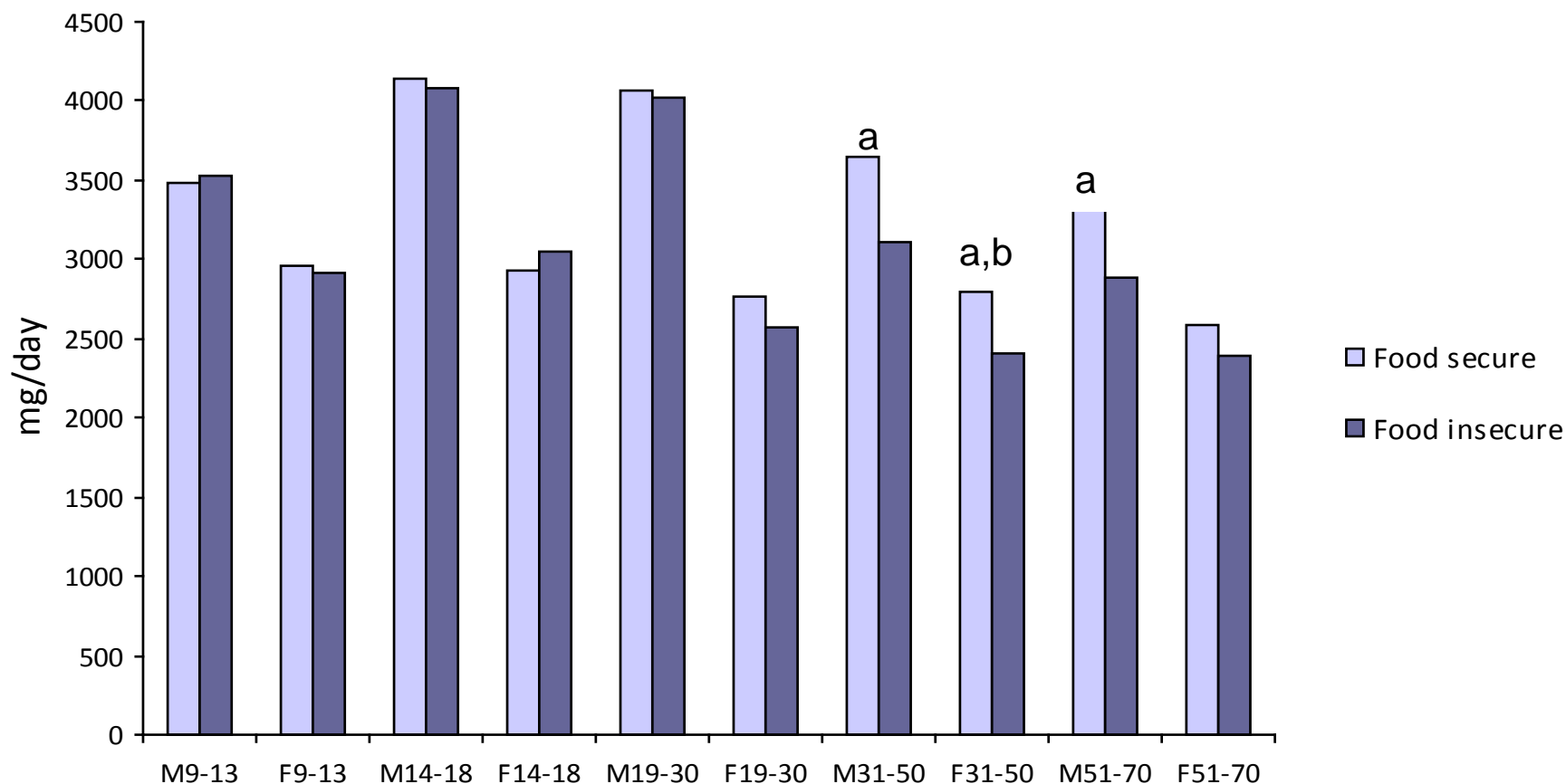
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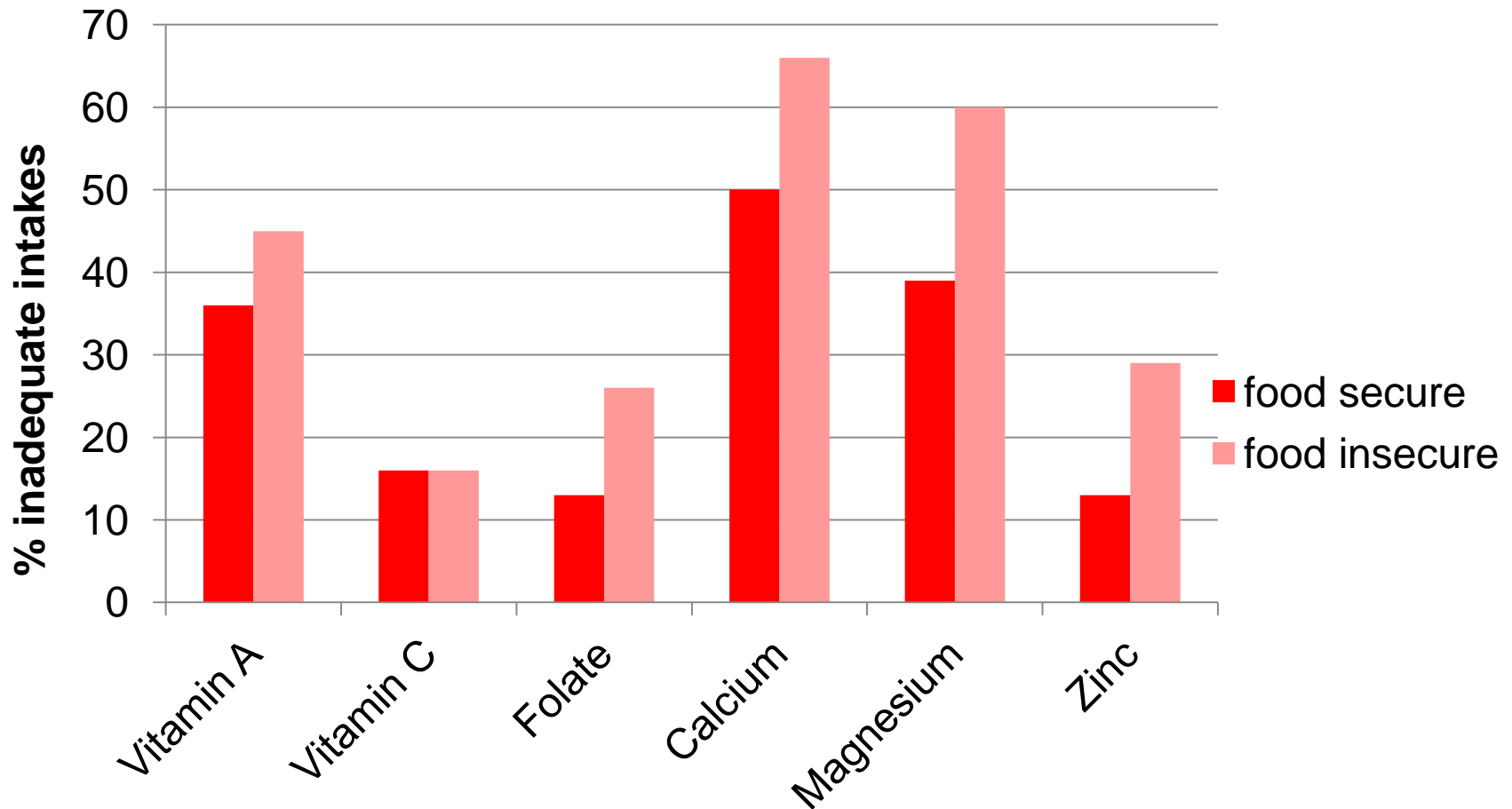
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# Mean SODIUM intake (mg/day), by age, sex and household food insecurity, CCHS 2004



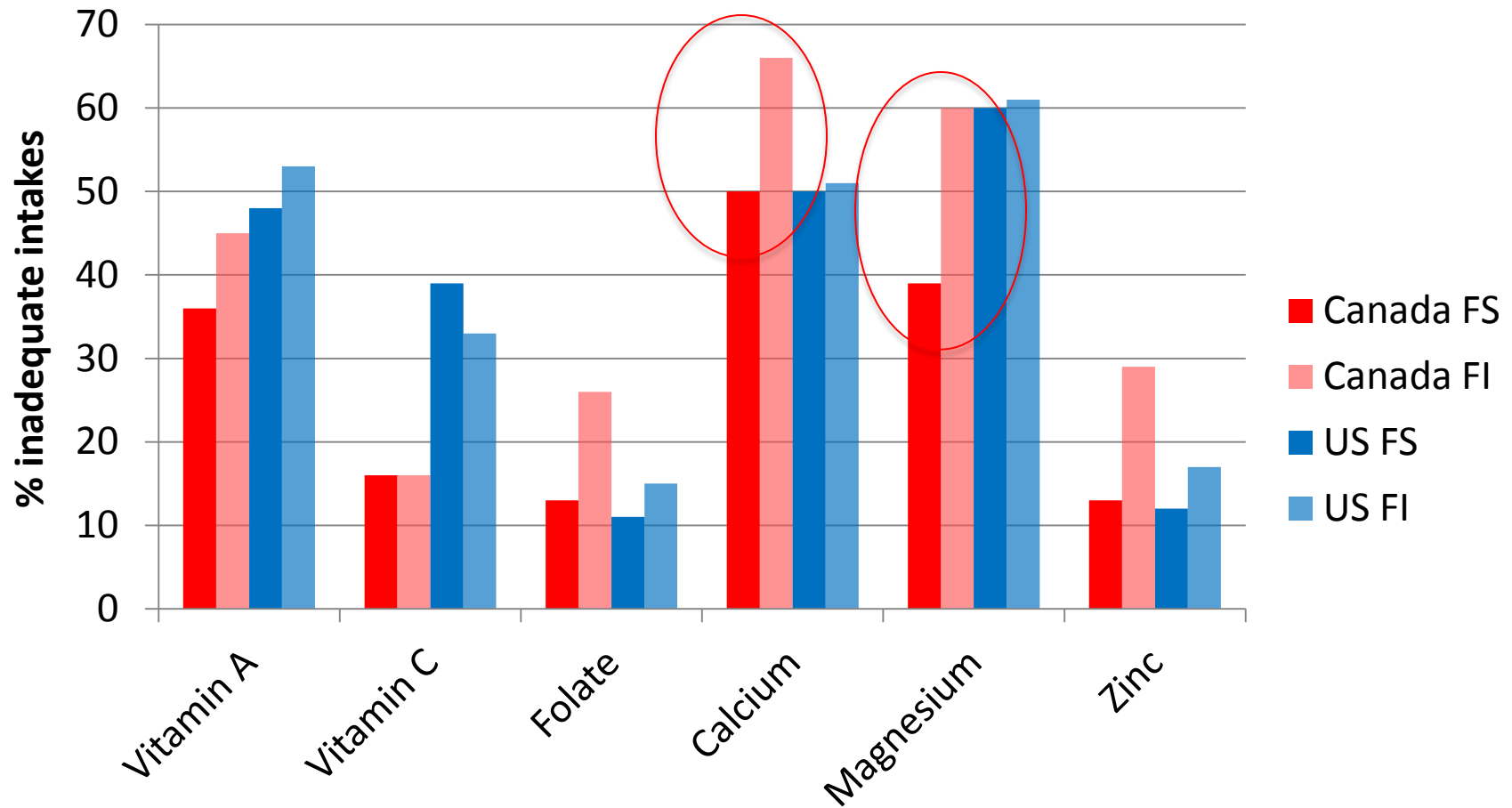
**a:**  $P < 0.05$ , comparison of transformed intakes; **b:**  $P < 0.05$ , ANOVA adjusted for income, education, immigrant status, household composition, and current smoking.

# Prevalence of nutrient inadequacy by food insecurity, individuals $\geq 9$ years of age in Canada (CCHS 2004)



Note: food insecure defined as  $\geq 3$  affirmatives (USDA definition).

# Canada-US comparison of prevalence of nutrient inadequacy ( $\geq 9$ yr) by household food security status



Significantly greater difference between food secure and food insecure in Canada than US for calcium and magnesium.

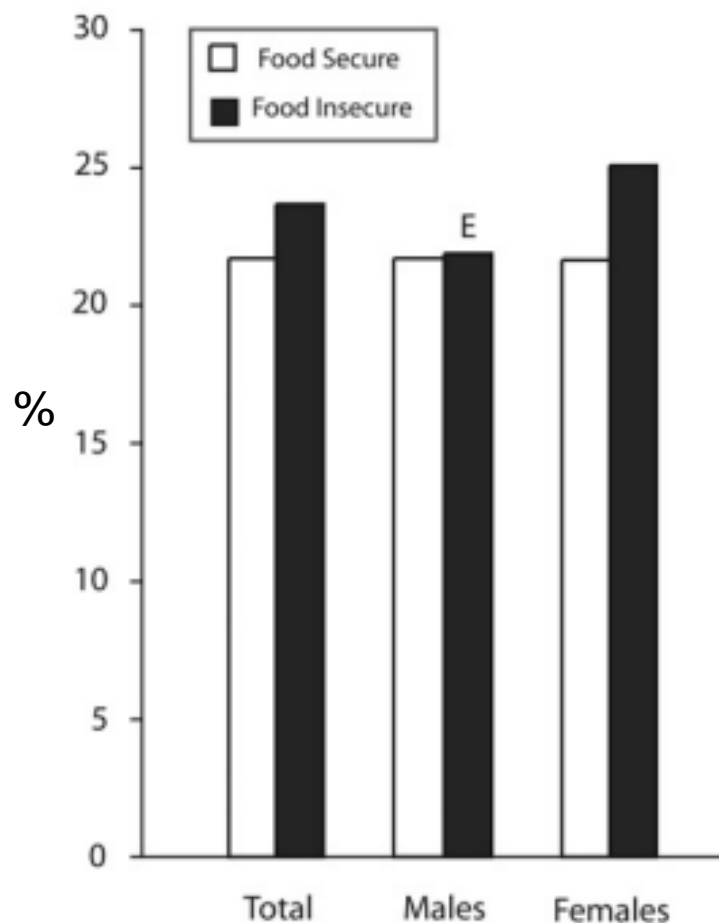
# Food insecurity has been associated with much higher levels of nutritional vulnerability among specific subgroups.

e.g., Study of 294 Inuit children, 8-15 years of age, from Nunavik (Pirkle et al, Can J Public Health, 2014)

- 49.7% were living in food insecure households.
- Children in food-insecure households were significantly shorter and had significantly lower hemoglobin levels than those in food-secure households.
- Even after adjustment for age, sex, etc, children in food-insecure households were, on average, about 2 cm shorter.

# **RELATIONSHIP BETWEEN HOUSEHOLD FOOD INSECURITY AND BODY WEIGHT**

## Prevalence of obesity for respondents 12 yr and older by sex and food security status, CCHS 2004:



Adjusting for socio-demographic factors

- no significant association between food insecurity and odds of obesity for males or females.
- elevated odds only for women reporting 'food insecurity with mild hunger' (≈ moderate food insecurity).

'E' reflects statistical uncertainty of estimate for food insecure males.



# Relationship between food insecurity and body weight?

- Most consistent evidence of association is for adult women – not men and not children. (see Eisenmann et al, *Obes Rev* 2010; Troy et al, Institute of Medicine, 2009)
- Existing literature is limited:
  - Cross-sectional
  - Self-reported height and weight data
  - Food insecurity measured for last 12 months → relevant period of exposure?
  - Confounding by low income, race, parity, chronic ill-health, family structure, etc. (Franklin et al, *J Community Health* 2012)
- Prospective studies from US show no evidence that food insecurity causes weight gain among women. (Jones & Frongillo, *Public Health Nutr* 2007; Whitaker & Sarin, *J Nutr* 2007)

# HEALTH AND CHRONIC CONDITIONS

**Food insecurity is associated with a myriad of negative health outcomes across the life cycle.**



# Effects of food insecurity on pregnancy, birth outcomes, and early life

- Qualitative research in Canada suggests food insecurity contributes to early cessation of breastfeeding and struggles to afford needed formula.  
(Frank, *Food and Foodways*, 2015; Partyka et al, *Can J Diet Prac Res*, 2010)
- Canadian evidence on pregnancy, birth outcome and early life health outcomes is lacking.
- US evidence suggests that food insecurity may increase the probability of
  - Pregnancy complications (Laraia et al, *J Am Diet Assoc*, 2010)
  - Low birth weight, and birth defects (Carmichael et al, *J Nutr* 2007)
  - Poorer health and increased likelihood of hospitalization (Cook et al, *J Nutr* 2006)
  - Compromised development (Rose-Jacobs et al, *Pediatrics*, 2008; Hernandez & Jacknowitz, *J Nutr* 2009)

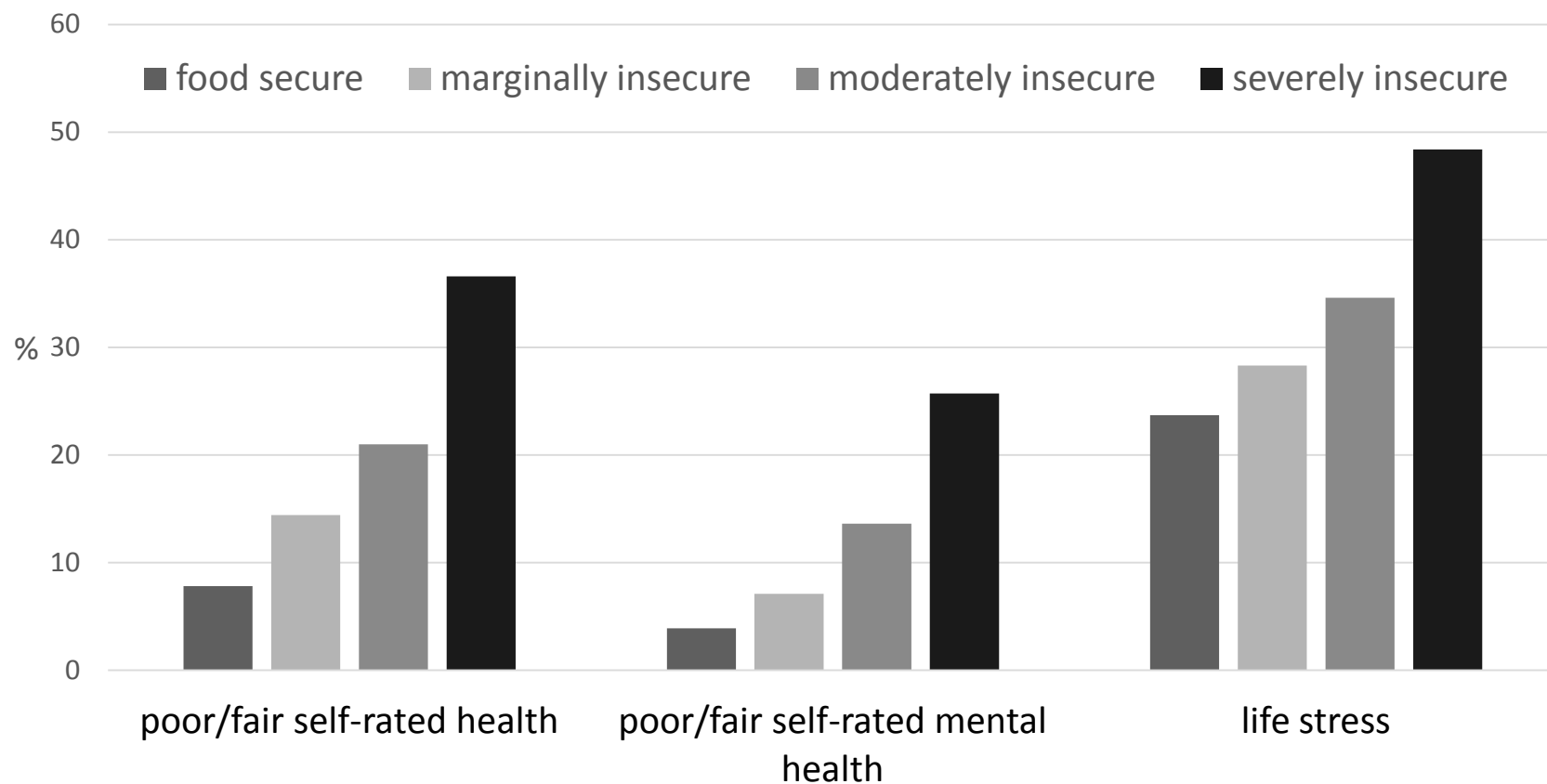
# Food insecurity in childhood takes a lasting toll on health independent of other indicators of disadvantage

Analyses of National Longitudinal Survey of Children and Youth (10-16 years of follow-up):

- Children and youth who experienced hunger (ever) were more likely to have poorer health.
- Multiple episodes of hunger were associated with higher odds of chronic conditions, including asthma.
- Child hunger predicted depression and suicidal ideation in late adolescence and early adulthood.
- The pattern of depression among young adults who experienced childhood hunger is more persistent than found in non-exposed possibly indicating bio embedding.

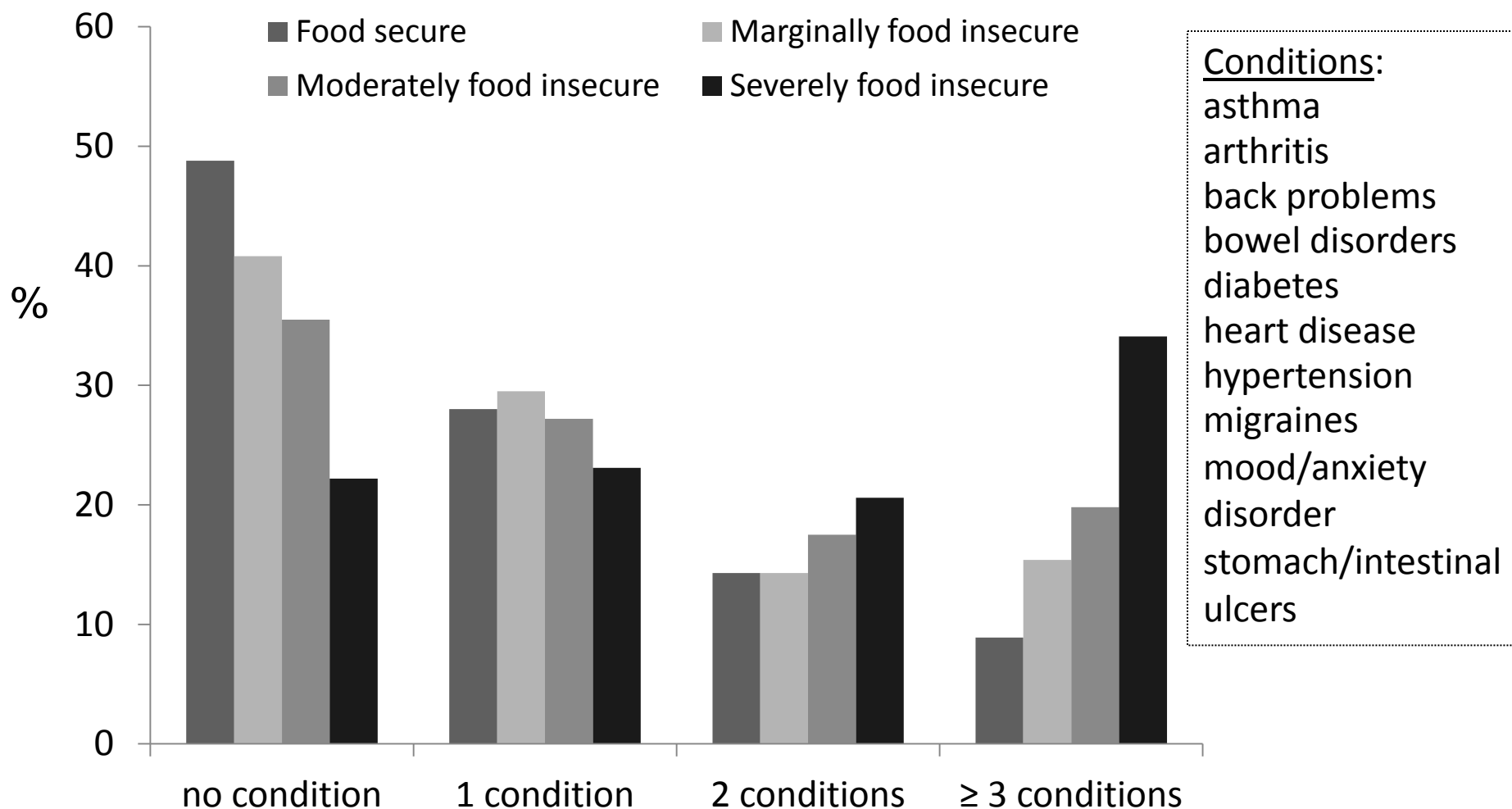
(Kirkpatrick et al., Arch Pediatric Adol Med 2010; McIntyre et al., J Affective Disorders 2013, McIntyre et al. J Social Psych Psych Epid, 2017)

# Self-rated health status of adults 18-64 years, by household food insecurity status

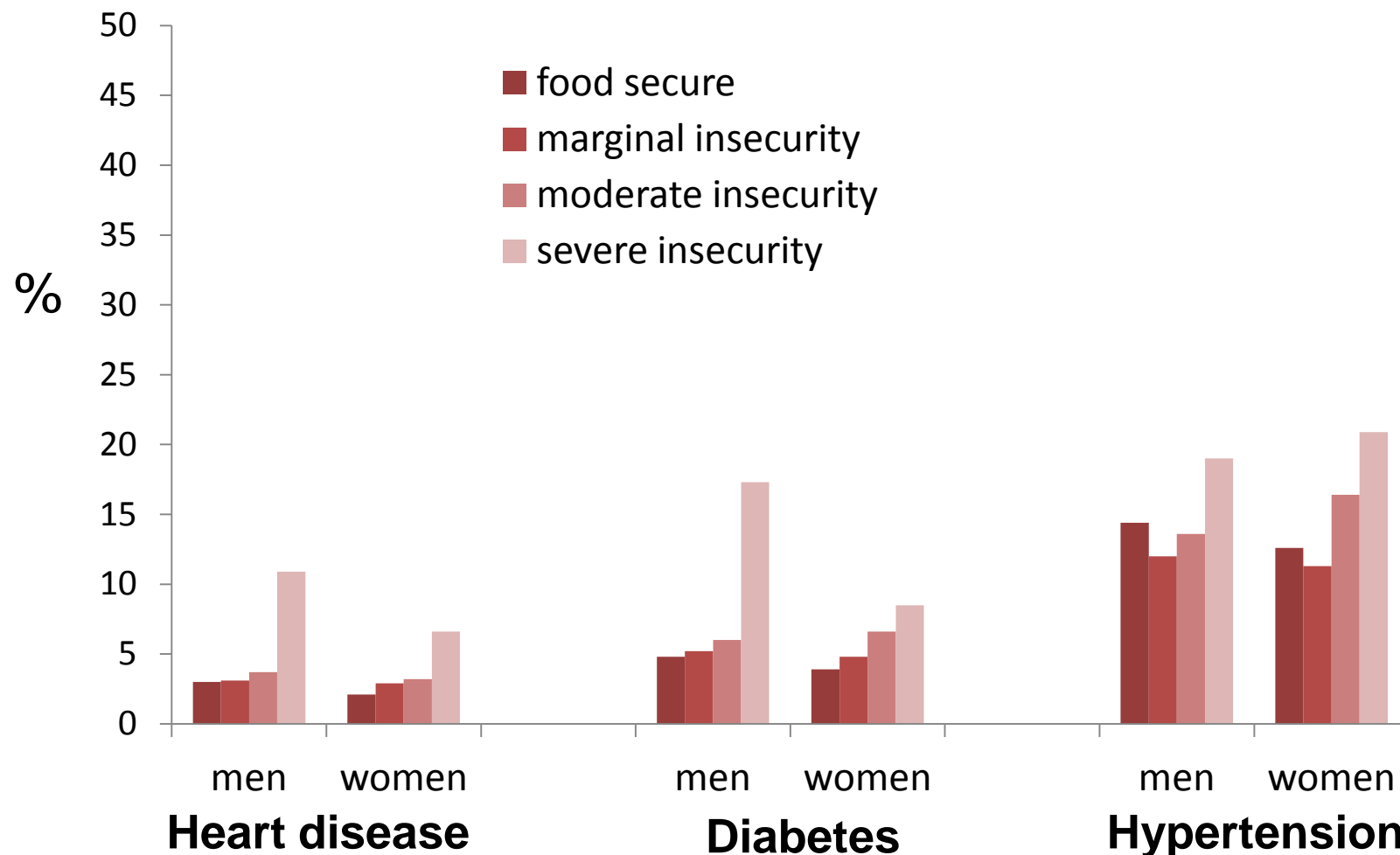


(Tarasuk et al, unpublished analysis of CCHS 2007-08)

# Prevalence of chronic conditions among adults, 18-64 years, by household food security status, CCHS 2007-08

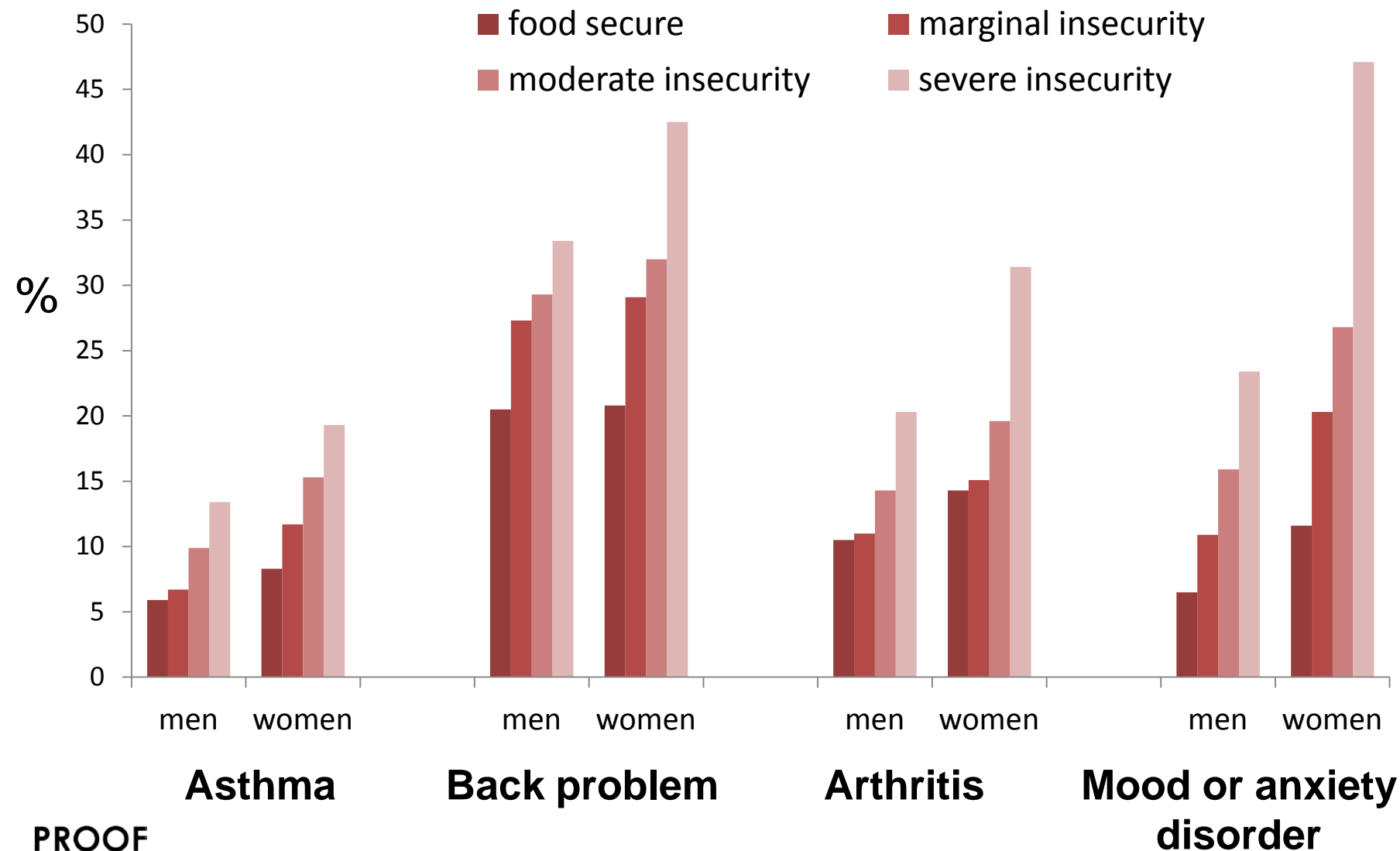


# Proportion of Canadian adults (18 - 64 years) reporting selected chronic conditions, by food security status

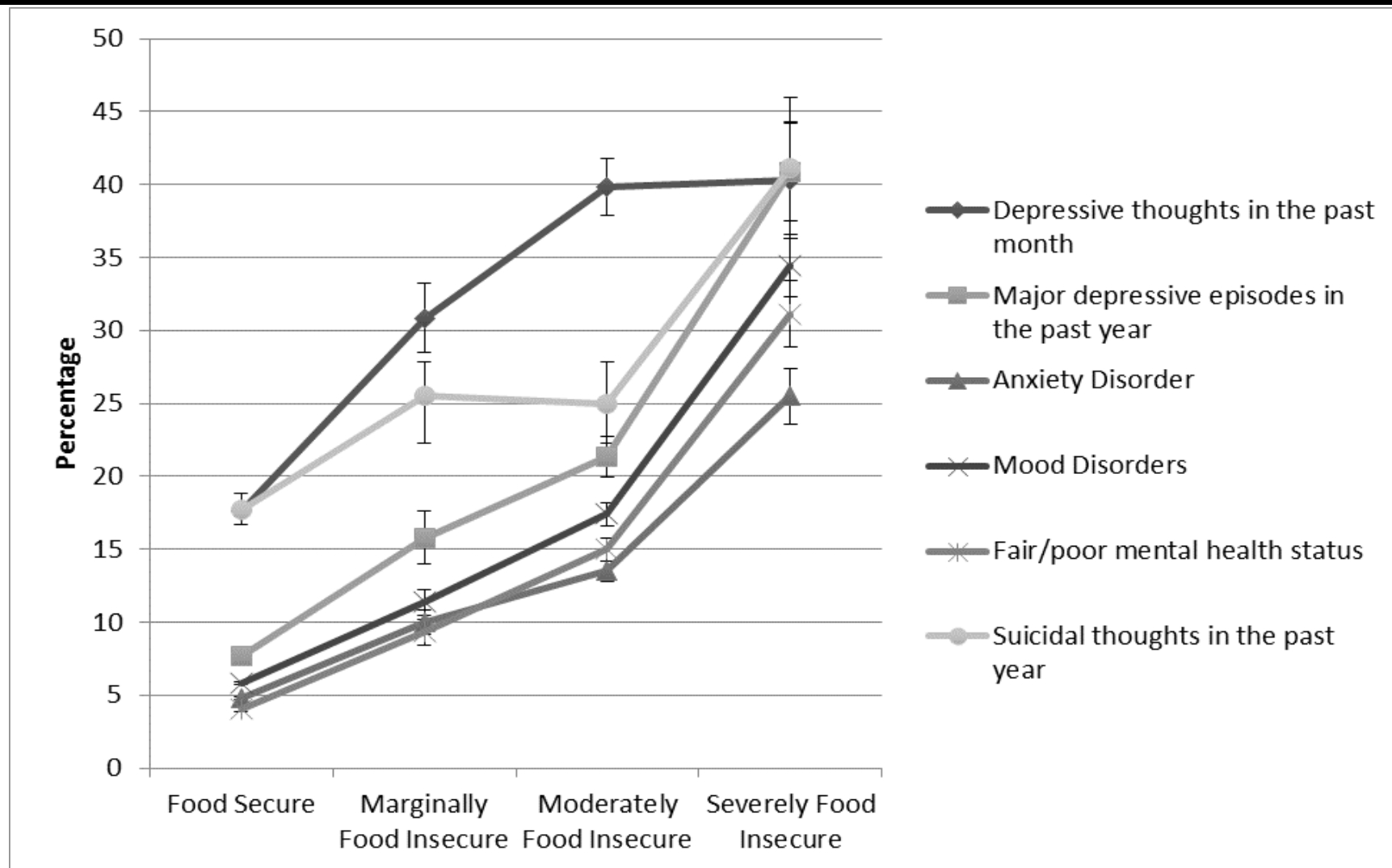




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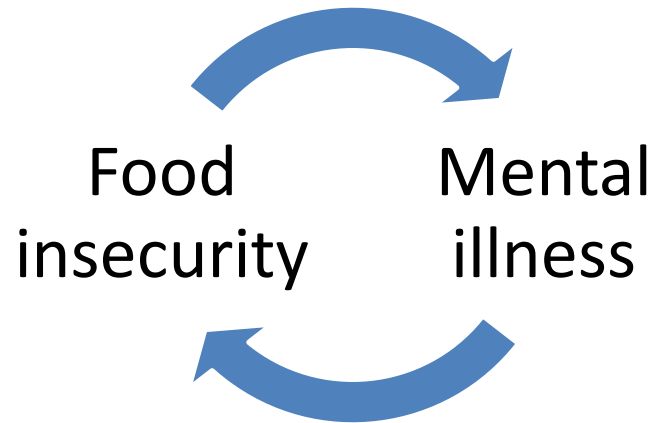


# Food insecurity gradient for 6 adverse mental health outcomes, CCHS 2005-2012 (unadjusted)



(Jessiman-Perreault & McIntyre, under review)

# The relationship between food insecurity and mental health appears to be bidirectional.



- Evidence of bidirectionality: 3 year follow up study of female welfare recipients in Michigan in 1997. (Heflin, Siefert & Williams, 2005; Heflin, Corcoran & Siefert, 2007 )
- Evidence from Britain and US that mothers' mental health can temporally precede food insecurity (Melchior, et al., 2009; Garg et al, 2015). [usual assumption is that food insecurity precedes mental illness]

# CHRONIC DISEASE MANAGEMENT

# HIV Disease Status in the Context of Food Insecurity

- 70% prevalence of food insecurity documented among HIV-positive individuals in Canada. (Anema et al, AIDS Care 2011)
- Results of systematic review and meta-analysis indicated that food-insecure people had 1.32 times greater odds (95% CI: 1.15-1.53) of having lower CD4 counts, suggesting food insecurity is a barrier to immune recovery. (Aibibula et al, AIDS Care 2016)
- BC study of HIV-positive injection drug users found those reporting food insecurity were almost twice as likely to die compared to those who were food secure, over 13 years of follow up. (Anema et al, *PloS One*2013)

(Aibibula et al. *AIDS Care*. 2016. Anema et al, *AIDS Care* 2011;23(2):221-30. Anema et al, *PLoS One*. 2013;8(5):e61277)

# Managing Diabetes in the Context of Food Insecurity

- Increased likelihood of hospitalization among children with insulin-requiring diabetes with food insecurity (Marjerrison et al, 2011) .
- Indications of poorer self-care among Canadian adults with diabetes and moderate/severe food insecurity (Gucciardi et al, 2009).
- Among adults with diabetes mellitus in the United States, food insecurity has been associated with more frequent hypoglycemic episodes (Seligman et al 2010a), poorer self-management (Seligman et al 2010a), increased need for health services (Seligman et al 2010b), and increased use of physician services (Nelson et al 2001).

(Marjerrison et al, *J Pediatrics*, 2011;158:607-11; Gucciardi et al, *Diabetes Care* 2009; 32:12. Nelson et al, *J Gen Intern Med*. 2001;16:404-11. Seligman et al, *J Health Care Poor Underserved*. 2010a;21(4):1227-1233. Seligman et al. *J Nutr*. 2010b;140(2):304-10.

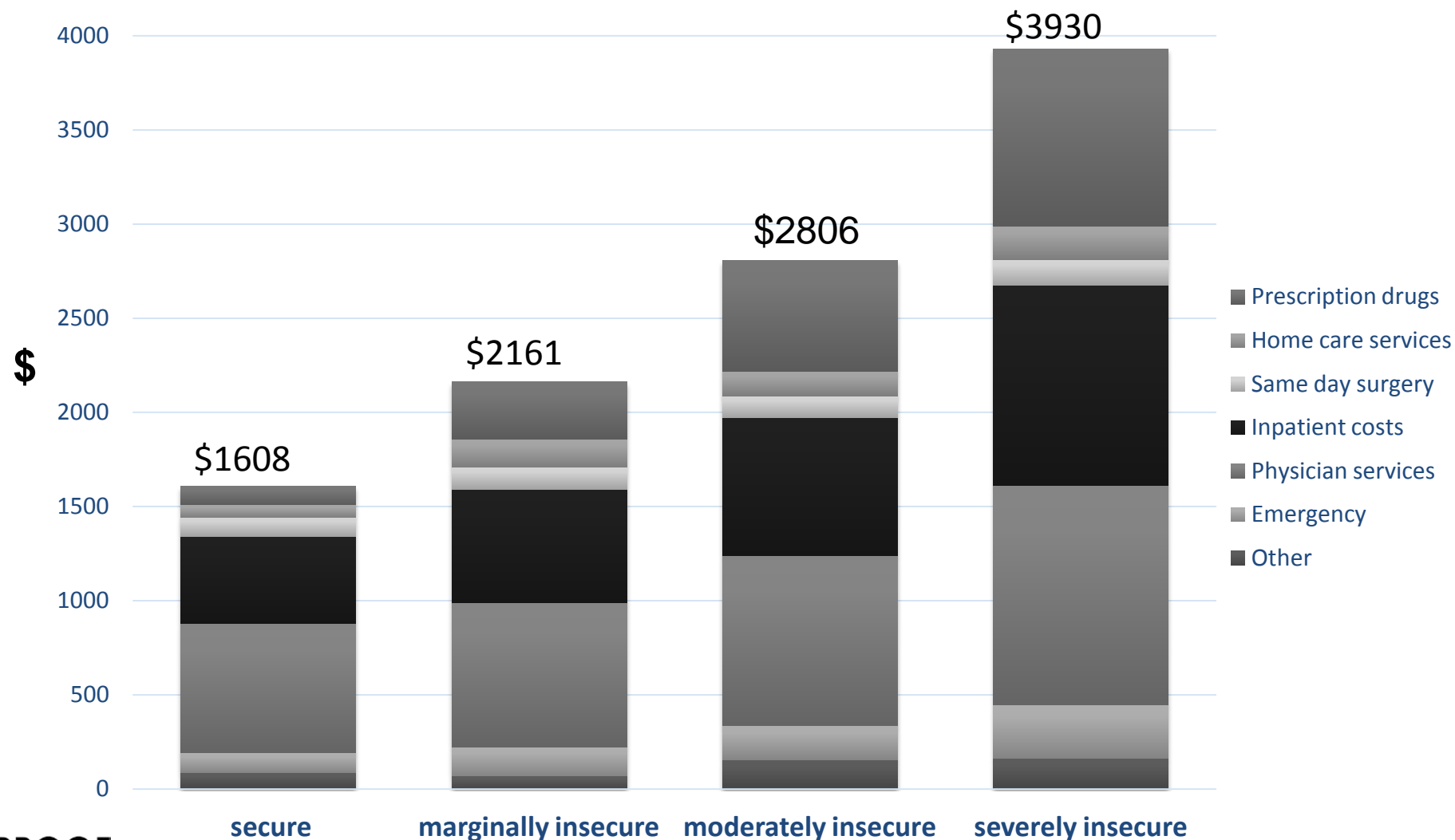
# Managing Chronic Kidney Disease in the Context of Food Insecurity

- A US study has shown that food insecurity may contribute to disparities in chronic kidney disease, especially among persons with co-morbid diabetes or hypertension (Crews et al, 2014).
- Implications for disease progression and dialysis?

# HEALTH CARE COSTS



# Average health care costs per person incurred over 12 months for Ontario adults (18-64 years of age), by household food insecurity status:



# Household food insecurity also relates to the probability of high-cost health care use.

- Top 5% of health care users account for 2/3 of total health care expenditures.

Analysis of relation between food insecurity status and health care use in the next 5 years among a cohort of Ontario adults :

- Food-insecurity → 46% greater odds of high-cost health care use in next 5 years, after taking into account baseline morbidity and other socio-demographic risk factors.
- Food insecurity = single strongest predictor of high-cost health care use.

# SCREENING FOR FOOD INSECURITY

# Classic screening criteria in public health<sup>1</sup>.

1. The condition sought should be an important health problem.
2. There should be an accepted treatment for patients with recognized disease.
3. Facilities for diagnosis and treatment should be available.
4. There should be a recognizable latent or early symptomatic stage.
5. There should be a suitable test or examination.
6. The test should be acceptable to the population.
7. The natural history of the condition, including development from latent to declared disease, should be adequately understood.
8. There should be an agreed policy on whom to treat as patients.
9. The cost of case-finding (including diagnosis and treatment of patients diagnosed) should be economically balanced in relation to possible expenditure on medical care as a whole.
10. Case-finding should be a continuing process and not a “once and for all” project.

<sup>1</sup><http://www.who.int/bulletin/volumes/86/4/07-050112BP.pdf>

# Classic screening criteria in public health<sup>1</sup>.

**Food insecurity arguably meets 2/10.**

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# WHO emerging screening criteria:

## 10 additional challenges for food insecurity

1. The screening programme should respond to a recognized need.
2. The objectives of screening should be defined at the outset.
3. There should be a defined target population.
4. There should be scientific evidence of screening programme effectiveness.
5. The programme should integrate education, testing, clinical services and programme management.
6. There should be quality assurance, with mechanisms to minimize potential risks of screening.
7. The programme should ensure informed choice, confidentiality and respect for autonomy.
8. The programme should promote equity and access to screening for the entire target population.
9. Programme evaluation should be planned from the outset.
10. The overall benefits of screening should outweigh the harm.

# More questions raised re screening method

- What tool to use?
  - options range from full 18 items on CCHS to 2 item subsets
- Who should do the screening?
- Mode of administration?
- Will screening capture severity of food insecurity?

BIGGEST Question: What are you going to do about it?

# **WHY SCREENING MAY BE SEEM LIKE A GOOD IDEA**



**1) Because chronic disease is more prevalent among food insecure individuals, they are over-represented in clinical populations.**

e.g., 2010 survey of 314 adults diagnosed with diabetes mellitus receiving outpatient services at Calgary clinic (Galesloot et al, 2012)

→ 8.3% reported moderate household food insecurity  
→ 6.7% reported severe household food insecurity } 15.0%

Prevalence of moderate/severe food insecurity in Alberta in 2010: 7.2%

(Galesloot et al, *Can J Diet Prac Res* 2012;73:e261-e266a; Tarasuk et al, 2014)

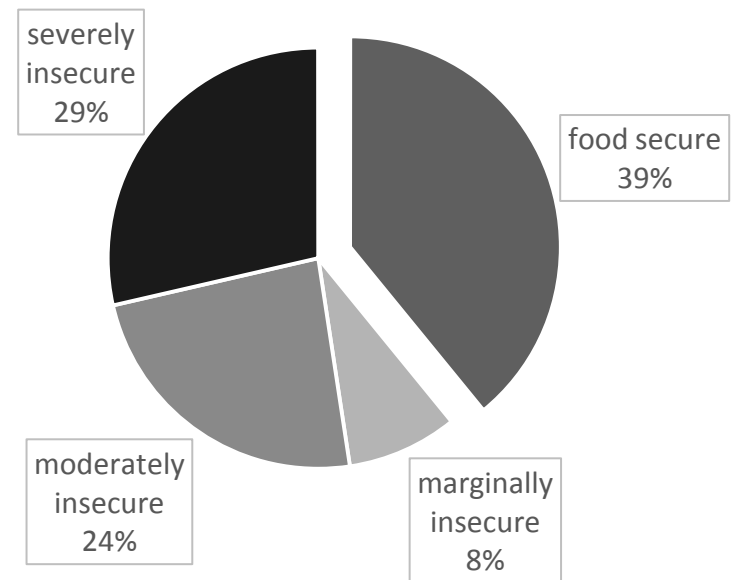
## **2) Because one US authority has recommended screening for children's exposure to household food insecurity.**

- Argument in the US that screening can enable health care providers to refer parents/caregivers for publicly funded food assistance programs (e.g., food stamps [SNAP], WIC) that will provide them with substantial resources. (See for example American Academy of Pediatrics' recommendation, October 2015.)
- In Canada, we have no comparable programs [nor is that the answer]. Referrals to local food banks and other community food programs will yield nowhere near the same levels of assistance. Our safety net is income-based.

### 3) Because screening social assistance recipients might get them special diet allowances.

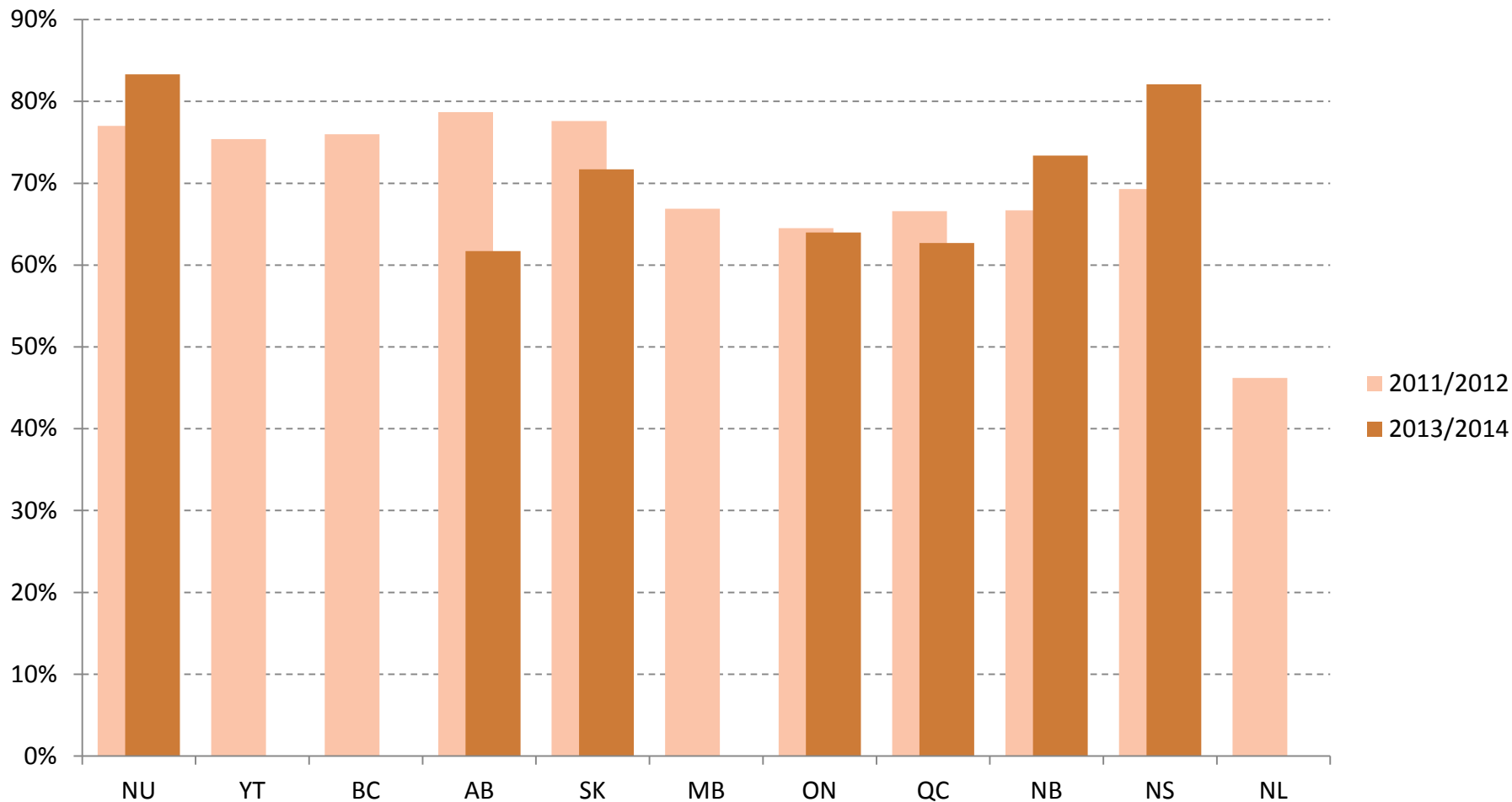
- In some jurisdictions, additional benefits are available for recipients with special health needs (e.g., special diet allowances).
- BUT Social assistance recipients are at such high risk of food insecurity that screening is unnecessary.
- Anyone who qualifies for these benefits should be helped to access them (and they still require the disease).

Food security status of households reliant on social assistance, CCHS 2014



(Adapted from Tarasuk, Mitchell & Dachner, *Household Food Insecurity in Canada*, 2014. 2016)

# Proportion of households reliant on social assistance who were food insecure in 2011-12 and 2013-14



Data Source: Canadian Community Health Survey, 2011/2012 and 2013/2014. Newfoundland and Labrador, Manitoba, British Columbia and Yukon Territory did not participate in the food security module of the 2013 and 2014 CCHS. Prince Edward Island and the Northwest Territories excluded due to small sample size.

**4) Because there is value in screening that nets referrals for assistance with income tax, etc to help ensure people access all benefits to which they are entitled.**

- Identification of low income is sufficient.
- “Do you ever have difficulty making ends meet at the end of the month?”

Brcic, Vanessa, Caroline Eberdt, and Janusz Kaczorowski (2011), “Development of a Tool to Identify Poverty in a Family Practice Setting: A Pilot Study,” *International Journal of Family Medicine*, vol. 2011.

# Summary

- Food insecurity is related to dietary inadequacies.
- The health effects are pervasive and extend beyond nutrition-related conditions.
- The health burden occurs along a gradient of increasing severity, and it is costly.
- Bi-directionality has been observed in mental health.
- Disease management is impaired, worsening existing chronic conditions.
- Screening remains unwarranted in regular healthcare settings.

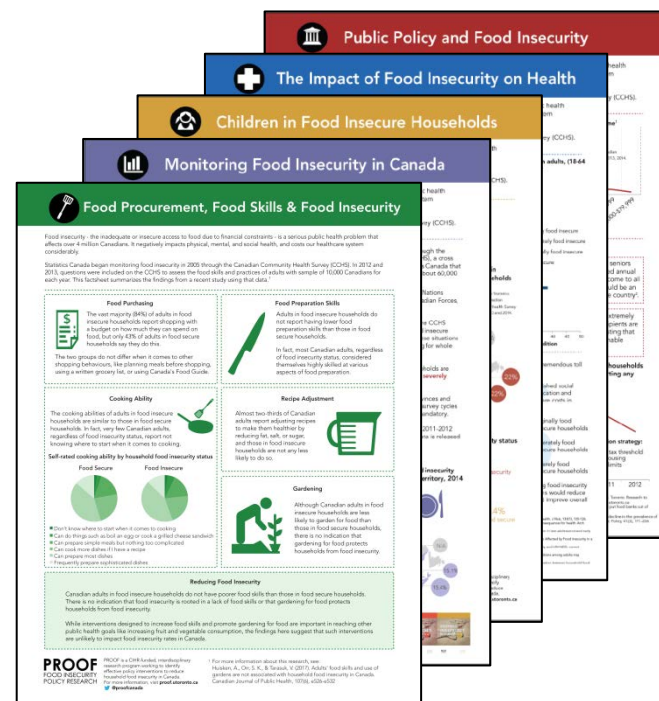
# PROOF

FOOD INSECURITY  
POLICY RESEARCH

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@proofcanada



## Investigators:

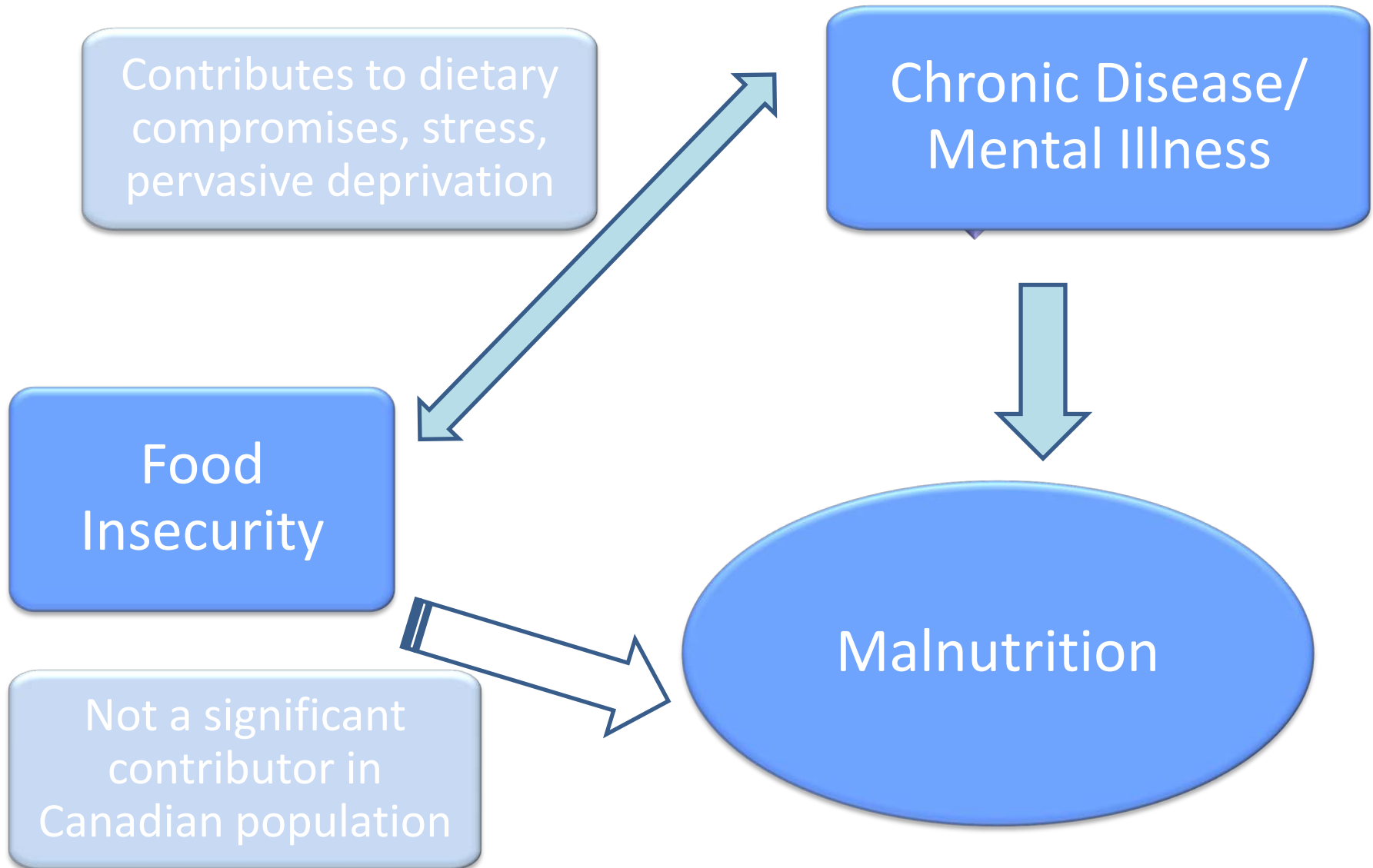
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# **IMPLICATIONS FOR HEALTHCARE PROVIDERS**

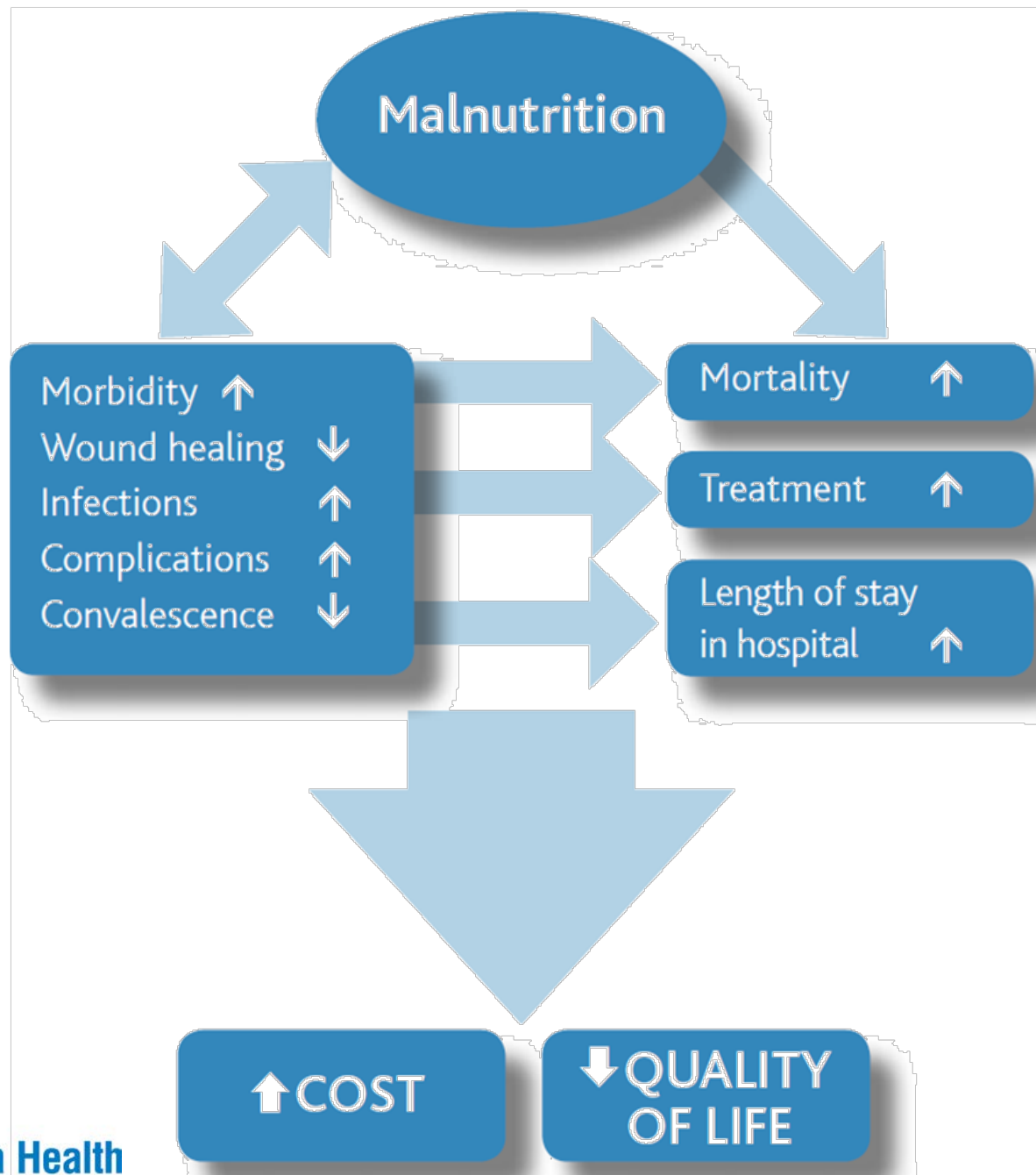




# Definition of Malnutrition

- A **decline in lean body mass** (with or without fat loss) that leads to functional impairment
- 6 characteristics of malnutrition to aid in its diagnosis:
  - Insufficient energy intake
  - Weight loss
  - Muscle mass loss
  - Subcutaneous fat mass loss
  - Edema
  - Hand grip strength





# Risk Factors for Malnutrition vs Food Insecurity

## Malnutrition

- Unintended weight loss
- Poor intake
- Poor appetite
- Swallowing disorder
- Malabsorption
- Limited access to food
- Reduced functional status & mobility
- Frailty/ older age
- Diseases such as cancer, liver disease, kidney disease, HIV

## Food Insecurity

- Lower income
- Reliance on social assistance
- Renter (vs home owner)
- Presence of children under 18 yr (vs couple without children)
- Lone-parent female-led households
- Aboriginal or black respondent

# Nutrition Risk Screening- Older adults

## *SCREEN II*

14 questions covering issues that influence the nutritional health of seniors, including:

- Appetite
- Frequency of eating
- Motivation to cook
- Ability to shop and prepare food
- Weight changes
- Isolation and loneliness
- Chewing and swallowing
- Digestion
- Food restrictions due to health conditions

# Health System Implications

## *Food Insecurity:*

Inadequate or insecure access to food due to financial constraints

## *Malnutrition*

Inadequate nutrient intake (especially protein & calories) related to barriers to food intake or increased needs

## *Severe Food Insecurity :*

Indicates reduced food intake and disrupted eating patterns; highly clinically relevant for diet-sensitive conditions

# Impact of food insecurity on managing health conditions

## ↑ **expenses required to manage condition**

- equipment, supplies, medication

## ↑ **costs to access healthcare services**

- transportation, parking, childcare

## ↓ **earnings**

- poor health, loss of wages, ↓ energy and productivity

## ↓ **energy to engage in financial coping strategies**

- delay bill payments, seek loans, access charitable support

# Patient Care Considerations

- Simple, easy to use tools, needed for screening malnutrition **and** food insecurity (or poverty)
- Tools need to be integrated into patient care processes and made routine
- Ethical screening principles need to be followed (*i.e. appropriate interventions for those identified at risk*)
- Clinicians need information about malnutrition and food insecurity to improve care and patient outcomes



# Canadian Nutrition Screening Tool

## Identify patients who are at risk for malnutrition

	Date:		Date:	
	Admission		Rescreening	
<b>Ask the patient the following questions*</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
Have you lost weight in the past 6 months <b>WITHOUT TRYING</b> to lose this weight? <small>If the patient reports a weight loss but gained it back, consider it as NO weight loss.</small>				
Have you been eating less than usual <b>FOR MORE THAN A WEEK?</b>				
<b>Two “YES” answers indicate nutrition risk†</b>				

\* If the patient is unable to answer the questions, a knowledgeable informant can be used to obtain the information. If the patient is uncertain regarding weight loss, ask if clothing is now fitting more loosely.

## 1 Screen Everyone

"Do you ever have difficulty making ends meet at the end of the month?"

(Sensitivity 98%, specificity 40% for living below the poverty line)<sup>2</sup>

## 2 Poverty is a Risk Factor

Consider:

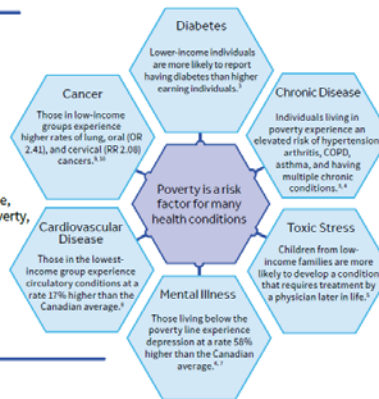
New immigrants, women, Indigenous peoples, and LGBTQ+ are among the highest risk groups.

Example 1:

If an otherwise healthy 35-year-old comes to your office, without risk factors for diabetes other than living in poverty, you consider ordering a screening test for diabetes.

Example 2:

If an otherwise low-risk patient who lives in poverty presents with chest pain, this elevates the pre-test probability of a cardiac source and helps determine how aggressive you are in ordering investigations.



## 3 Intervene

Ask Everyone: "Have you filled out and sent in your tax forms?"

- Ask questions to find out more about your patient—their employment, living situation, social supports, and the benefits they receive. Tax returns are required to access many income security benefits: e.g., GST / HST credits, child benefits, working income tax benefits, and property tax credits. Connect your patients to [Free Community Tax Clinics](#).
- Even people without official residency status can file returns.
- Drug Coverage: All Albertans have access to prescription drug benefits through the Alberta government sponsored drug program. Visit [drugcoverage.ca](#) to see what benefits you may be eligible for.



*Do you ever have difficulty making ends meet at the end of the month?*

# What can health care providers do?

- Provide patient centered, collaborative care
- Assess: *Determine if food insecurity is a problem/barrier*
  - Financial access to food
  - Find out more about patient's situation/living condition
  - Assess questions about barriers and enablers to meet goals and manage chronic disease
  - Ask questions to identify if there are opportunities for funding which are not being accessed
- Educate: *Ask if patient wants information/supports*
  - Provide information about government programs or health benefits
  - Provide information as appropriate about community services
- Work as a multidisciplinary team and connect patient with appropriate services/resources

# Additional opportunities

- Understand **patient and family perspectives** on how the health care system can provide better care for patients experiencing food insecurity
- Understand the **prevalence** of food insecurity for those accessing health services
- Research on **poverty screening** and the impact of screening on patient care and outcomes
- Improve **education** of health care providers starting with undergraduate training

# Take Home Messages

- YOU can help raise awareness among health care providers about how food insecurity impacts health
- Collective action is needed
- Need purposeful, evidence based approaches

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