



Question: What is the relationship between household food insecurity (HFI) and measures of body weight?

Table 2. Summary of studies examining the relationship between household food insecurity and weight outcomes in children

Author, Year Study Design, Duration Risk of Bias Score: Data Source, Location	Race/ Ethnicity Sample Size Age Gender Weight status at baseline	Description Food Insecurity Measure	Results	Summary of Findings	Limitations
Bhargava, 2008 PCS; 4y Risk of Bias Score: 4/24 The Early Child Longitudinal Study-Kindergarten Cohort (ECLS-K) US-nationally representative	Black (9%) Hispanic of all races (16%) White (65%) Asian (4%) N=7,635 6.1y (SD=0.4) 49.5% female Mean BMI: 16.86±2.83kg/m ²	Households' food security levels in previous 12 months: Used USDA Household Food Security Survey Module (HFSSM)- 18-item scale	Maximum likelihood estimates from dynamic random effects model using model 1: <i>Weight: NS</i> <i>BMI: NS</i> <i>Z-score of BMI: NS</i>	Household food insecurity was not a significant predictor of children's weights, BMI or Z-scores of BMI.** **Authors compared differences in findings to similar studies such as Jyoti, 2005 and suggested that findings "were presumably due to different model formulations, use of appropriate econometric techniques for longitudinal data at three time points and systematic treatment of households' food insecurity scores". (Noted for Jyoti et al, 2005: They "approximated food insecurity via a dichotomous variable that did not reflect intensity; statistical significance of its coefficient	NEL BAT Limitations: high loss to follow-up (61%) was not addressed; Diet not measured. Other limitations: Children's energy and nutrient intakes were not measured. It would be useful to measure weight of parents in the cohort for further analysis of determinants of food insecurity. Low rate of food insecurity in the cohort (<7%).



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				in the model for girls' weight changes may have been due to chance, given the low explanatory power of the model.")	
<p>Dubois, 2006</p> <p>PCS; 3y</p> <p>Risk of Bias Score: 4/24</p> <p>Longitudinal Study of Child Development in Quebec (LSCDQ)</p> <p>Canada-nationally representative</p>	<p>NR</p> <p>N=1,514</p> <p>4.5y (at follow-up)</p> <p>49.0% female</p> <p>Birth weight:</p> <p><2500g: 4.4%</p> <p>2500-4000g: 84.8%</p> <p>>4000g: 10.8%</p> <p>Mother's BMI:</p> <p><25 (normal): 71.8%</p> <p>≥25 (overweight or obese): 28.2%</p>	<p>Family Food Insufficiency data were collected via self-administered maternal questionnaires administered when the child was 1.5 years old and again at 4.5 years old. The questions were originally developed for the Radimer/Cornell questionnaire validated in the US.</p>	<p>Food insufficiency and risk of obesity at follow-up (ref: food sufficient):</p> <p><i>Obesity risk (Cole criteria of obesity):</i> Adjusted OR=3.43 (95% CI=1.543-7.621)</p> <p><i>Less than 2500g birth weight (Cole criteria of obesity):</i> Adjusted OR=3.144 (95% CI=1.160-8.525)</p> <p><i>Obesity risk (≥95%ile on USDA growth curve):</i> Adjusted OR=1.958 (95% CI=1.052-3.644)</p> <p><i>Less than 2500g birth weight (≥95%ile on USDA growth curve):</i> Adjusted OR=1.088 (95% CI=0.419-2.825)</p>	<p>Household food insufficiency was positively associated to increased likelihood of overweight/obesity among preschool children, independent of living in a low-income household. Food insufficiency during early childhood is related to overweight at 4.5 years with the highest risk being among low-birth-weight children who experience food insufficiency in their preschool years.</p>	<p>NEL BAT Limitations: no adjustment for race, physical activity, energy intake, or use of food assistance; it appears children could be categorized as food insufficient if either baseline or follow-up indicated they were, this could lead to very small exposure periods/cross-sectional relationships for some children who were only food insufficient at follow-up</p> <p>Other Limitations: Food insufficiency measure not specific to</p>



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					the child; prevalence food insufficiency relatively low (6.3%)
Jyoti, 2005 PCS; 4y Risk of Bias Score: 2/24 Early Child Longitudinal Study-Kindergarten Cohort (ECLS-K) USA	White (62.1%) Black (11.4%) Hispanic (16.6%) Other or more than one race (10.0%) N=11,460 6.2y 49.1% female Mean BMI: 16.42±2.32kg/m ²	Household food insecurity measured using USDA's Household Food Security Survey Module, an 18-item scale.	Baseline food insecurity (kindergarten) and anthropometric outcomes at follow-up (3rd grade): <i>All and Boy's (change in BMI): NS</i> <i>Girl's change in BMI: β=0.428 (P=0.002)</i> <i>All and Boy's (change in weight): NS</i> <i>Girl's change in weight: β=0.761 (P=0.002)</i> Persistent food insecurity and anthropometric outcomes at follow-up (3rd grade): <i>All (change in BMI): β=0.354 (P=0.028)</i> <i>Boy's change in BMI: NS</i> <i>Girl's change in BMI: β=0.552</i>	After controlling for known confounders in the lagged model, food insecurity at kindergarten predicted greater BMI and weight gains for girls. When looking at food security over time, girls had significant increase in weight gain when comparing those with secure food with persistently insecure food as well as comparing secure food to insecure food at any time. No associations with boy's weight or BMI were seen in fully adjusted models.	NEL BAT Limitations: high loss to follow-up (46%); no adjustment for diet/energy Other limitations: There is a long distance between the cause-effect relationship of food security change and weight gain to make strong conclusions; Some measures were taken by teachers, who are not involved in collection of exposure status, but it is not reported if the assessors of body



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			(P=0.021) <i>All (change in weight):</i> $\beta=0.649$ (P=0.026) <i>Boy's change in weight:</i> NS <i>Girl's change in weight:</i> $\beta=1.040$ (P=0.016) Became food secure and anthropometric outcomes at follow-up (3rd grade): <i>All groups, BMI, and weight:</i> NS		weight and height were blinded.



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Metallinos-Katsara, 2012 PCS; 5y Risk of Bias Score: 2/24 Special Supplemental Nutrition Program for Women, Infants, and Children US	Non-Hispanic white (41.4%) Non-Hispanic black (20.6%) Hispanic (31.6%) Asian (6.5%) N=28,353 3.1y (SD=0.81) 49.0% female Underweight: 3.3% Normal weight: 62.8% Child overweight: 16.8% Obese: 17.1%	Food insecurity status derived from parent/caretaker responses to a four question sub scale (of the 18-item Core Food Security Module) during first infancy and last child visit. A third measure of food-security status combined these two measures into a single-time integrated variable that reflects status at both time points to measure chronicity.	Food insecurity and risk of obesity (Ref: persistently food secure) Persistent food insecure with no hunger: OR=1.22 (95% CI=1.06-1.41) All other combinations of late, early, or persistent food insecurity and no hunger/hunger: NS	Persistent food insecurity without hunger is prospectively related to child obesity. Non-persistent food insecurity and persistent or non-persistent food insecurity with hunger were not associated with obesity risk.	NEL BAT Limitations: Diet and physical activity was not assessed Other limitations: Data used are program data and generally have greater measurement error than data gathered specifically for research, household food-security status reflected adult status.



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<p>Rose, 2006</p> <p>PCS; 1y</p> <p>Risk of Bias Score: 2/24</p> <p>Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K)</p> <p>US</p>	<p>58.8% white, 15.5% black, 18.6% Hispanic/Latino, 2.7% Asian</p> <p>N=12,890</p> <p>6.2y</p> <p>48.6% female</p> <p>11.2% of the girls and 11.8% of the boys were overweight</p>	<p>Food-insecurity status was assessed by using the full 18-question US Department of Agriculture household Food Security Scale. Food insecure (i.e., either with or without hunger) or food secure.</p>	<p>Food insecurity and weight outcomes at 1 year follow-up</p> <p><i>Risk of overweight: NS</i></p> <p><i>Risk of high weight gain: OR=0.73 (95% CI=0.57-0.93)</i></p>	<p>Household food insecurity was not associated with risk of overweight, and was associated with reduced risk of high weight gain in young children.</p>	<p>NEL BAT Limitations: No control for diet or physical activity, although proxy measures of these were controlled for</p> <p>Other limitations: Short follow up time; authors reported the food-insecurity variable was correlated with the error terms in the regression equations, unobserved factors, or omitted variables, which affect both food insecurity and overweight status, could bias estimates; the food insecure group combined those with and without hunger</p>