

Risk Factors of Childhood Obesity in Manitoba: A Population-Based Study

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Collaborators

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Background

Childhood obesity:

- Public health issue
- Associated with substantial costs¹
- Obesity prevalence tripled in Canada between 1978/9 (3%) and 2004 (9%)²
- Overweight/obesity prevalence is significantly higher in Manitoba (31%) than Canadian average (26%)²

¹Katzmarzyk P. & Janssen I. Can J Appl Physiol. 2004;29(1):90-115.

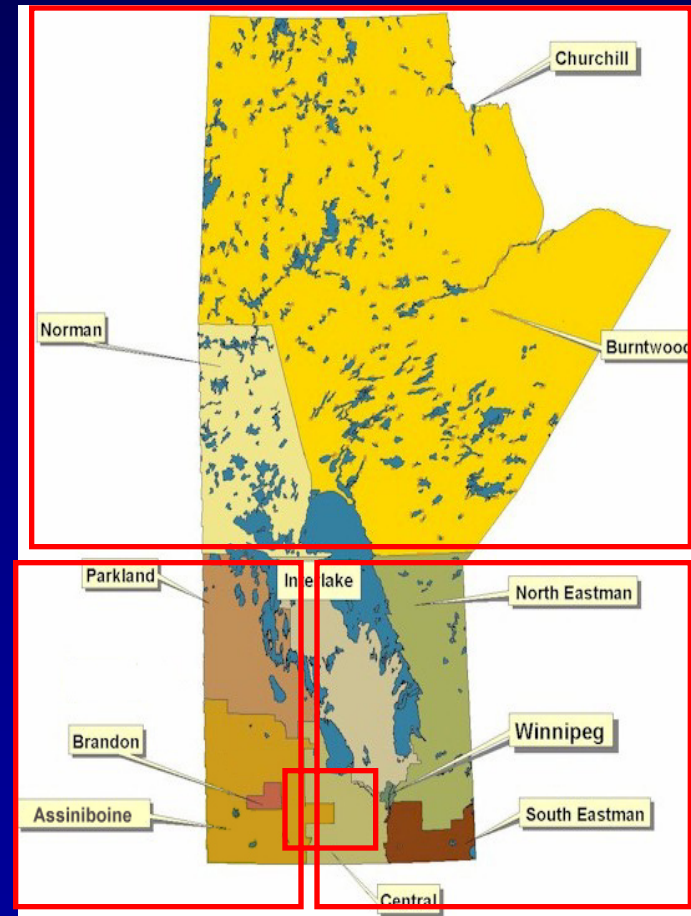
²Shields M. Health Reports 2006;17(3):27-42.

Data Source

- Canadian Community Health Survey 2.2 on Nutrition (CCHS 2.2)
 - Conducted by Statistics Canada in 2004
 - First survey to provide national, provincial and regional nutrition data in > 30 years
 - 24 hr dietary recall
 - Measured heights and weights
 - General health and chronic conditions

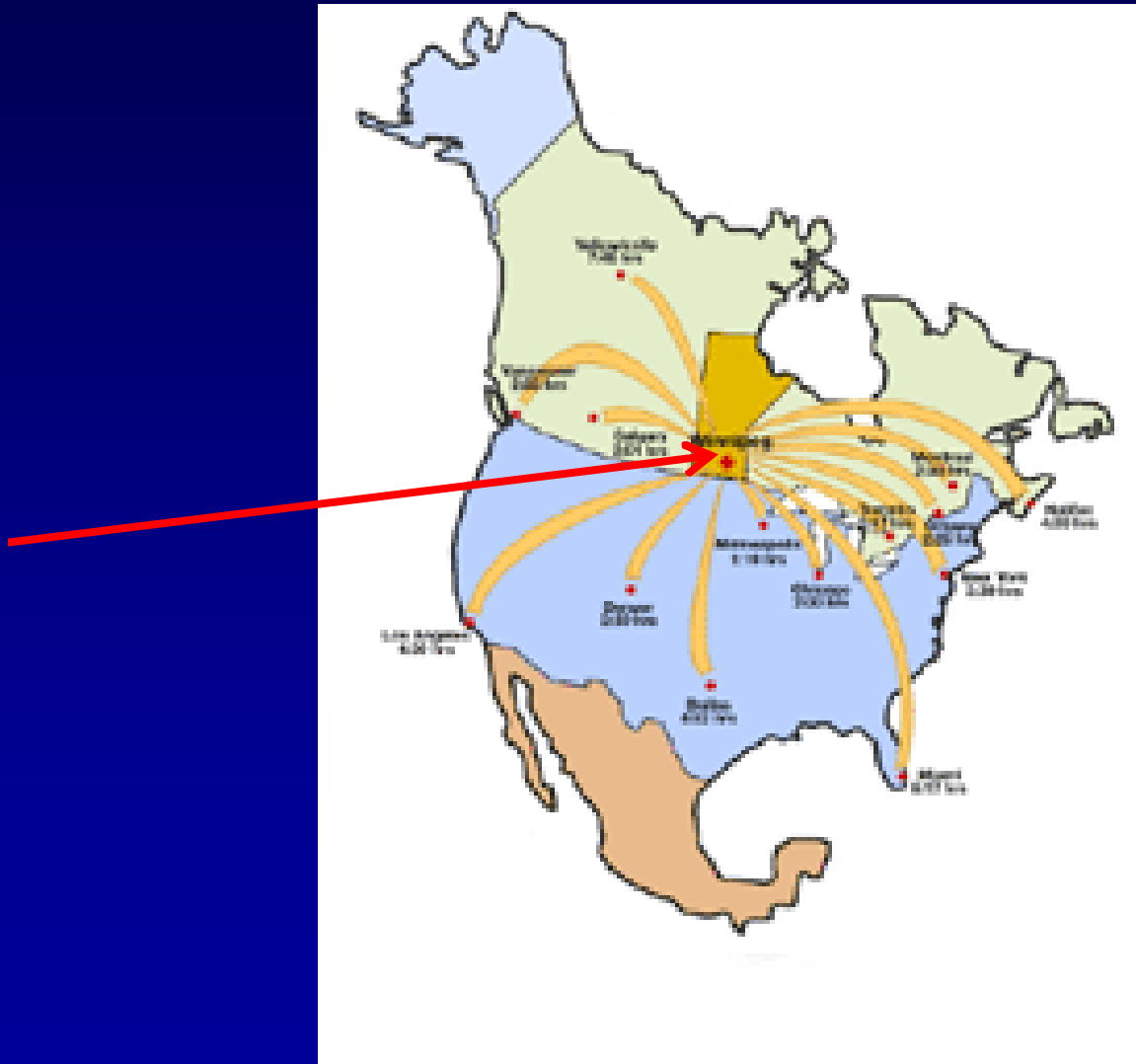
Data Source cont'd

- Manitoba Health and Healthy Living
 - Purchased additional sample to enhance analysis at sub-provincial level
 - Measured heights and weights for 1172/ 1651 (71%) Manitobans 2-17 years old
 - Computer assisted personal/telephone survey



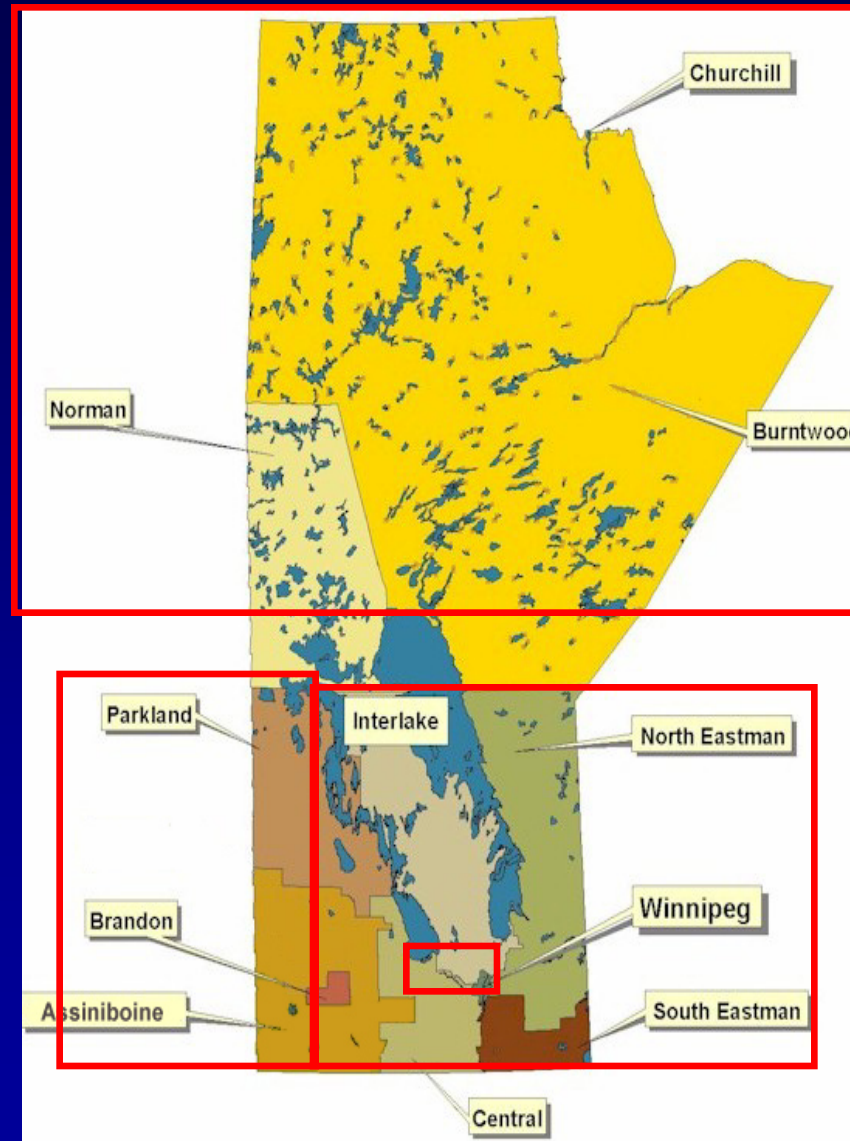
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Combined Health Regions



Childhood Obesity Definition

- Measured body weight and height
- BMI = body weight (kg) / height (m²)
- International Obesity Task Force age- and sex-specific cutoffs¹
 - Normal weight
 - Overweight
 - Obese
 - Pregnant females were excluded

¹Cole T. et al. British Med J 2000;320:1240.

Measurements

- Correlates
 - Food Security
 - Off-Reserve Aboriginal Culture/Racial Origin
 - Combined Health Regions
 - Gender
 - Age group
- Social Economic Status
 - Highest household education
 - Family income adequacy quartiles
- Healthy Living
 - Physical Activity
 - Sedentary Activity
 - Fruit/vegetable consumption

Household Food Insecurity

- Definition: “Limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (Anderson, 1990).

USDA standardized instrument (18 questions) which produced a summarized index variable on Household Food Security:

- Food secure
- Food insecure without hunger
- Food insecure with moderate hunger
- Food insecure with severe hunger

Statistical Analysis

- SAS 9.1 for Windows
 - Descriptive Statistics
 - Logistic regression analyses
 - Two estimation procedures as per Statistics Canada¹
 - Appropriate statistical weight
 - Design-based variance estimation via Bootstrap

¹Bailie L. et al. Statistics Canada 2002; Ottawa, ON.

Sample Distribution

Table 1. Description of the Population by Age Group and Gender

Age Group	Boys		Girls	
	n	%	n	%
2-5	200	23.8	188	23.2
6-11	279	33.2	274	33.8
12-17	361	43.0	349	43.0
Total	840	100.0	811	100.0

Total both boys and girls=1651

Overall Prevalence of Overweight/Obesity in Manitoba Children Age 2 – 17 Years

Figure 1. Prevalence of Weight Categories in Manitoba Children (age 2-17)

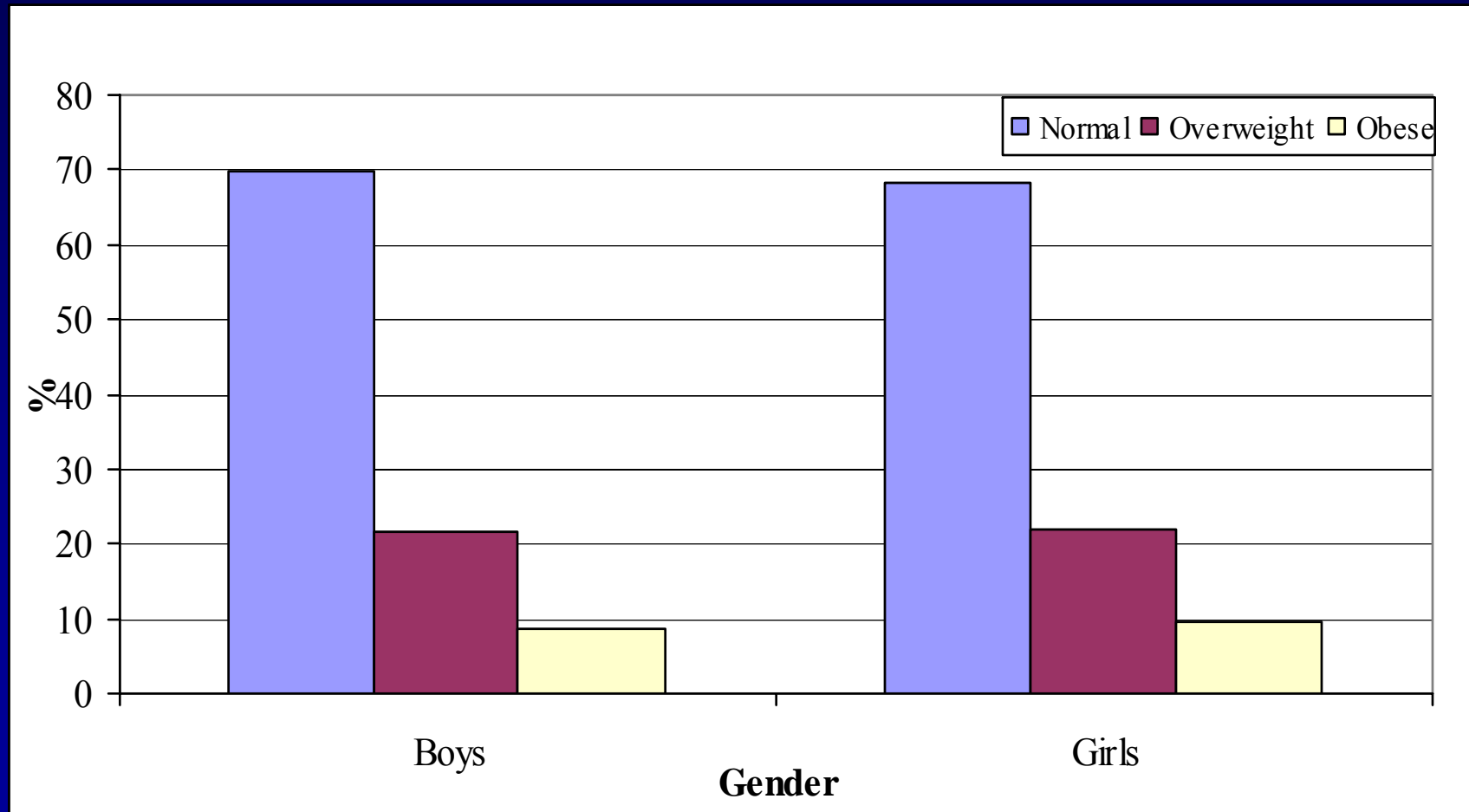


Figure 2. Prevalence of Overweight/Obesity in Manitoba Children by Age Group and Gender

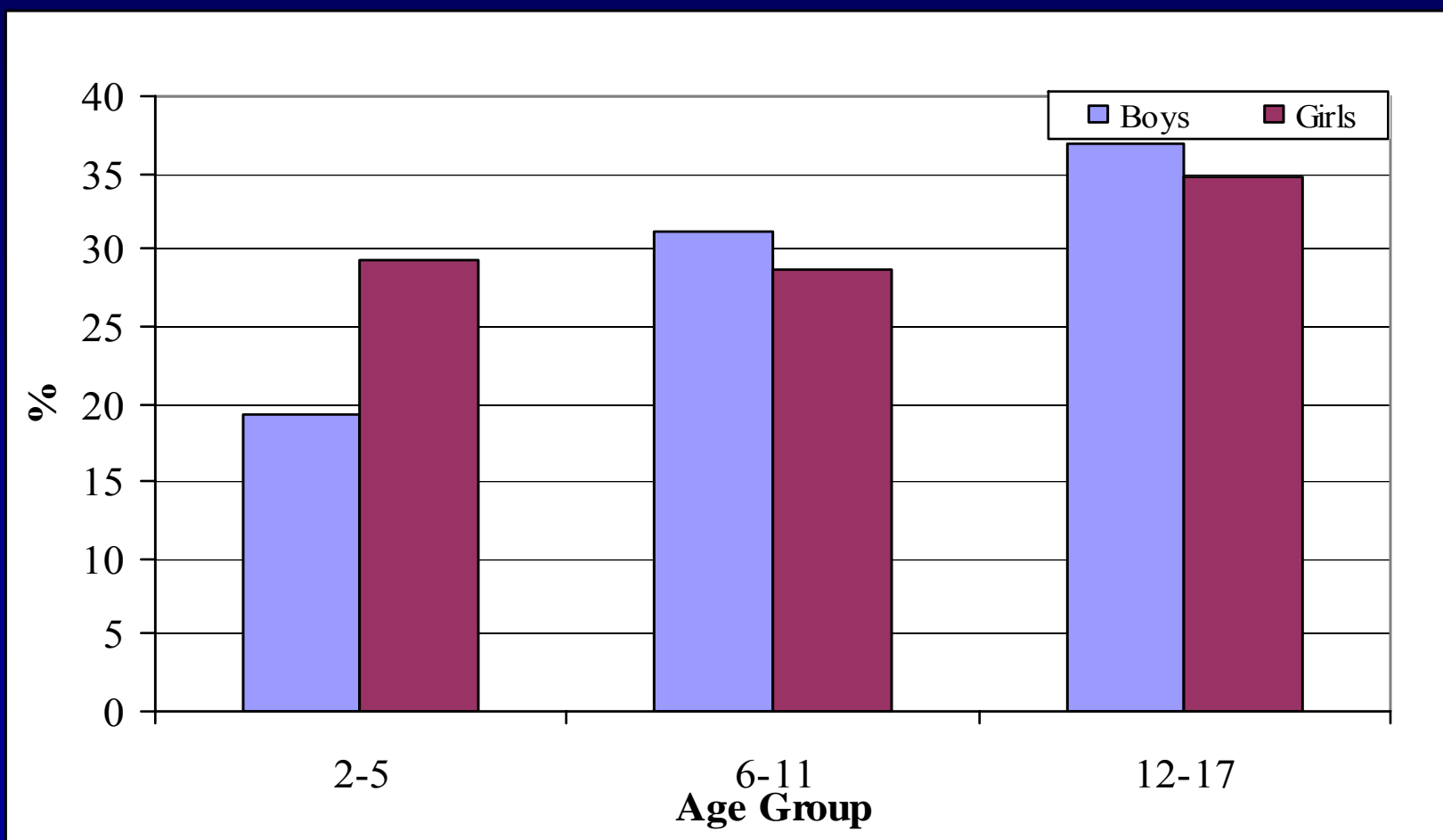


Figure 3. Prevalence of Overweight/Obesity Manitoba Children (age 2-17) by Off-Reserve Aboriginal Status

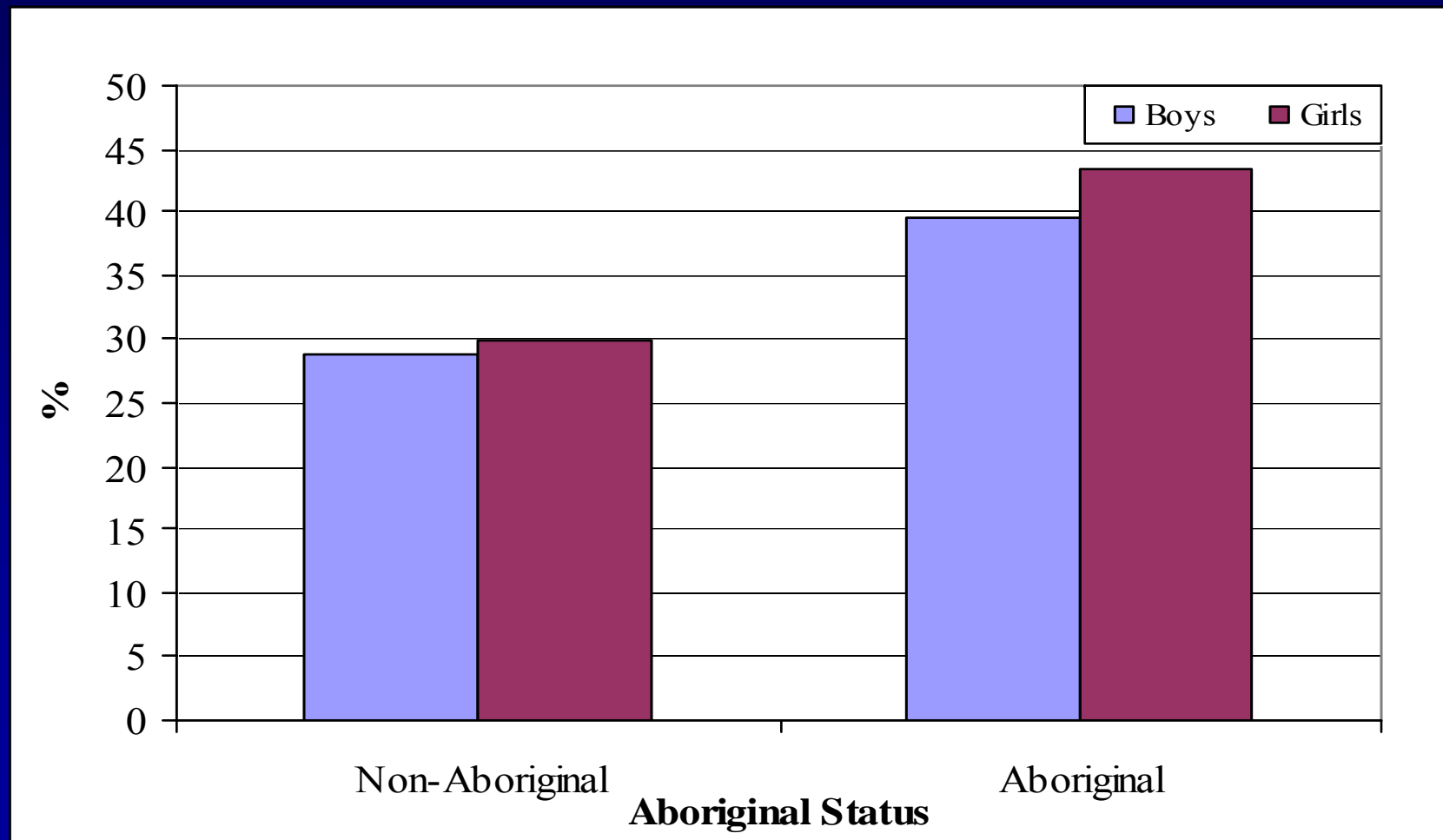


Figure 4. Prevalence of Overweight/ Obesity in Manitoba Children (age 2- 17) by Total Family Income

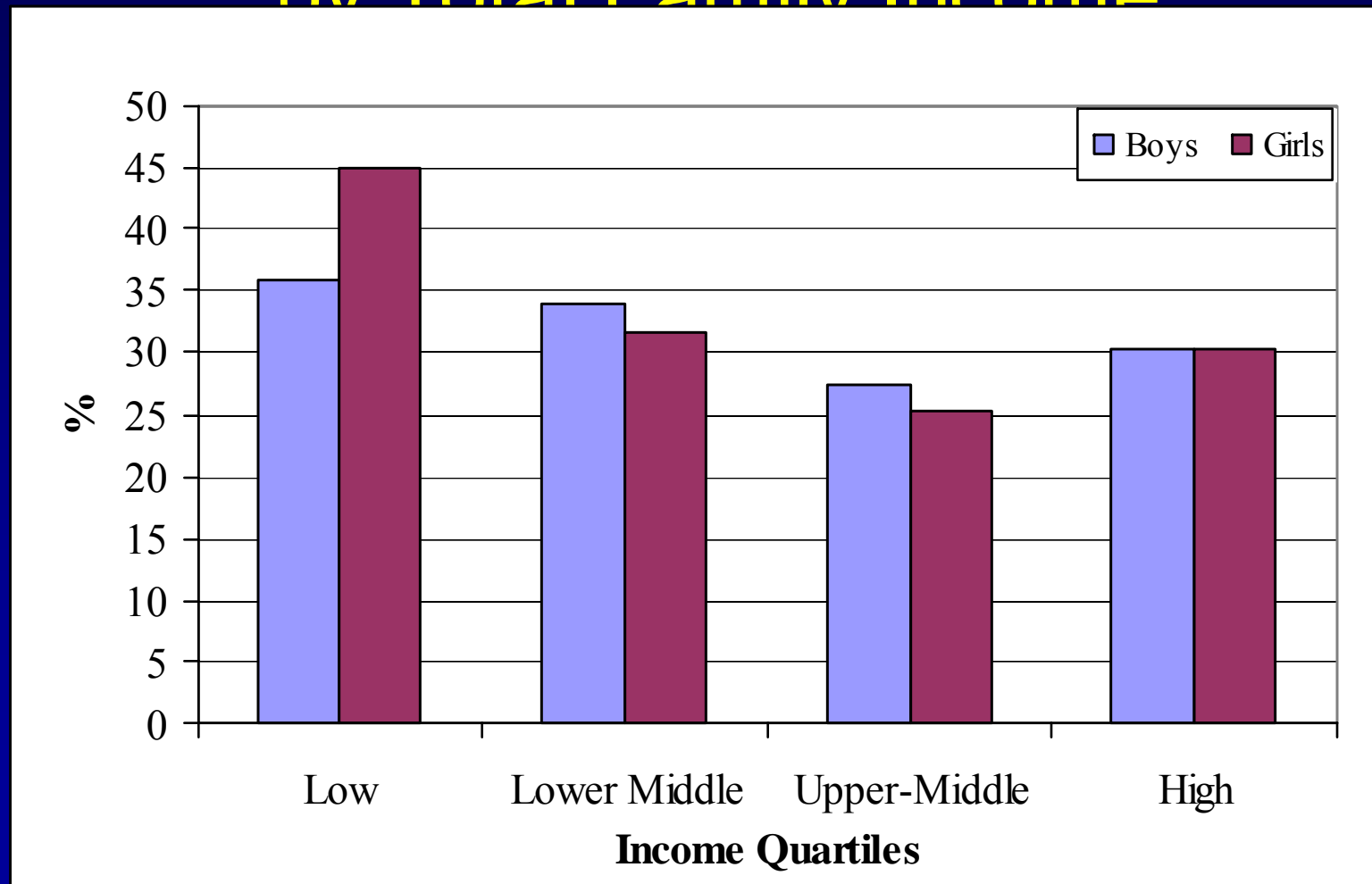


Figure 5. Prevalence of Overweight/ Obesity in Manitoba Children (age 2- 17)

by Highest Level of Parental Education

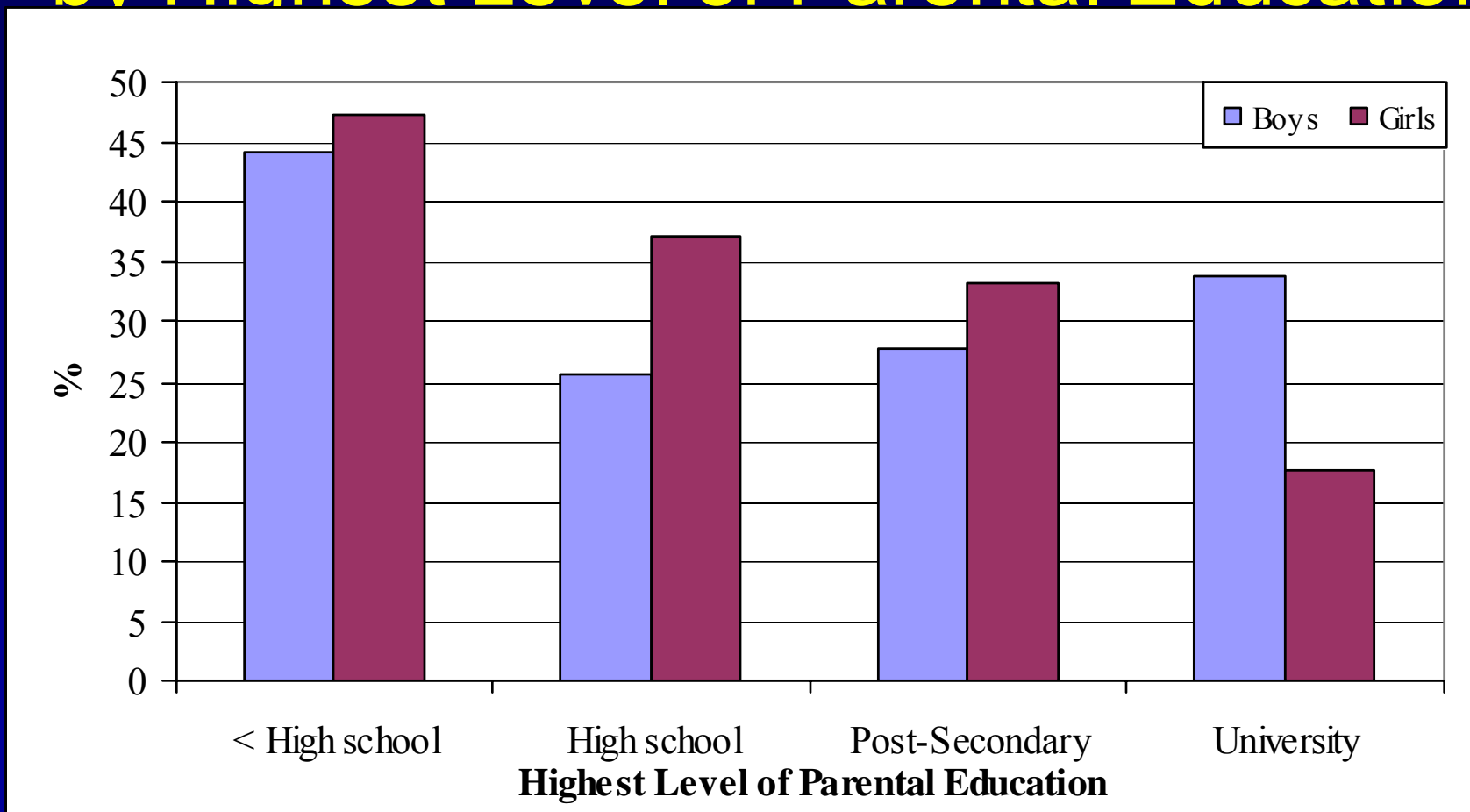


Figure 6. Prevalence of Overweight/ Obesity in Manitoba Children (age 2- 17) by Food Insecurity

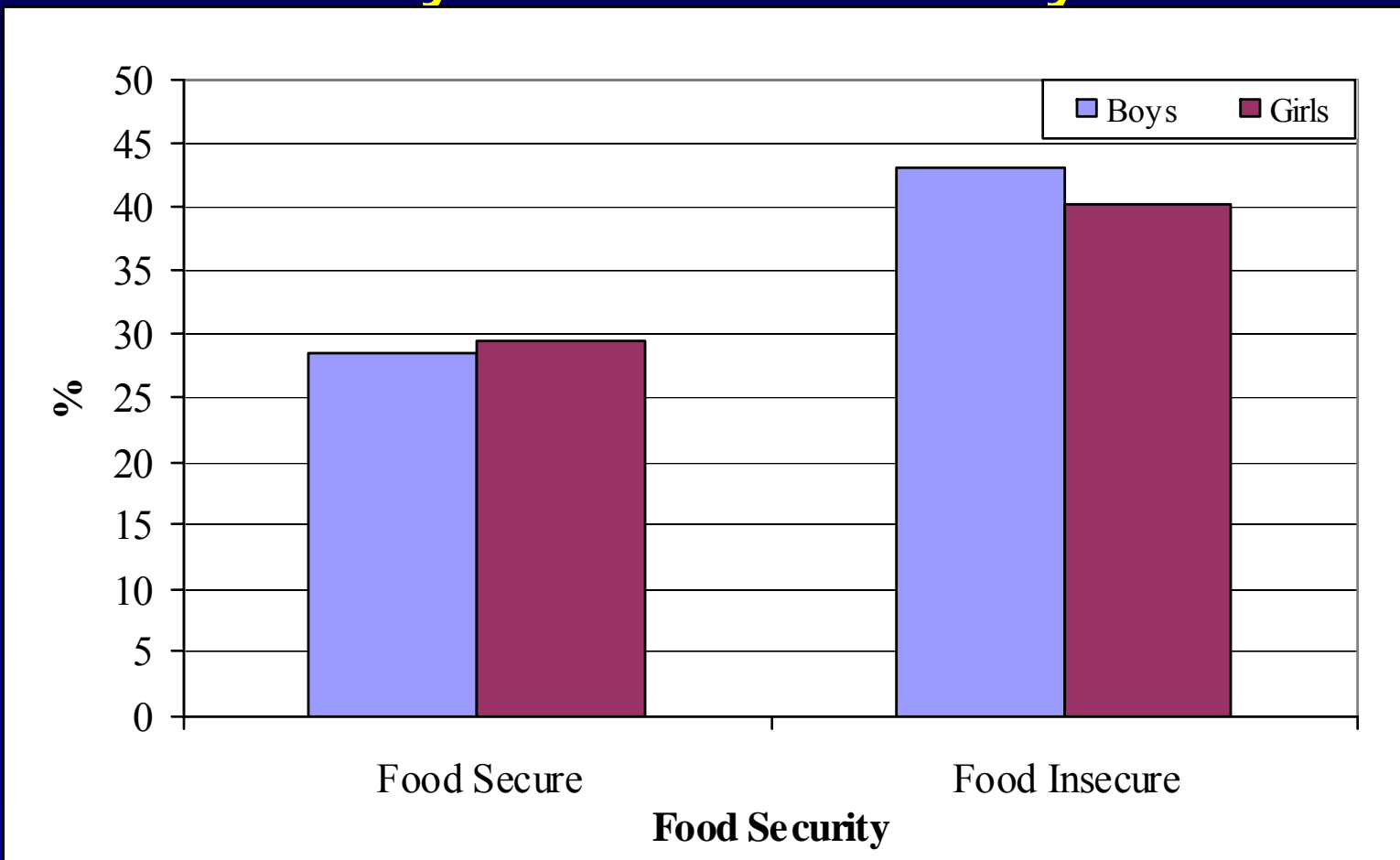


Table 2. Multivariable Logistic Regression Analyses on Overweight/Obesity Risk Factors in Manitoba Boys (age 2-17)

Risk Factor	Odds Ratio	95% Confidence Interval	p-value
Age Group	1.52	1.05-2.19	0.03
Food Insecurity	2.09	1.42-4.19	0.04
Parental Education	0.91	0.61-1.36	NS
Income Adequacy	0.87	0.62-1.22	NS
Aboriginal Origin	1.18	0.42-3.32	NS

Table 3. Multivariable Logistic Regression Analyses on Overweight/Obesity Risk Factors in Manitoba Girls (age 2-17)

Risk Factor	Odds Ratio	95% Confidence Interval	p-value
Age Group	1.27	0.94-1.72	NS
Food Insecurity	1.65	0.79-3.49	NS
Parental Education	0.58	0.36-0.96	0.03
Income Adequacy	1.03	0.82-1.21	NS
Aboriginal Origin	1.44	0.49-4.28	NS

Geographic Locations & Overweight/Obesity

By Age Group and Gender

Figure 7. Prevalence of Overweight/Obesity in Manitoba Children (age 2-11) by Gender & Combined Health Regions

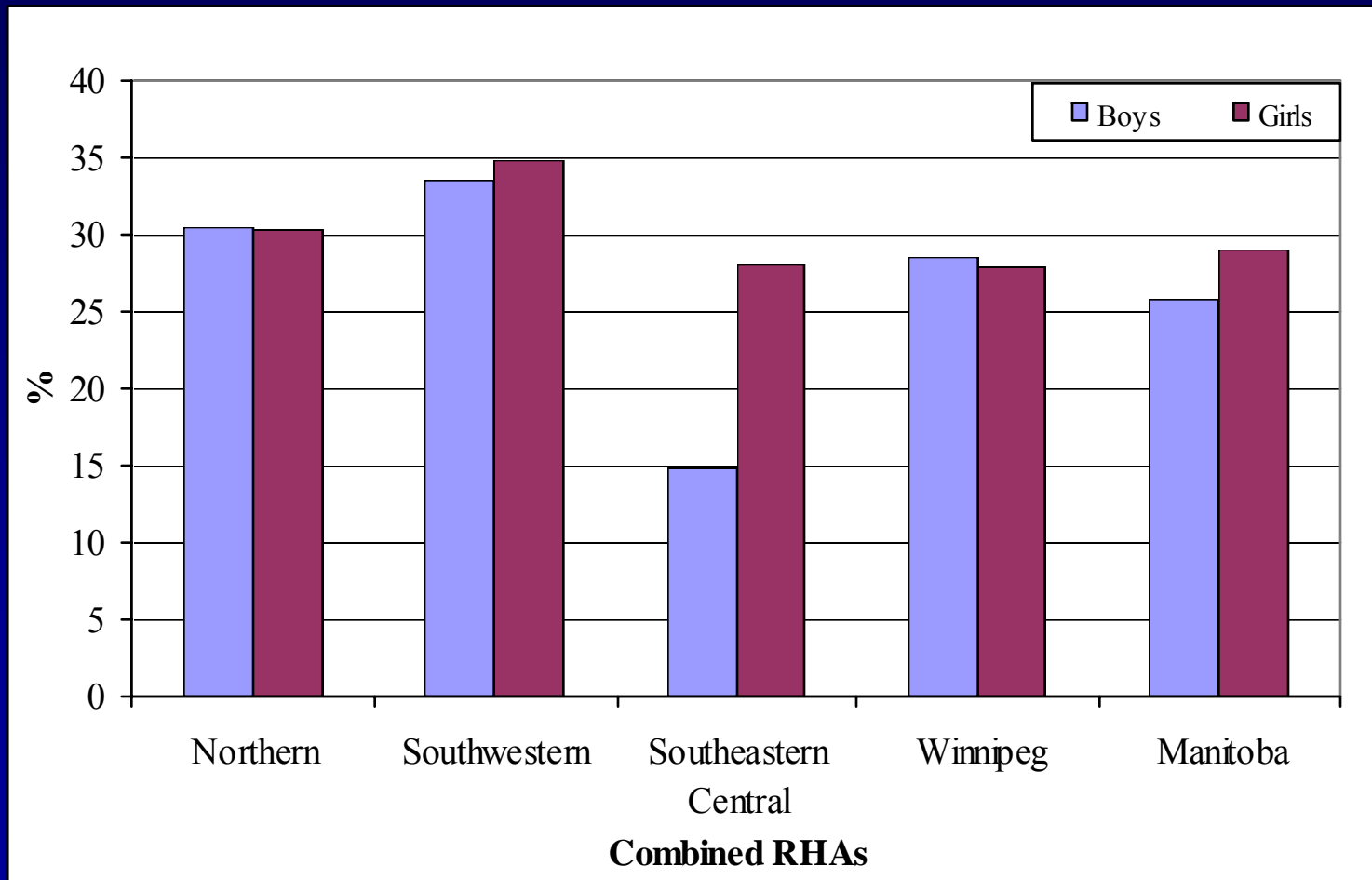


Figure 8. Prevalence of Overweight/Obesity in Manitoba Adolescents (age 12-17) by Combined Health Regions

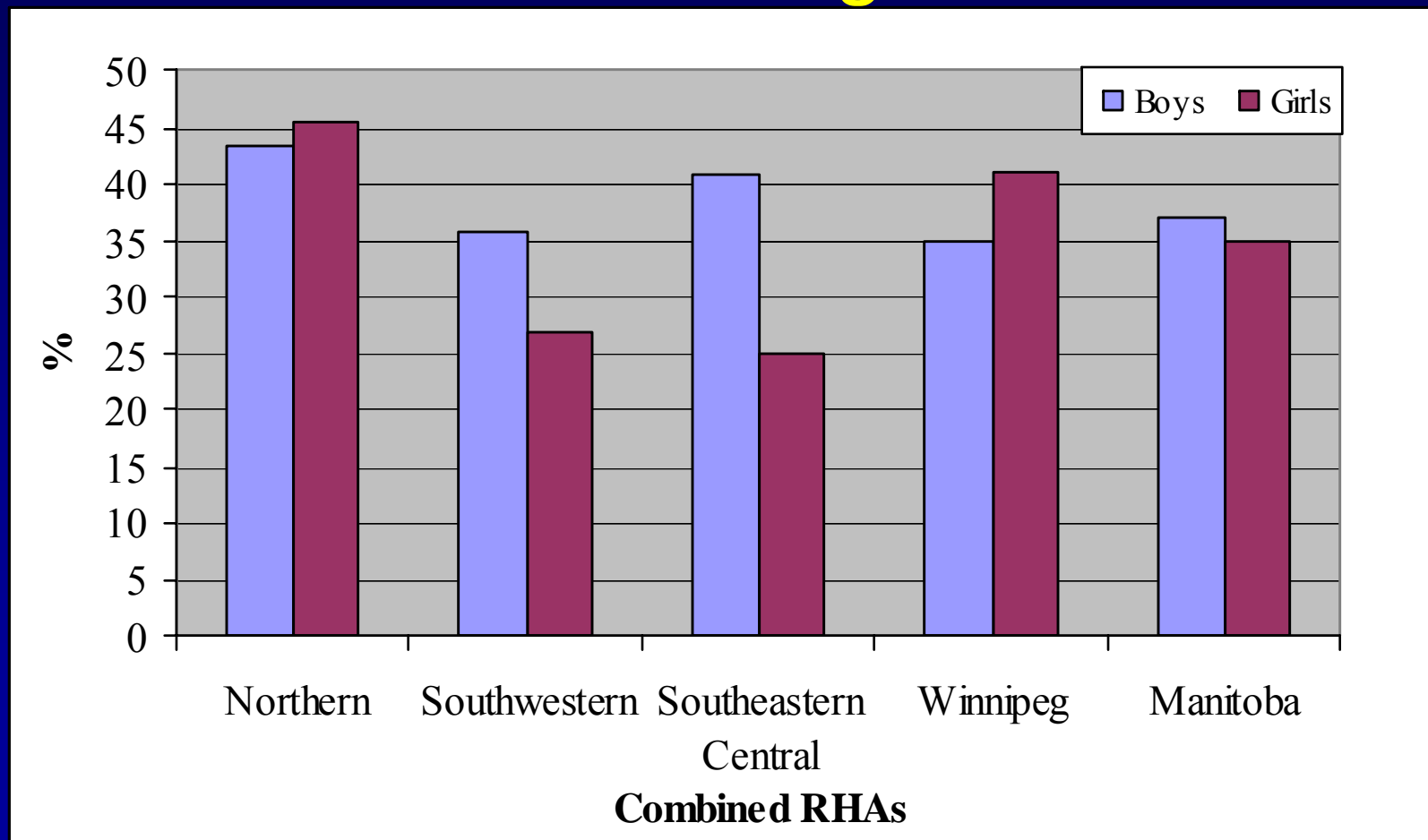


Table 4. Multivariable Logistic Regression Analyses on Overweight/Obesity Risk Factors in Manitoba Boys (age 2-11)

Risk Factor	Odds Ratio	95% Confidence Interval	p-value
Parental Education	0.97	0.06-2.43	NS
Income Adequacy	0.88	0.59-1.32	NS
Region of Residence ¹	1.46	1.10-1.94	0.01
Aboriginal Origin	2.30	0.74-7.12	NS

¹Reference Region=South western Manitoba

Table 5. Multivariable Logistic Regression Analyses on Overweight/Obesity Risk Factors in Manitoba Girls (age 2-11)

Risk Factor	Odds Ratio	95% Confidence Interval	p-value
Parental Education	0.62	0.36-1.08	NS
Income Adequacy	0.76	0.52-1.12	NS
Region of Residence ¹	1.10	0.83-1.47	NS
Aboriginal Origin	2.00	0.70-5.76	NS

¹Reference Region=South western Manitoba

Healthy Living & Overweight/Obesity

In Adolescents

Figure 9. Prevalence of Overweight/Obesity in Manitoba Adolescents (age 12-17) by Daily Physical Activity

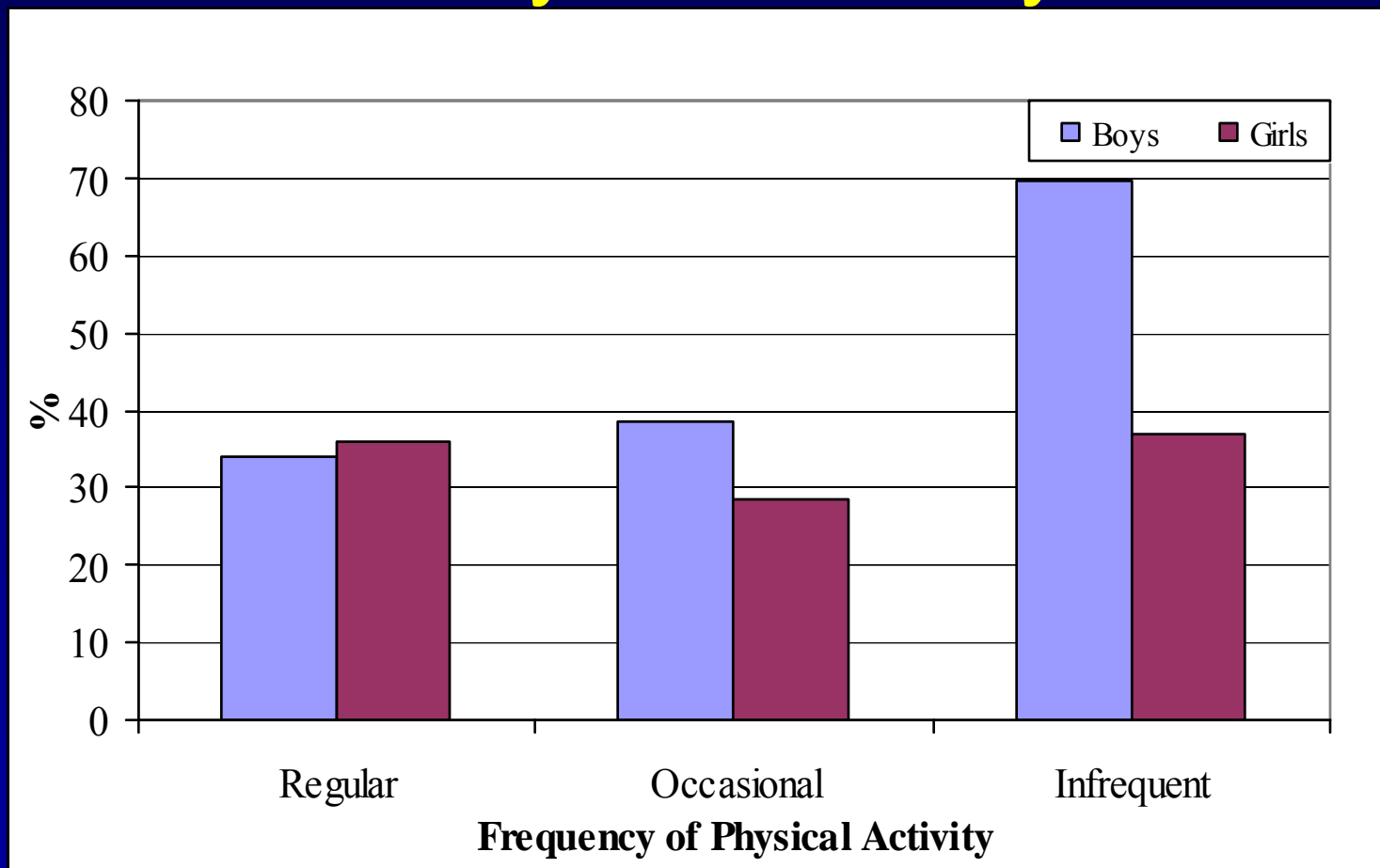


Figure 10. Prevalence of Overweight/Obesity in Manitoba Adolescents (age 12-17) by Weekly Sedentary Activity

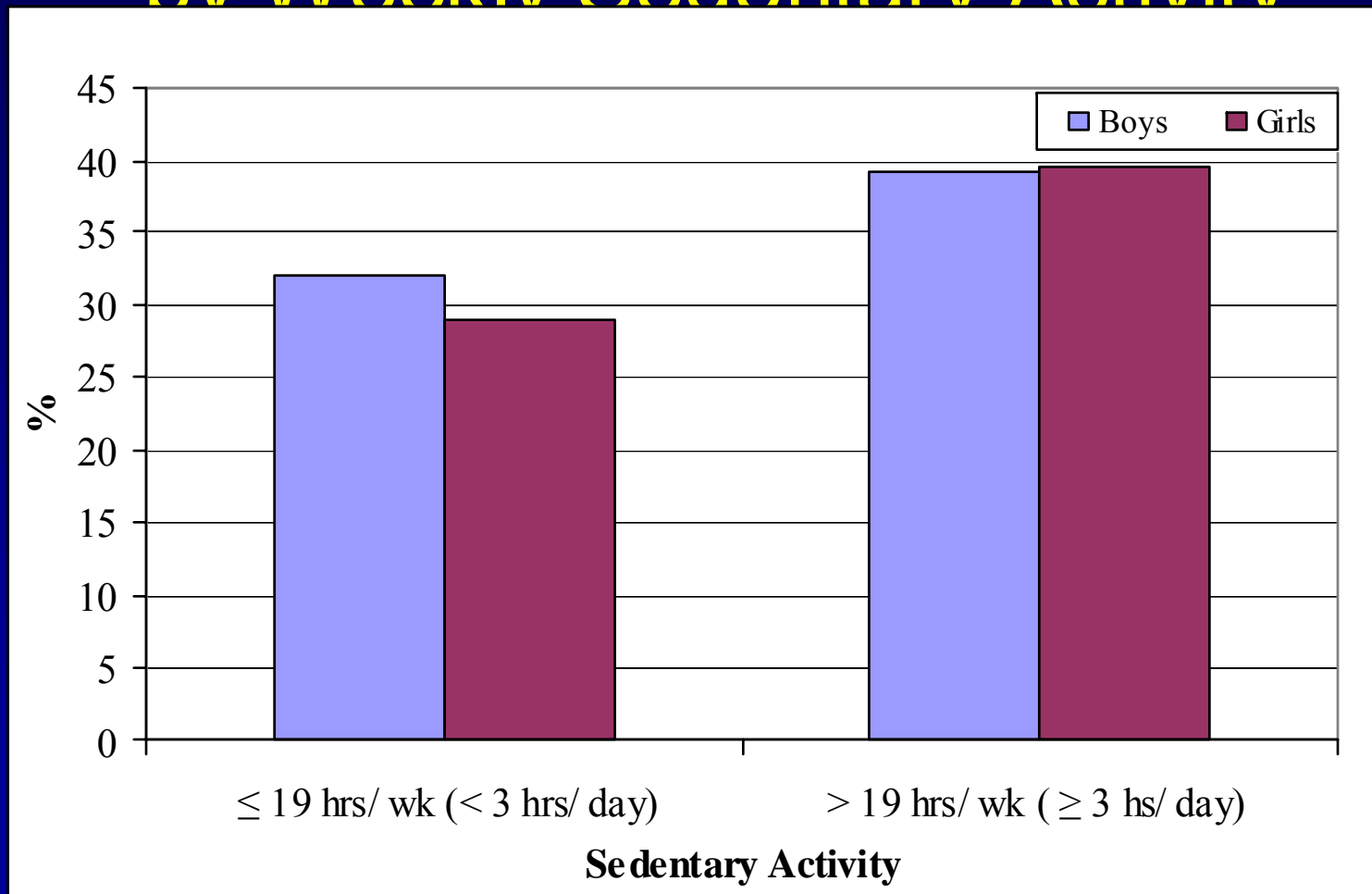


Figure 11. Prevalence of Overweight/Obesity in Manitoba Adolescents (age 12-17) by Daily Fruit/Vegetable Consumption

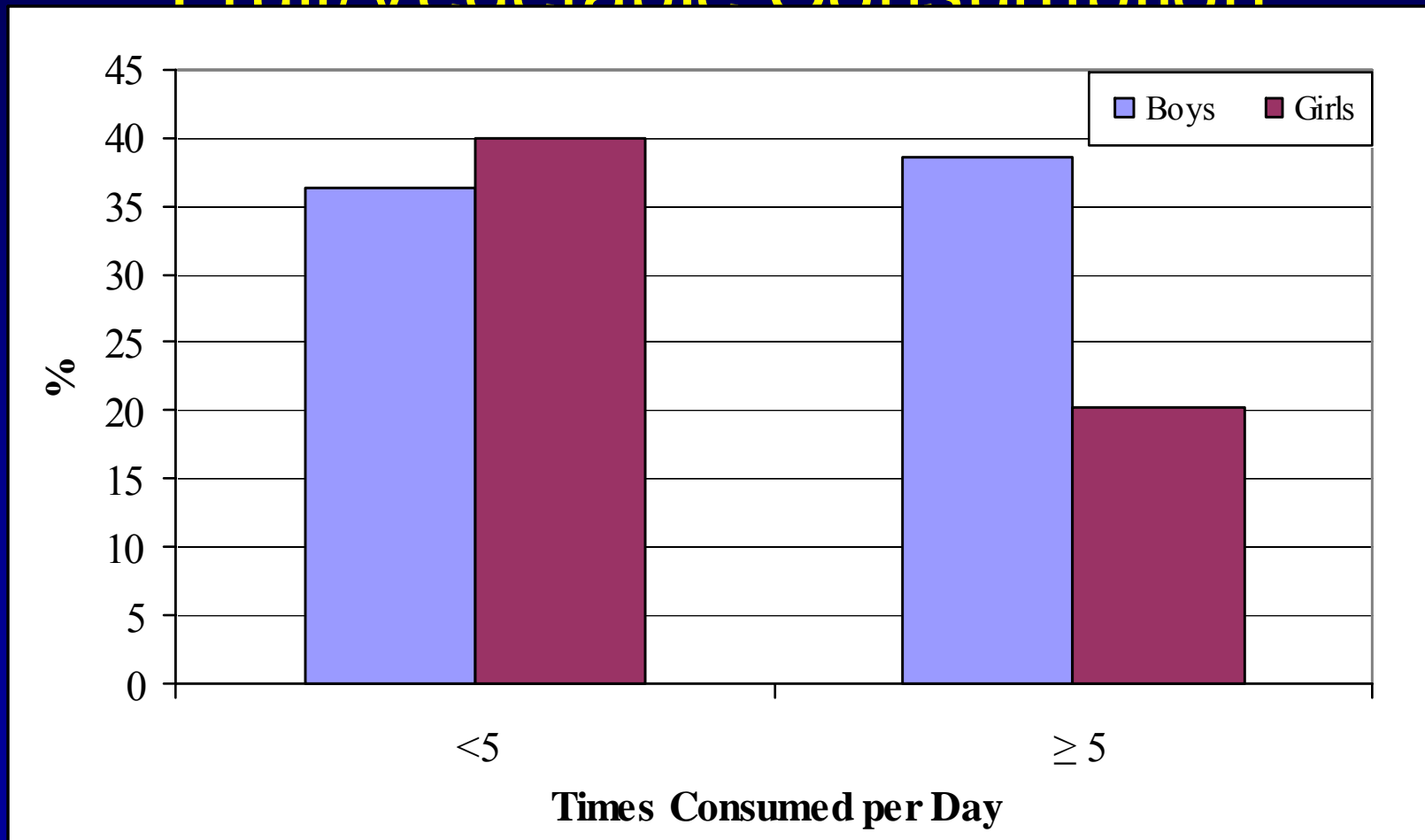


Table 6. Multivariable Logistic Regression Analyses on Overweight/Obesity Risk Factors in Manitoba Boys (age 12-17)

Risk Factor	Odds Ratio	95% Confidence Interval	p-value
Parental Education	0.83	0.60-1.22	NS
Regular Physical Activity ¹	0.23	0.05-1.09	0.06
Sedentary Activity ²	1.35	0.86-2.13	NS
≥ 5 Fruits/ Veg per Day ³	1.10	0.32-3.83	NS

¹ Regular and occasional physical activities lasting > 15 minutes per time.

² Sedentary behaviour ≤ 19 hours or ≥ 20 hours per week in past 3 months.

³ Consumption of fruits and vegetables ≥ 5 times per day.

Table 7. Multivariable Logistic Regression Analyses on Overweight/Obesity Risk Factors in Manitoba Girls (age 12-17)

Risk Factor	Odds Ratio	95% Confidence Interval	p-value
Parental Education	0.67	0.43-1.02	0.06
Regular Physical Activity ¹	0.91	0.24-3.47	NS
Sedentary Activity ²	1.45	1.04-2.02	0.03
≥ 5 Fruits/ Veg per Day ³	0.38	0.14-1.02	0.06

¹ Regular and occasional physical activities lasting > 15 minutes per time.

² Sedentary behaviour ≤ 19 hours or ≥ 20 hours per week in past 3 months.

³ Consumption of fruits and vegetables ≥5 times per day.

Summary: Overall Prevalence

- Nearly 1/3 of Manitoba children aged 2-17 (31%) are overweight or obese. Or, nearly 1/4 of Manitoba children (22%) are overweight and almost one in ten Manitoba children (9%) are obese.
- The prevalence of overweight/ obesity in Manitoba children increases with age, from 23% for children 2-5 years old, to 29% for 6-11 year olds and to 35% for 12-17 year olds.

Summary: Social Economic Status

- The prevalence of overweight/ obesity decreases as parental education and household income increases.
- Over 40% of children from food insecure households are overweight/ obese.
- Gender:
 - Boys from food insecure households are twice as likely to be overweight/ obese as compared to boys from food secure homes.
 - Parental education significantly affects the prevalence of overweight/obesity in girls, but not in boys.

Summary: Geographic Location

- 2 – 11 Age Group:
 - Boys who live in south eastern and central Manitoba have relatively lower risk for being overweight or obese.
- 12 – 17 Age Group:
 - Data showed a north to south decrease in the prevalence of overweight/obesity among Manitoba adolescents, but this trend did not reach statistical significance due to small sample size.

Summary:

Healthy Living in Adolescents

- Boys:
 - Regular physical activity reduces the risk of being overweight/obese.
- Girls:
 - Being more sedentary increases the risk of being overweight/obese;
 - Consuming fruits and vegetables more than 5 times per day has protective effect on healthy weight.

Conclusion: High Risk Sub-populations

- Boys living in food insecure households.
- Girls whose parents had not completed high school.
- Adolescent girls who are more sedentary and/or consume fruits and vegetables less than 5 times per day.
- Adolescent boys who are infrequently physically active.

Conclusion: Policy Implications

- The identification of risk factors among specific populations is beneficial in tailoring public health policies and programs for prevention/ intervention of childhood obesity.

Strengths

- Measured heights and weights
- Sub-provincial (regional) analyses
- Associations identified between obesity and:
 - Gender
 - Age
 - Food Insecurity

Limitations

- Many self- or proxy-reported data
- Cross-sectional
- Some small sample sizes
- Physical and sedentary modules may not fully represent children's habits
- Vegetable, fruit and juice consumption based on frequency, not quantity

Future Directions

- Increase awareness/ promotion of obesity prevention
 - Media, language, style of approach
- Strategies/ policies
 - Targeting high-risk groups
 - Addressing health determinants
 - Creating healthy environments to support healthy living

Acknowledgements

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Manitoba Government Initiatives for Active Living, Chronic Disease Prevention and Healthy Eating

Chronic Disease Prevention Initiative	Develop community-led activities to address chronic disease risk factors in 60 communities
Healthy Schools	Promote healthy lifestyles and activities that promote lifelong wellness
Food in Schools	Help school communities develop and implement nutrition policies
In-Motion	Help Manitobans make physical activity part of their daily lives for health and enjoyment
Healthy Child Manitoba	Works with families to support their children within strong communities to help children reach their potential
Northern Healthy Foods Initiative	Works with northern communities to develop community gardens, create greenhouses, develop food focused business and nutrition awareness

Summary of Regional Policies, Programs and Activities Related to Healthy Weights and Obesity

- Pre- & postnatal nutrition education for parents
- Family-focused activities
- Community-based nutrition activities
- Preschool literacy- & healthful eating programs
- Day care menu reviews
- Wellness fairs for parents of preschoolers
- Nutrition counseling by dietitians
- School partnerships
- Recreation centre partnerships
- Participate in health professional and community networks to facilitate partnerships & planning